

Quality Audits

2021-22

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SNDT Women's University
Mumbai - 20

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Mukhtangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SNDT/21-22/01

Date: 11/6/2022

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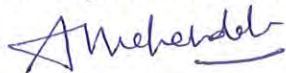
This is to certify that we have conducted Energy Audit at SNDT Women's University Mumbai's Churchgate. Juhu and Pune Campuses in the year 2021-22.

The University has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of BEE STAR Rated Equipment
- Installation of 500 kWp Roof Top Solar PV Plant.
- Installation of 16000 LPD Solar Thermal Water Heating System at Hostel blocks.

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,
Certified Energy Auditor
EA-8192




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SNDT Women's University

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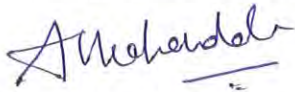
This is to certify that we have conducted Green Audit at SNDT Women's University Mumbai's Churchgate. Juhu and Pune Campuses in the year 2021-22.

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 Plastic Free Campus, 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,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788



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SNDT Women's University

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Yashashree, 26, Nirmal Bag Society,
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Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SNDT/21-22/03

Date: 11/6/2022

CERTIFICATE

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 2021-22

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
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For Engress Services,



A Y Mehendale,

Certified Energy Auditor, EA-8192

ASSOCHAM GEM Certified Professional: GEM: 22/788



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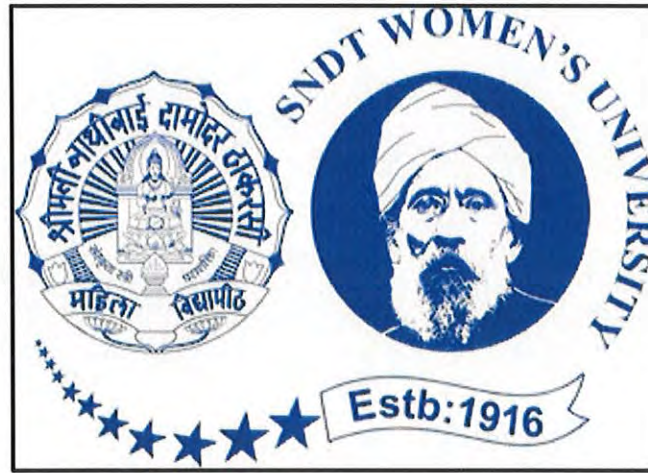
SNDT Women's University

ENERGY AUDIT REPORT

of

SNDT WOMEN'S UNIVERSITY

Mumbai 400 020



Year: 2021-22

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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REGISTRATION CERTIFICATES

Regn. No. EA-8192 No. 2942



National Productivity Council
(National Certifying Agency)

PROVISIONAL CERTIFICATE

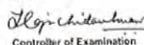
This is to certify that Mr. / Mr. Achyut Yashavant Melhendale
son / daughter of Mr. Yashavant
has passed the National Certification Examination for Energy Auditors in April- 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfilment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India
Date : 10th August 2007


Controller of Examination

AUDITOR CERTIFICATE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY



Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra-411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.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 Ugress Services
Yashshree, 26, Nirmal Bag Society,
Near Mukangan English School,
Parvati, Pune - 411 009.

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

Registration Number : MEDA/ECN/2022-23/Class A/EA-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 empanelment 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)

MEDA REGISTRATION CERTIFICATE



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Registrar

SNTD Women's University
Mumbai - 20.

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: 2021-22.

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 Energy Consumption & CO₂ Emissions:

No	Parameter/ Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	823614	741.25
2	Maximum	85098	76.59
3	Minimum	55694	50.12
4	Average	68634.50	61.77

3. Measures adopted for Energy Conservation:

- Usage of LED Lights
- Usage of BEE STAR Rated equipment
- Installation of **500 kWp** Roof Top Solar PV Plant.
- Installation of **16000 LPD** Solar Thermal Water Heating System.

4. Usage of Alternate/Renewable Energy:

- The University has installed **500 kWp** Roof Top Solar PV Plant.
- Electrical Energy generated by Solar PV Plant in 21-22 is **557535 kWh**.
- Energy Purchased in 21-22 is **266079 kWh**.
- Total Annual Energy Requirement in 21-22 is **823614 kWh**.
- The percentage of Alternate Energy to Annual Energy requirement is **67.69 %**.

5. Usage of LED Lighting:

- The LED Lighting Load of the University is **33.77 kW**.
- The Total Lighting Load of the University is **216.01 kW**.
- The % of LED to the total annual lighting power requirement works out to be **15.63 %**

6. Assumption:

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

7. Reference:

1. For Computation of CO₂ Emissions: www.tatapower.com



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ABBREVIATIONS

AC	: Air conditioner
SNTD	: Shreemati Nathibai Damodar Thackersey
D/L	: Down Lighter
FTL	: Fluorescent Tube Light
LED	: Light Emitting Diode
kWh	: kilo-Watt Hour
kWp	: Kilo Watt Peak
Qty	: Quantity
W	: Watt
kW	: Kilo Watt
PC	: Personal Computer
MT	: Metric Ton



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CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study the Connected Load
2. To Study Present level of Energy Consumption
3. To compute the present CO₂ emissions
4. To study Usage of Renewable Energy
5. To study usage of LED Lighting

1.2 General Details of University:

Table No 1: General Details of University

No	Head	Particulars
1	Name	SNDT Women's University
2	Address	1, Nathibai Thackersey Road, Mumbai 400 020
3	Campuses Under Study	1) Churchgate Campus, Mumbai 2) Juhu Campus, Mumbai 3) Pune Campus
4	Year of Establishment	1916



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CHAPTER-II

STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

Table No 2: Details of Connected Load of Churchgate Campus:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	1414	40	56.56
2	20 W LED Fitting	101	20	2.02
3	Ceiling Fan	854	52	44.41
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			338.76

Chart No 1: Connected Load of Churchgate Campus:

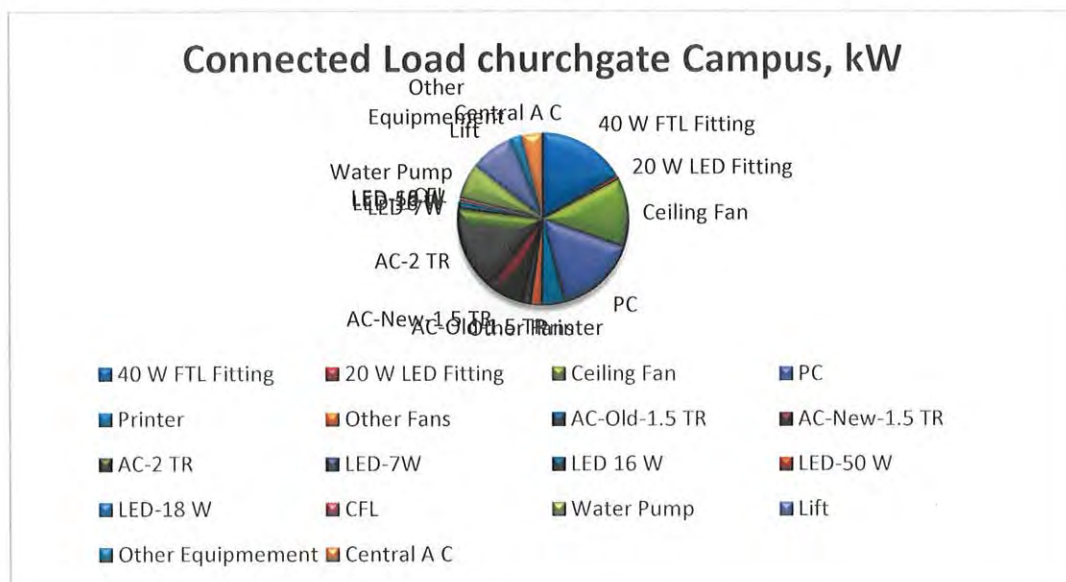


Table No 3: Details of Connected Load of Juhu Campus:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	2681	40	107.24
2	20 W LED Fitting	466	20	9.32
3	40 W LED Fitting	19	40	0.76
4	16 W LED Fitting	51	16	0.816
5	18 W LED Fitting	78	18	1.404
6	22 W Led Fitting	23	22	0.506
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	27	1800	48.6
14	Lift	3	5595	16.78
15	Water Pumps	1	11190	11.19
16	Other Equipment	50	150	7.5
17	Total			577.07

