Quality Audits

2019-20

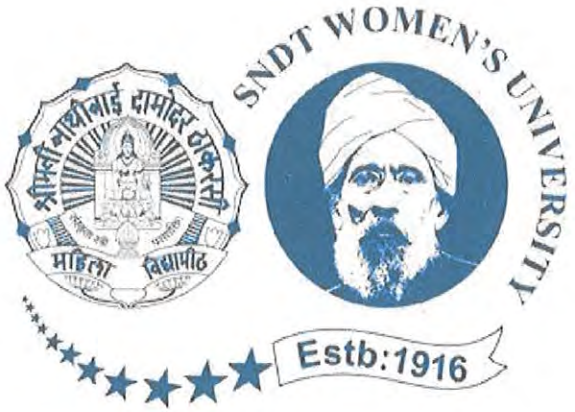
INDEX

Sr. No.	Content	Page No.
1	Energy Audit Report for the year 2019-20	1-19
2	Green Audit Report for the year 2019-20	20-42
3	Environment Audit Report for the year 2019-20	43-60

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20

ENERGY AUDIT REPORT
of
SNDT WOMEN'S UNIVERSITY
MUMBAI



Year: 2019-20

Prepared by

Enrich Consultants

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

Certified True Copy

ENRICH CONSULTANTS Pune

Registrar
SNDT Women's University
Mumbai - 20.

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006,
Ph No: 020-26614393/266144403
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174 — 19th September , 2018

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	:	**Enrich Consultants** Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Energy Conservation Programme*
Registration Number	:	***MEDA/ECN/CR-05/2018-19/EA-03***

- 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 the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31st March 2021** 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.

19/9/18
(Smita Kudarikar)
General Manager (EC)

Certified True Copy
Registrar
SNDT Women's University
Mumbai - 20

ENRICH CONSULTANTS * Pune *

Enrich Consultants

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

Ref: EC/SNDT/19-20/01 Date: 25/08/2020

CERTIFICATE

This is to certify that we have conducted Energy Audit at SNDT Women's University, Mumbai in the year 2019-20.

The University has adopted following Energy Efficient 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.
- Usage of BEE STAR Rated Equipment

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

For Enrich Consultants,

Mehendale

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENRICH CONSULTANTS * Pune *

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

INDEX

No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	8
1	Introduction	9
2	Study of Connected Load	10
3	Study of Present Energy Consumption	12
4	Study of Carbon Foot printing	14
5	Study of Usage of Alternate Energy	16
6	Study of Usage of LED Lights	18

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20

ENRICH CONSULTANTS Pune

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of SNDT Women's University, Mumbai for awarding us the assignment of Energy Audit of their Churchgate, Juhu & Pune Campuses for the Academic Year: 2019-20.

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

ENRICH CONSULTANTS Pune

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. Present Energy Consumption & CO_2 Emissions:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	739670	591.74
2	Maximum	92020	73.62
3	Minimum	39839	31.87
4	Average	61639.17	49.31

3. Various measures adopted for Energy Conservation:

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

4. Usage of Alternate/Renewable Energy Source:

- The University has installed **500 kWp** Roof Top Solar PV Plant and **16000 LPD** Solar Thermal Water Heating System at the Hostel Blocks.
- Total Annual Electrical Energy Demand is **1487615 kWh.**
- Annual Alternate Energy Usage is **747945 kWh.**
- The percentage of Alternate Energy to Annual Energy requirement is **50.28 %.**

5. Percentage of Lighting Power Requirement met by LED Lighting:

- The Annual Total Lighting Demand is **182121 kWh.**
- The annual LED Lighting Demand is **29464 kWh.**
- The % of LED to the total annual lighting power requirement works out to be **16.18 %**

6. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere.
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh** of Electrical Energy /Day
3. Daily working hours-**4 Nos** (For Lighting Calculations)
4. Annual working Days-**200 Nos** (For Lighting Calculations)
5. Annual Solar Energy Generation Days: For Solar PV Plant: **300 Nos**
6. Annual Solar Thermal Water System Usage Period: **200 Nos**

7. References:

1. For Electrical Energy saved by Solar Thermal Plant: www.mahaurja.com
2. For Energy Generated by Solar PV Plant: www.solarrooftop.gov.in

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

ENRICH CONSULTANTS Pune

ABBREVIATIONS

AC	:	Air conditioner
SNDT	:	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

Certified True Copy

Registrar
SNDT Women's University
Mumbai

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 CO_2 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,
3	Year of Establishment	1916