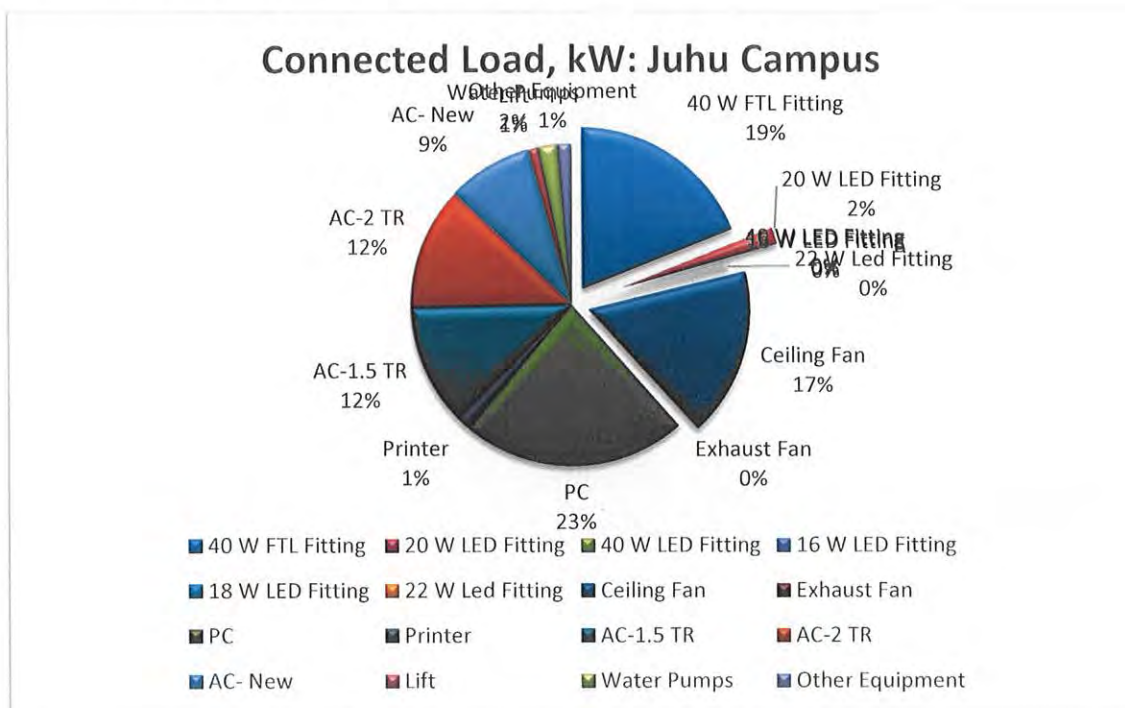
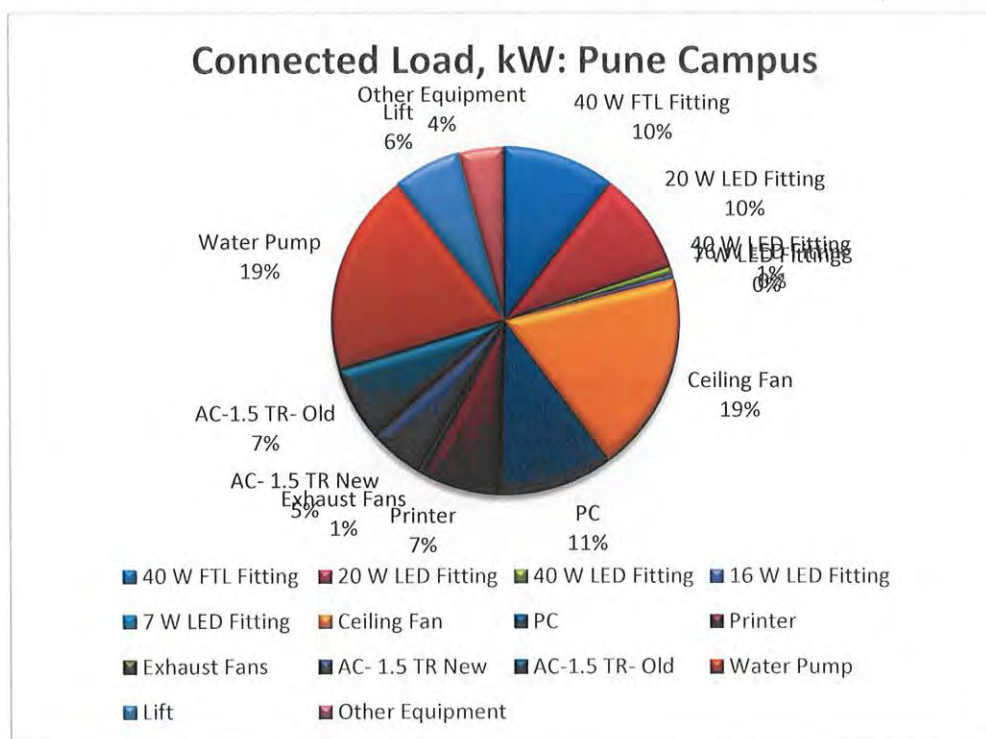
Chart No 2: Connected Load of Juhu Campus:

Table No 4: Details of Connected Load of Pune Campus:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	461	40	18.44
2	20 W LED Fitting	840	20	16.8
3	40 W LED Fitting	30	40	1.2
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	50	150	7.5
15	Total			177

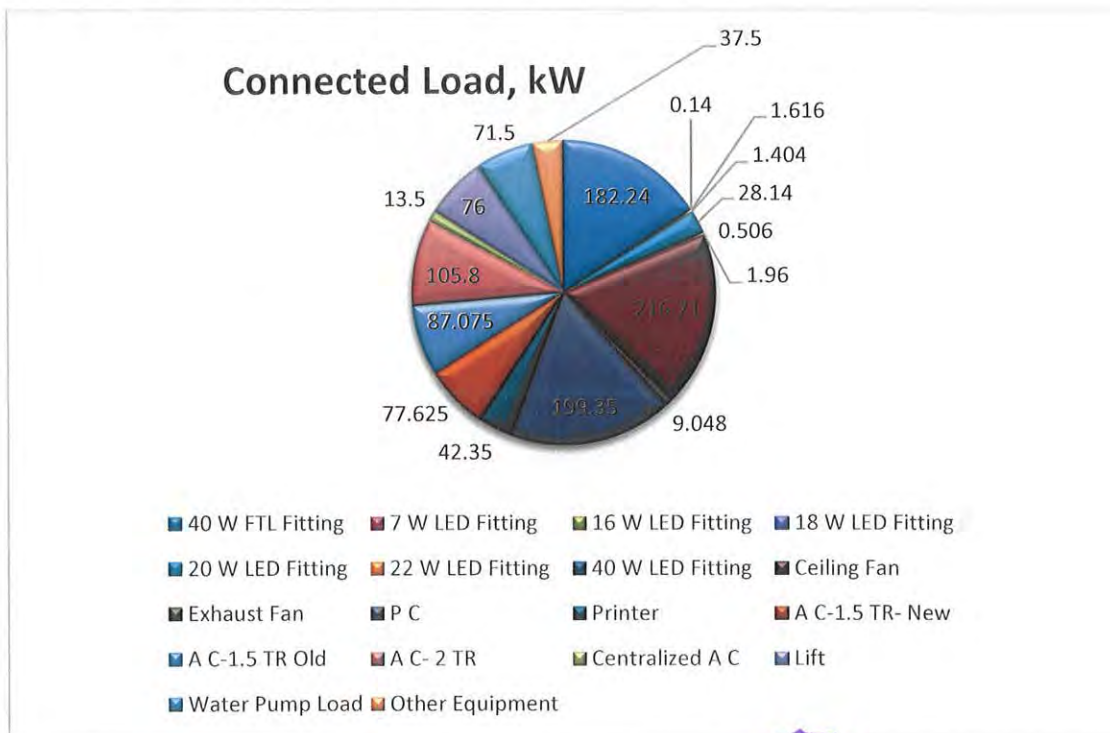
Chart No 3: Connected Load of Pune Campus:

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Table No 5: Details of Overall Connected Load of All Three Campuses:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	4556	40	182.24
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	1407	20	28.14
6	22 W LED Fitting	23	22	0.506
7	40 W LED Fitting	49	40	1.96
8	Ceiling Fan	3334	65	216.71
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	45	1725	77.625
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	150	250	37.5
19	Grand Total			1171.46

Chart No 4: Total Connected Load of All Three Campuses:

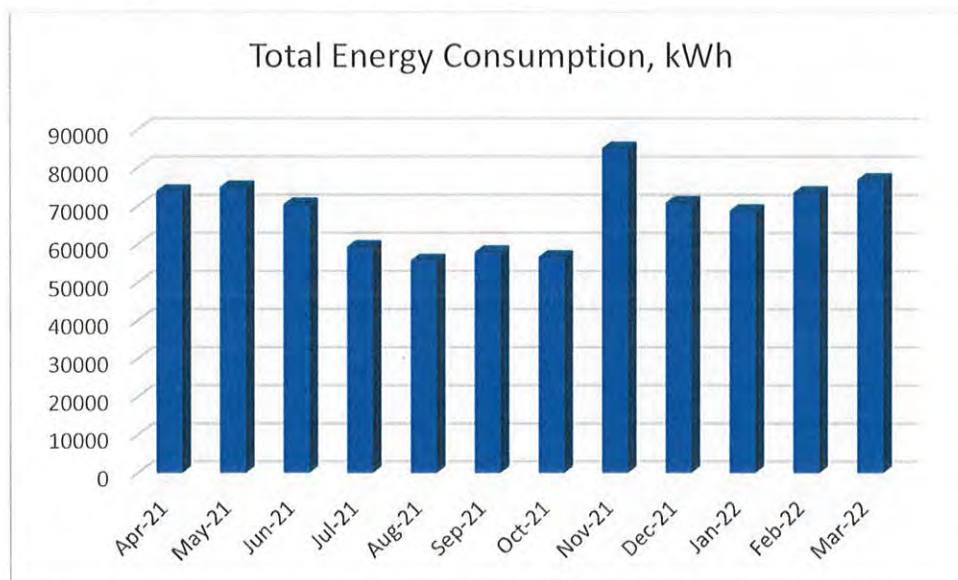


CHAPTER-III**STUDY OF PRESENT ENERGY CONSUMPTION**

In this chapter, we present the consumption of Electrical Energy of all three campuses for the Academic Year: 2021-22.

Table No 6: Study of Consumption of Electrical Energy: 2021-22:

No	Month	Churchgate			Pune	Juhu-1	Juhu-2	Total Energy Consumed, kWh
		M-1	M-2	M-3		M-1	M-2	
1	Apr-21	4639	4046	5581	5986	3606	50025	73883
2	May-21	3525	3077	3501	6005	3528	55244	74880
3	Jun-21	2509	2767	3112	6301	3228	52466	70383
4	Jul-21	3821	3085	3574	5933	3432	39419	59264
5	Aug-21	3972	3241	3378	5697	3750	35656	55694
6	Sep-21	3697	2739	2991	6467	4020	37965	57879
7	Oct-21	3580	3004	3408	7453	4080	35091	56616
8	Nov-21	4705	4174	4541	5865	4152	61661	85098
9	Dec-21	4426	3360	4281	7378	5964	45434	70843
10	Jan-22	4821	3264	4748	6379	5316	44187	68715
11	Feb-22	3644	2724	3680	6515	4764	52146	73473
12	Mar-22	4490	2754	4377	9446	7578	48241	76886
13	Total	47829	38235	47172	79425	53418	557535	823614
14	Maximum	4821	4174	5581	9446	7578	61661	85098
15	Minimum	2509	2724	2991	5697	3228	35091	55694
16	Average	3985.75	3186.25	3931	6618.75	4451.5	46461.3	68634.50

Chart No 5: Study of variation of Monthly Electrical Energy Consumption, kWh:

CHAPTER-IV

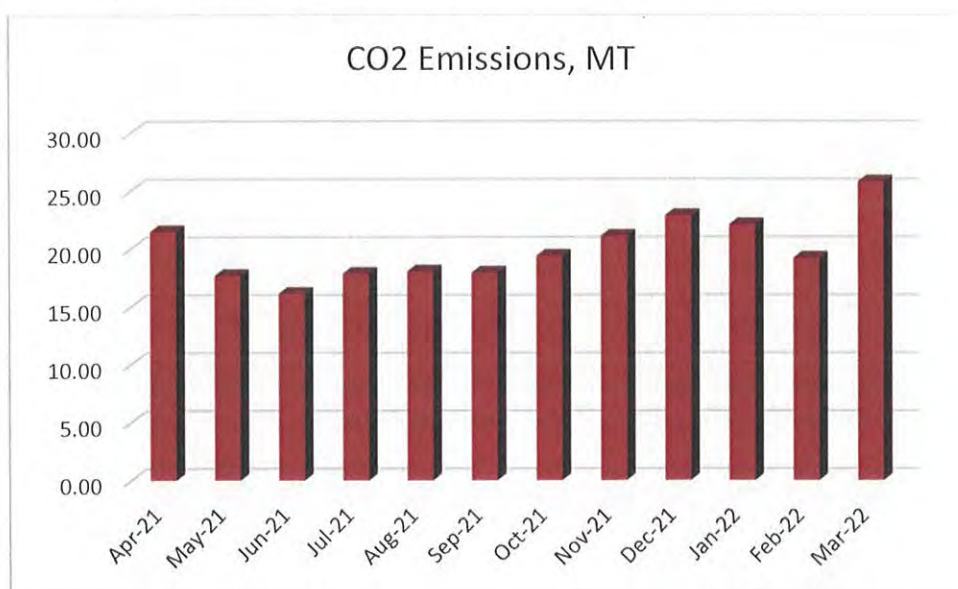
STUDY OF CARBON FOOTPRINTING

A **Carbon Foot print** is defined as the Total Greenhouse Gas Emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions:** 1 Unit kWh of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere.

Table No 7: Month wise CO₂ Emissions:

No	Month	Total Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	21.47	21.47
2	May-21	17.67	17.67
3	Jun-21	16.13	16.13
4	Jul-21	17.86	17.86
5	Aug-21	18.03	18.03
6	Sep-21	17.92	17.92
7	Oct-21	19.37	19.37
8	Nov-21	21.09	21.09
9	Dec-21	22.87	22.87
10	Jan-22	22.08	22.08
11	Feb-22	19.19	19.19
12	Mar-22	25.78	25.78
13	Total	239.47	239.47
14	Maximum	25.78	25.78
15	Minimum	16.13	16.13
16	Average	19.96	19.96

Chart No 6: Representation of Month wise CO₂ Emissions:



CHAPTER-V

STUDY OF USAGE OF ALTERNATE ENERGY

The University has installed Roof Top Solar PV Plant, on various buildings at Juhu Campus. The total Capacity of Solar Plant is 500 kWp.

In this Chapter, we compute the % of Usage of Alternate Energy to Total Energy Consumed.

Table No 8: Computation of Usage of Alternate Energy to Annual Power requirement:

No	Particulars	Value	Unit
1	Annual Energy purchased	266079	kWh
2	Annual Energy Generated by 500 kWp Solar PV Plant	557535	kWh
3	Annual Energy Demand = (1) + (2)	823614	kWh
4	% of Alternate Energy to Annual Energy Demand = (2) *100 / (3)	67.69	%

Photograph of Roof Top Solar PV Plant:



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CHAPTER VI

STUDY OF USAGE OF LED LIGHTING

In the following Table, we present the percentage of annual Lighting load met by LED lights.

Table No 9: Computation of % of Annual LED Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fitting	4556	Nos
2	Load/unit of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fittings	182.24	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	1407	Nos
14	Load/unit of 20 W LED Fitting	20	W/unit
15	Total Load of 20 W LED Fittings	28.14	kW
16	No of 22 W LED Fitting	23	Nos
17	Load/unit of 22 W LED Fitting	22	W/unit
18	Total Load of 22 W LED Fittings	0.506	kW
19	No of 40 W LED Fitting	49	Nos
20	Load/unit of 40 W LED Fitting	40	W/unit
21	Total Load of 40 W LED Fittings	1.96	kW
22	Total LED Lighting Load=6+9+12+15+18+21	33.77	kW
23	Total Lighting Load=3+6+9+12+15+18+21	216.01	kW
24	% of LED to Total Lighting Load = $22 \times 100 / 23$	15.63	%



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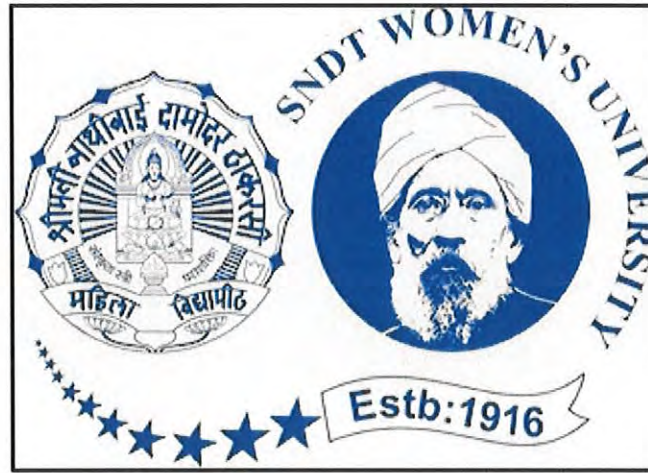
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GREEN AUDIT REPORT

of

SNDT WOMEN'S UNIVERSITY

Mumbai 400 020



Year: 2021-22

Prepared by

ENGRESS SERVICES

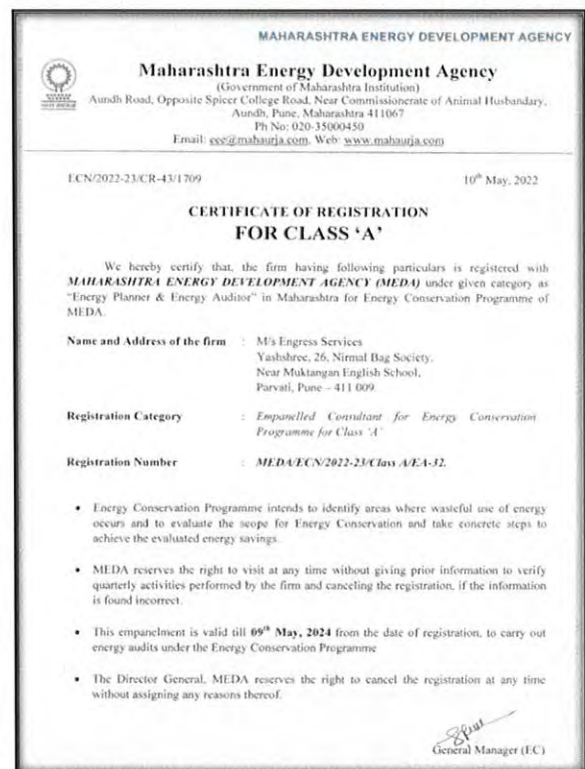
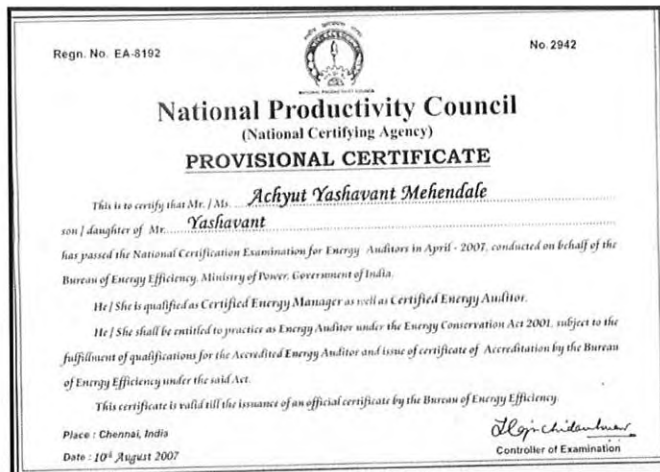
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Near Mukhtangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: enrichcons@gmail.com



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MEDA EMPANELMENT CERTIFICATE



ASSOCHAM GEM CP CERTIFICATE



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Mumbai - 20.

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Page 4

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1	Total	823614	741.25
2	Maximum	85098	76.59
3	Minimum	55694	50.12
4	Average	68634.50	61.77

3. Various measures adopted for Energy Conservation:

- Usage of Energy Efficient LED Lights
- Usage of BEE STAR Rated Equipment
- Installation of **500 kWp** Roof Top Solar PV Plant.
- Installation of **16000 LPD** Solar Thermal Water Heating System.

4. Usage of Renewable Energy & CO₂ Emission Reduction:

- The University has installed **500 kWp** Roof Top Solar PV Plant.
- Annual Energy generated by Roof Top Solar PV Plant is **557535 kWh**.
- The reduction in Annual CO₂ Emissions is **501.78 MT**.

5. Waste Management:

5.1 Solid Waste Management:

The Waste is segregated at source. Waste Bins are kept at various locations.

5.2 Organic Waste Management:

The University has made provision of a Bio Composting Bed and Bio Tumbler unit for conversion of Organic Waste.

5.3 Sanitary Waste management:

The University has made provision of Sanitary waste Incinerator.

6. Rain Water Management:

The University has implemented Rain Water Management Project at all Campuses. The Rain Water is collected through Pipes and is used to increase the Underground Water Table.

7. Green and Sustainable Practices:

- Good Internal Roads

- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of Awareness on Ban on Single Use Plastic, by Display of posters

8. Assumption:

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

9. Reference:

1. For Computation of CO₂ Emissions: www.tatapower.com



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ABBREVIATIONS

SNTD	:	Shreemati Nathibai Damodar Thackersey
LPD	:	Liters Per Day
MT	:	Metric Ton
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
kWp	:	Kilo Watt Peak
Qty	:	Quantity
kW	:	Kilo Watt



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CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study Present Energy Usage
2. To Study CO₂ Emissions
3. To study usage of Renewable Energy
4. To study Waste Management practices
5. To study Rain Water Harvesting
6. To study Green & Innovative Practices
7. To study Biodiversity of Plants

1.2 General Details of University:

Table No 1: General Details:

No	Head	Particulars
1	Name	SNTD Women's University
2	Address	1, Nathibai Thackersey Road, Mumbai 400 020
3	Campuses Under Study	1) Churchgate Campus, Mumbai 2) Juhu Campus, Mumbai 3) Pune Campus
4	Year of Establishment	1916



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CHAPTER-II

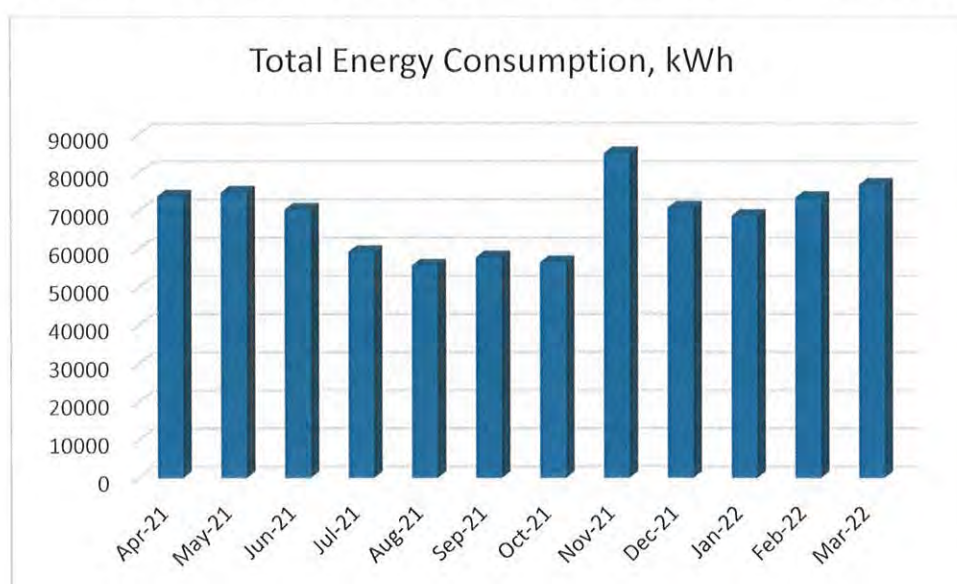
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the consumption of Electrical Energy for the Year: 2021-22.

Table No 2: Study of Consumption of Electrical Energy: 2021-22:

No	Month	Campus Wise Energy Consumed, kWh			Total Energy Consumption, kWh
		Churchgate	Juhu	Pune	
1	Apr-21	14266	53631	5986	73883
2	May-21	10103	58772	6005	74880
3	Jun-21	8388	55694	6301	70383
4	Jul-21	10480	42851	5933	59264
5	Aug-21	10591	39406	5697	55694
6	Sep-21	9427	41985	6467	57879
7	Oct-21	9992	39171	7453	56616
8	Nov-21	13420	65813	5865	85098
9	Dec-21	12067	51398	7378	70843
10	Jan-22	12833	49503	6379	68715
11	Feb-22	10048	56910	6515	73473
12	Mar-22	11621	55819	9446	76886
13	Total	133236	610953	79425	823614
14	Maximum	14266	65813	9446	85098
15	Minimum	8388	39171	5697	55694
16	Average	11103	50912.75	6618.75	68634.50

Chart No 1: Study of variation of Monthly Electrical Energy Consumption, kWh:



CHAPTER-III

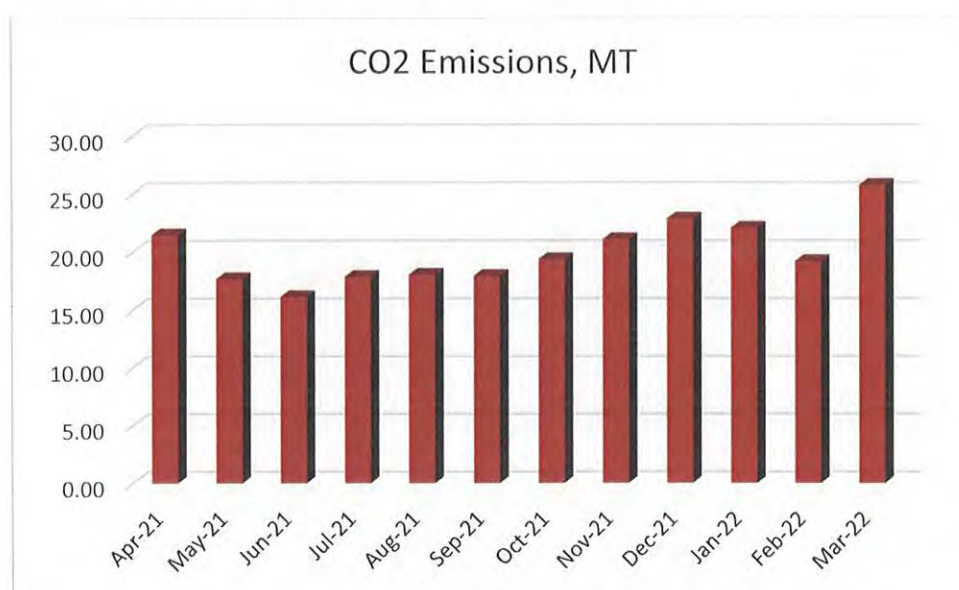
STUDY OF CO₂ EMISSIONS

A **Carbon Foot print** is defined as the Total Greenhouse Gas Emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions:** 1 Unit kWh of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere

Table No 3: Month wise CO₂ Emissions:

No	Month	Total Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	23858	21.47
2	May-21	19636	17.67
3	Jun-21	17917	16.13
4	Jul-21	19845	17.86
5	Aug-21	20038	18.03
6	Sep-21	19914	17.92
7	Oct-21	21525	19.37
8	Nov-21	23437	21.09
9	Dec-21	25409	22.87
10	Jan-22	24528	22.08
11	Feb-22	21327	19.19
12	Mar-22	28645	25.78
13	Total	266079	239.47
14	Maximum	28645	25.78
15	Minimum	17917	16.13
16	Average	22173.3	19.96

Chart No 2: Representation of Month wise CO₂ Emissions:



CHAPTER-IV

STUDY OF USAGE OF RENEWABLE ENERGY

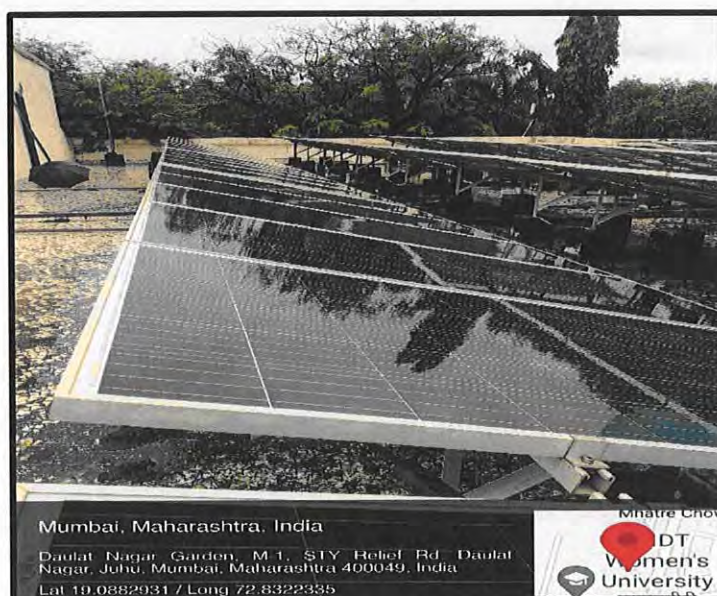
The University has installed Roof Top Solar PV Plant, on various buildings at Juhu Campus. The total Capacity of Solar Plant is 500 kWp.

In the following Table, we present the Annual Reduction in CO₂ Emissions.

Table No 4: Computation of Reduction in Annual CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Solar PV Plant Capacity	500	kWp
2	Annual Electrical Energy generated by Solar PV Plant	557535	kWh
3	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO ₂
4	Annual Reduction in CO₂ Emissions= (2) *(3)/1000	501.78	MT

Photograph of Roof Top Solar PV Plant:



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CHAPTER-V

STUDY OF WASTE MANAGEMENT

5.1 Solid Waste Management:

The Waste is segregated at source. Waste collection bins are placed at various locations to collect the Waste.

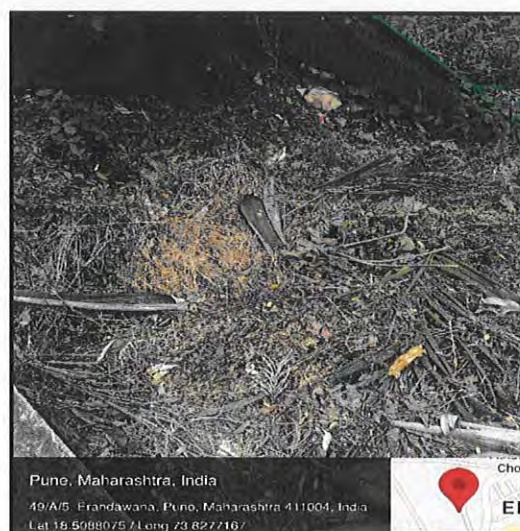
Photograph of Waste Collection Bin (Churchgate campus):



5.2 Organic Waste Management:

The University has made provision of a Bio Composting Bed, for conversion of Organic Waste.

Photograph of Bio Composting Bed (Pune campus):

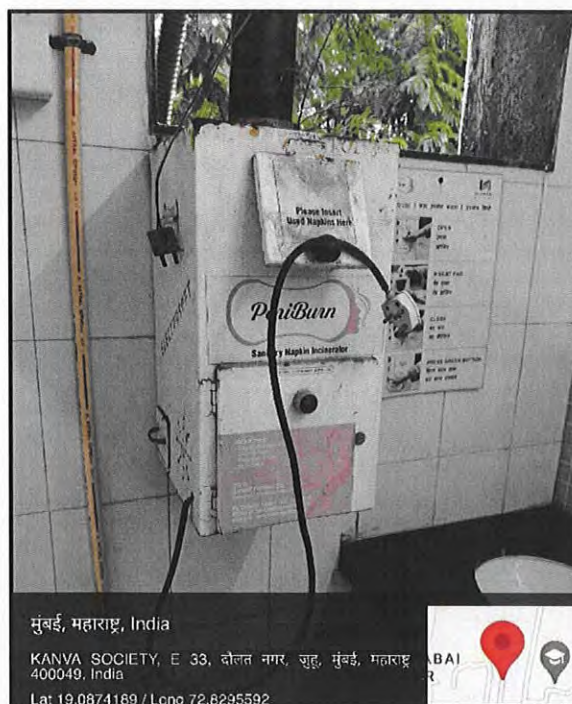


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5.3 Sanitary Waste management:

The University has made provision of Sanitary waste Incinerator.

Photograph of Sanitary Waste Incinerator (Juhu campus):



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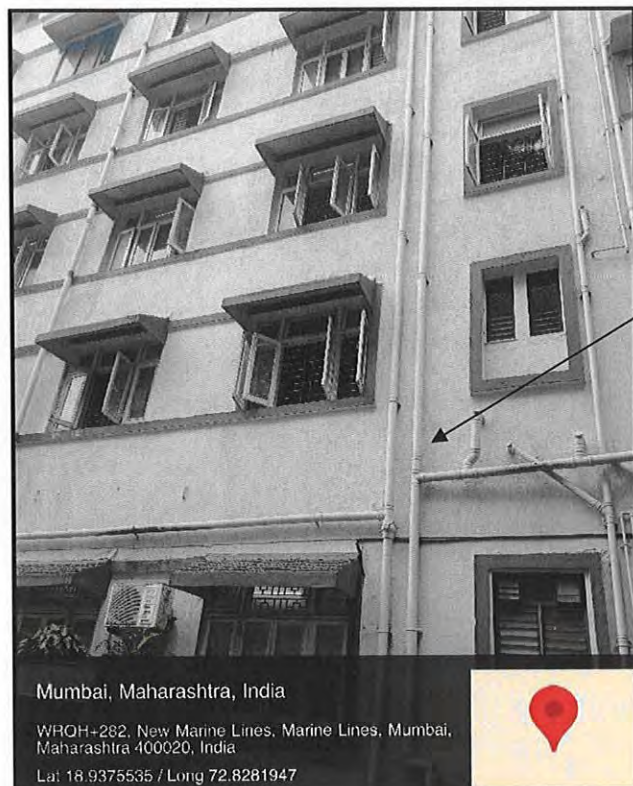
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CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

The University has implemented Rain Water Management Project at all 3 Campuses. The Rain Water is collected is used to increase the Underground Water Table.

Photograph of Rain Water Collecting Pipe at Churchgate campus:



Rain Water
Collecting Pipe



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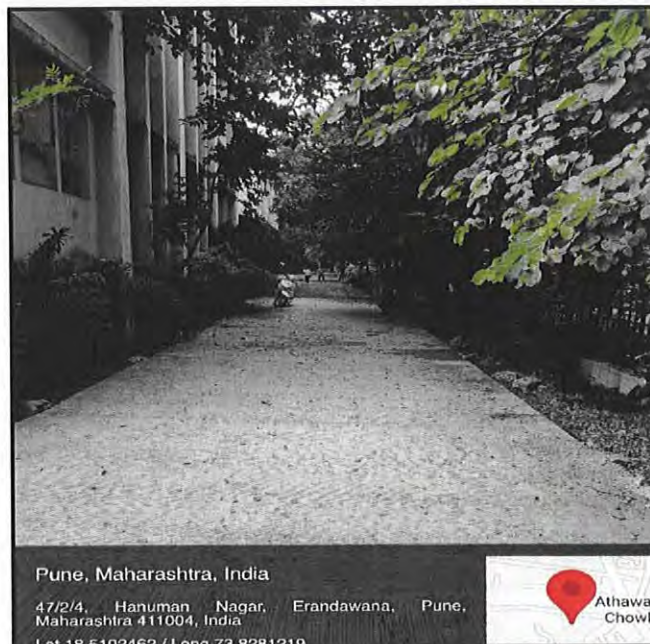
CHAPTER-VII

STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Internal Roads:

For easy movement of commuters, in the campus, the University has maintained good internal roads, within the campus. For pedestrians, separate foot paths are constructed.

Photograph of Internal Road at Pune Campus:



7.2 Internal Tree Plantation:

The University has well maintained Lawn and Tree Plantation.

Photograph of Lawn & Tree Plantation at Juhu Campus:



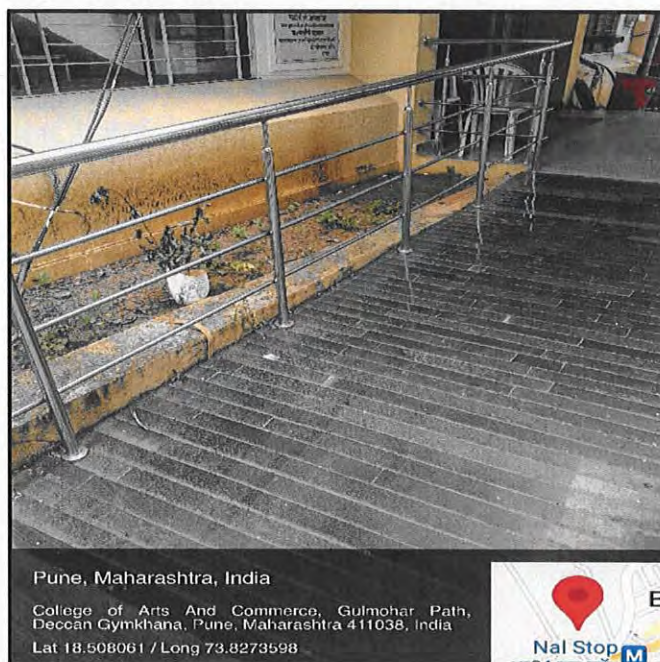
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7.3 Provision of Ramp for Divyangajan:

The University has made provision of Ramp, for easy movement of Divyangajan.

Photograph of Ramp (Pune Campus):



7.4 Creation of Awareness by Display of Posters:

The University has displayed posters to ban the usage of Single Use Plastic in the campus.

Photograph of Poster on Ban the usage of Single Use Plastic:



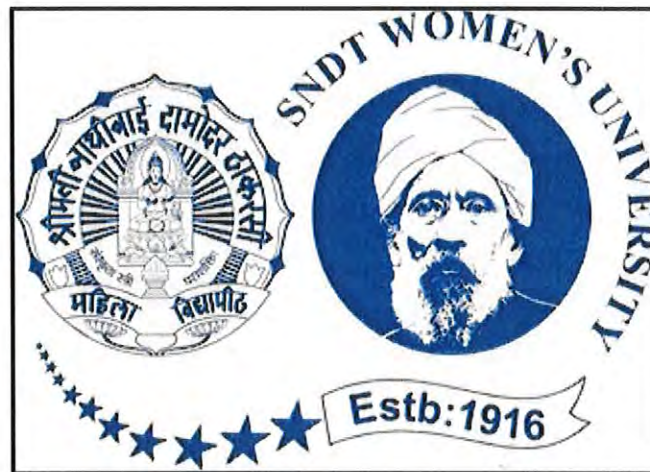
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ENVIRONMENTAL AUDIT REPORT

of

SNDT WOMEN'S UNIVERSITY

Mumbai 400 020



Year: 2021-22

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
Near Mukhtangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: enrichcons@gmail.com

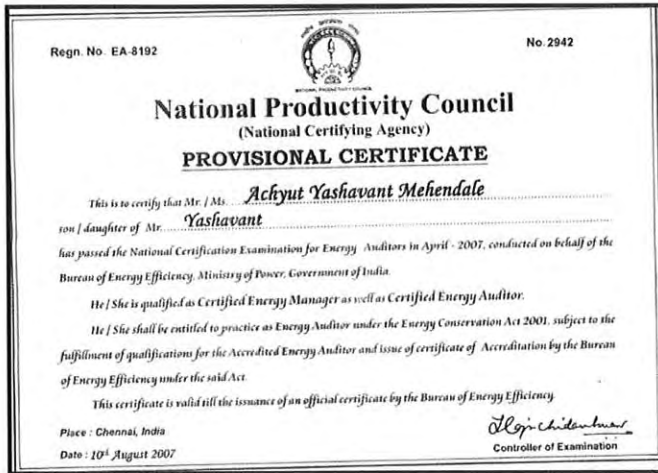


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SNDT Women's University

REGISTRATION CERTIFICATES



BEE AUDITOR CERTIFICATE

MEDA EMPANELMENT CERTIFICATE



ASSOCHAM GEM CP CERTIFICATE



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of SNDT Women's University, Mumbai for awarding us the assignment of Environmental Audit of their Churchgate, Juhu & Pune Campuses for the Academic Year: 2021-22.

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



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EXECUTIVE SUMMARY

1. SNDT 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 caused by Day-to-Day Operation:

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

3. Present Energy Usage & CO₂ Emissions:

No	Parameter/Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	823614	741.25
2	Maximum	85098	76.59
3	Minimum	55694	50.12
4	Average	68634.50	61.77

4. Usage of Renewable Energy & CO₂ Emission Reduction:

- The University has installed **500 kWp** Roof Top Solar PV Plant.
- Annual Energy generated by Roof Top Solar PV Plant is **557535 kWh**.
- The reduction in Annual CO₂ Emissions is **501.78 MT**.

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	95	57	70
2	Minimum	81	46	68

6. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	25.8	85	129	45
2	Minimum	25.7	84	105	41.6

7. Waste Management:

7.1 Solid Waste Management:

The Waste is segregated at source. Waste Bins are kept at various locations.



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7.2 Organic Waste Management:

The University has made provision of a Bio Composting Bed, for conversion of Organic Waste.

7.3 Sanitary Waste management:

The University has made provision of Sanitary waste Incinerator, for disposal of Sanitary Waste.

8. Rain Water Management:

The University has implemented Rain Water Management Project at all Campuses. The Rain Water is collected through Pipes and is used to increase the Underground Water Table.

9. Environment Friendly Initiatives:

- Internal Tree Plantation.
- Creation of Awareness on Ban the usage of Single Use Plastic by Display of Posters

10. Assumption:

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

11. References:

1. For Computation of CO₂ Emissions: www.tatapower.com
2. For Indoor Air Quality: www.cpcb.com
3. For Indoor Comfort Parameters: www.ishrae.com



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ABBREVIATIONS

LED	: Light Emitting Diode
SNDT	: Shreemati Nathibai Damodar Thackersey
CPCB	: Central Pollution Control Board
ISHARE	: The Indian Society of Heating & Refrigerating & Air Conditioning Engineers
AQI	: Air Quality Index
PM2.5	: Particulate Matter of Size 2.5 microns
PM 10	: Particulate Matter of Size 10 microns
kWh	: kilo-Watt Hour
kWp	: Kilo Watt Peak
Qty	: Quantity
MT	: Metric Ton
LPD	: Liters Per Day



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A handwritten signature in blue ink, likely belonging to the Registrar, is placed over the text 'Registrar'.

Registrar

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SNDT Women's University
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CHAPTER-I 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.

Table No-1: Relevant Environmental Laws in India:

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

Table No-2: Some Important Environmental Rules in India:

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



Table No-3: National Environmental Plans & Policy Documents:

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 Consumption of various Resources & CO₂ Emissions
2. To Study Usage of Renewable Energy
3. To Study Indoor Air Quality & Comfort Parameters
4. To Study Waste Management Practices
5. To Study Rain Water Management
6. To Study Eco Friendly Practices

1.2 Table No 4: General Details of University:

No	Head	Particulars
1	Name	SNDT Women's University
2	Address	1, Nathibai Thackersey Road, Mumbai 400 020
3	Campuses Under Study	1) Churchgate Campus, Mumbai 2) Juhu Campus, Mumbai 3) Pune Campus
4	Year of Establishment	1916



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CHAPTER-II

STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

2.1 The University consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy

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

2.2 Representation of University as a System: Chart No:1

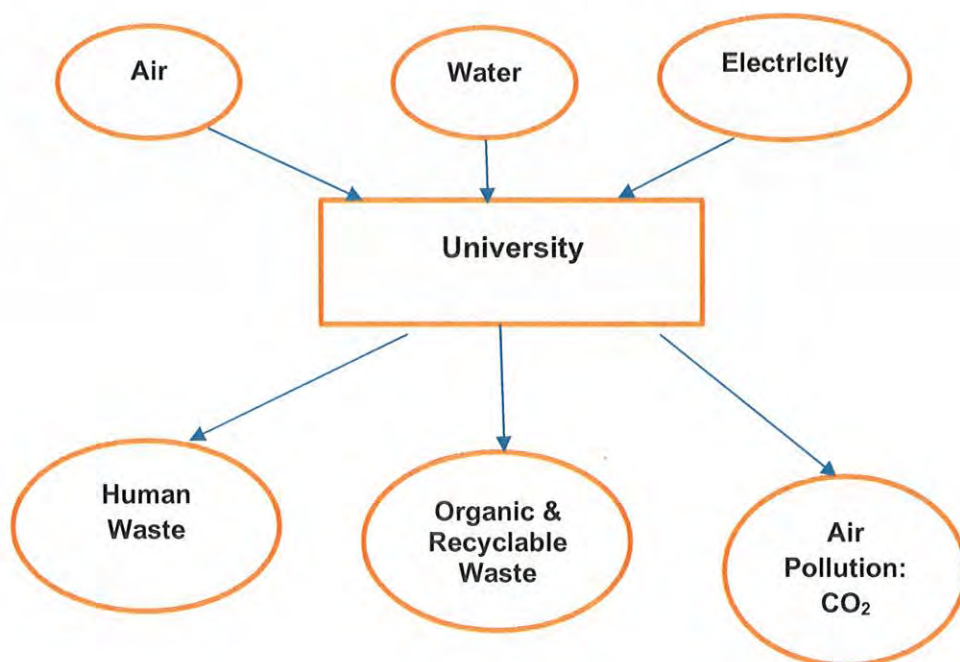


Chart No 1: Representation of University as a System & Environment

2.3 Computation of CO₂ Emissions: 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

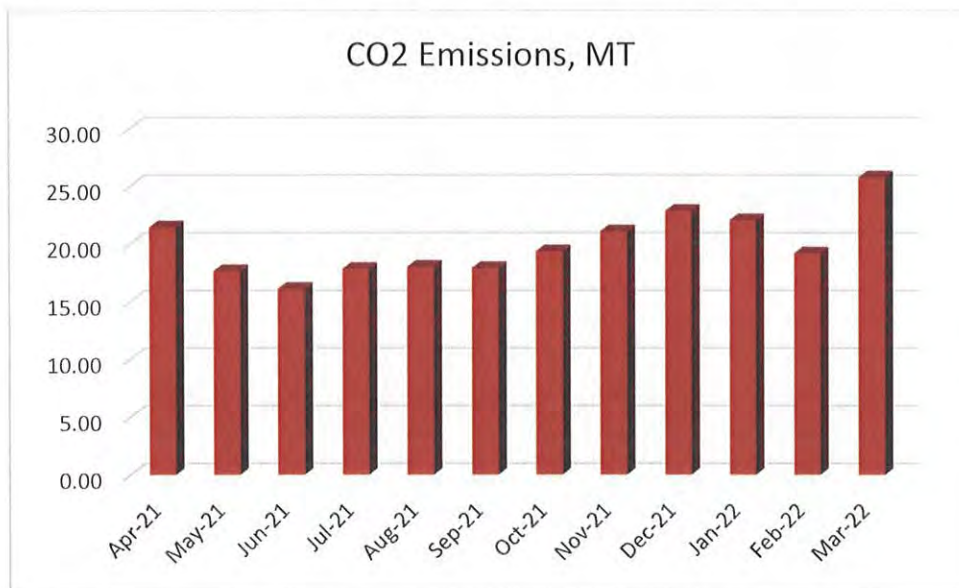
Table No 5: Month wise CO₂ Emissions:

No	Month	Total Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	23858	21.47
2	May-21	19636	17.67
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4	Jul-21	19845	17.86
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13	Total	266079	239.47
14	Maximum	28645	25.78
15	Minimum	17917	16.13
16	Average	22173.3	19.96

Chart No 2: Representation of Month wise CO₂ Emissions:



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CHAPTER-III

STUDY OF USAGE OF RENEWABLE ENERGY

The University has installed Roof Top Solar PV Plant, on various buildings at Juhu Campus.

The total Capacity of Solar Plant is 500 kWp.

In the following Table, we present the Annual Reduction in CO₂ Emissions.

Table No 6: Computation of Reduction in Annual CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Solar PV Plant Capacity	500	kWp
2	Annual Electrical Energy generated by Solar PV Plant	557535	kWh
3	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO ₂
4	Annual Reduction in CO₂ Emissions= (2) *(3)/1000	501.78	MT

Photograph of Roof Top Solar PV Plant:



CHAPTER IV

STUDY OF INDOOR AIR QUALITY PARAMETERS

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. 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) of Air (Prevention and control of pollution) Act, 1981 'air pollutant' has been defined as 'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment

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.

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 10: Indoor Air Quality Parameters: Pune Campus:

No	Location	AQI	PM2.5	PM10
1	Campus Admin	83	52	70
2	B Ed College	88	48	68
3	Home Science College	81	46	60
4	Management College	90	55	70
5	Library	95	57	69
	Maximum	95	57	70
	Minimum	81	46	68



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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 13: Study of Indoor Comfort Parameters: Churchgate Campus:

No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Campus Admin	25.7	84	115	41.6
2	B Ed College	25.8	84	129	42
3	Home Science College	25.8	85	105	41.9
4	Management College	25.8	85	114	45
5	Library	25.7	84	116	44.2
	Maximum	25.8	85	129	45
	Minimum	25.7	84	105	41.6



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CHAPTER VI

STUDY OF WASTE MANAGEMENT

6.1 Solid Waste Management:

The Waste is segregated at source. Waste collection bins are placed at various locations to collect the Waste.

Photograph of Waste Collection Bin (Churchgate campus):



6.2 Organic Waste Management:

The University has made provision of a Bio Composting Bed, for conversion of Organic Waste.

Photograph of Bio Composting Bed (Pune campus):

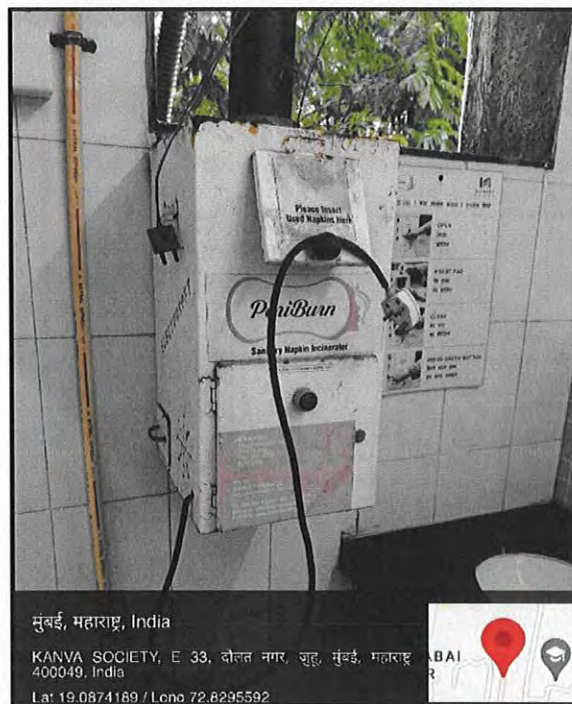


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6.3 Sanitary Waste management:

The University has made provision of Sanitary waste Incinerator.

Photograph of Sanitary Waste Incinerator (Juhu campus):



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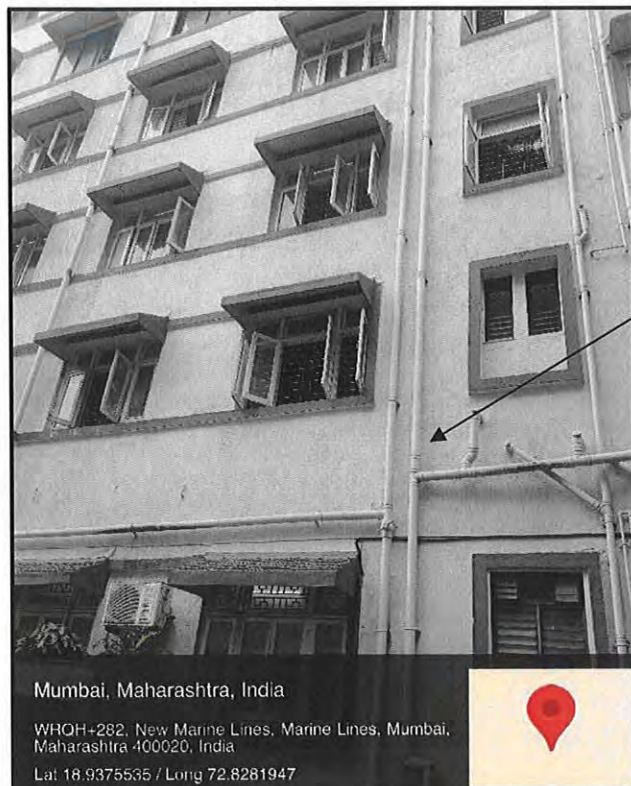
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CHAPTER-VII

STUDY OF RAIN WATER MANAGEMENT

The University has implemented Rain Water Management Project at all 3 Campuses. The Rain Water is collected is used to increase the Underground Water Table.

Photograph of Rain Water Harvesting Pipe at Churchgate campus:



Rain Water
Collecting Pipe



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CHAPTER-VIII

STUDY OF ENVIRONMENT FRIENDLY PRACTICES

8.1 Internal Tree Plantation:

The University has well maintained Lawn and Tree Plantation.

Photograph of Lawn & Tree Plantation at Juhu Campus:



8.2 Creation of Awareness by Display of Posters:

The University has displayed posters to ban the usage of Single Use Plastic in the campus.

Photograph of Poster on Ban the usage of Single Use Plastic:



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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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