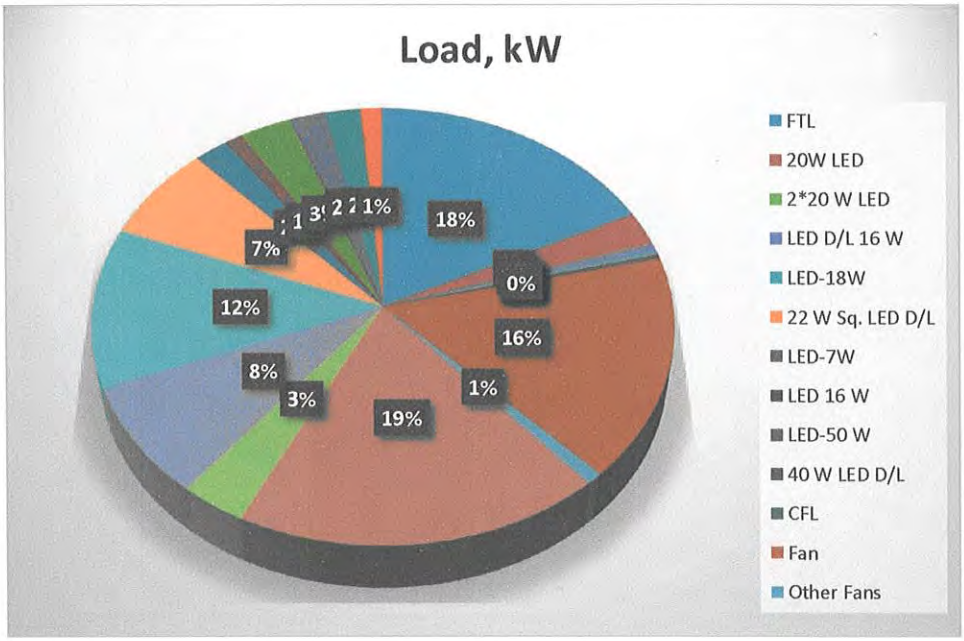
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 2: Details of Overall Connected Load of All Three Campuses:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	FTL	4662	40	186.48
2	20W LED	1307	20	26.14
3	2*20 W LED	17	40	0.68
4	LED D/L 16 W	361	16	5.776
5	LED-18W	120	18	2.16
6	22 W Sq. LED D/L	23	22	0.506
7	LED-7W	39	7	0.273
8	LED 16 W	0	0	0
9	LED-50 W	2	50	0.1
10	40 W LED D/L	30	40	1.2
11	CFL	53	32	1.696
12	Fan	3324	52	172.848
13	Other Fans	174	52	9.048
14	PC	1320	150	198
15	Printer	240	150	36
16	AC-1.5 Ton-Old	43	2025	87.075
17	AC-2 Ton	46	2700	124.2
18	AC- New	42	1800	75.6
19	Water Pump-C	4	5595	22.38
20	Water Pump-J	1	11190	11.19
21	Water Pump-P	6	5595	33.57
22	Lift	4	5595	22.38
23	Other Equipment	150	150	22.5
24	Central A C	1	13500	13.5
25	**Grand Total**			**1053**

Chart No 1 : Total Connected Load of All Three Campuses:



Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20

ENRICH CONSULTANTS Pune

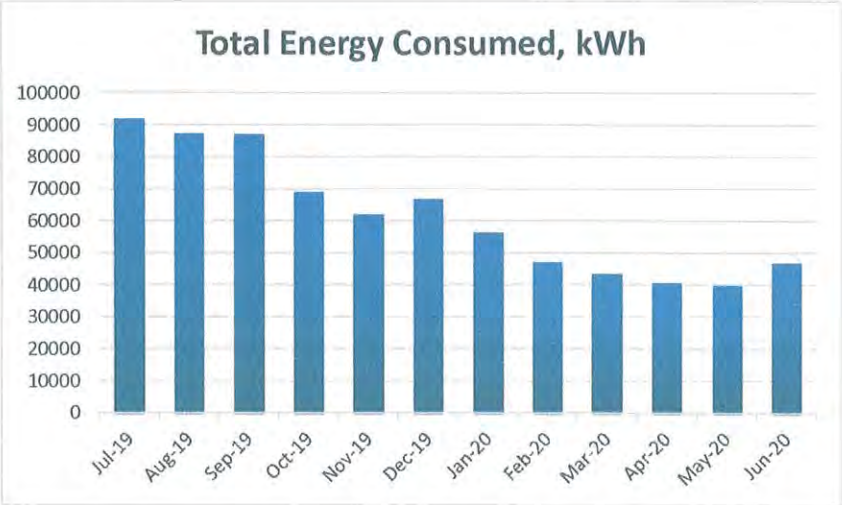
CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the consumption of Electrical Energy of all three campuses for the Academic Year: 2019-20.

Table No 3: Study of Consumption of Electrical Energy: 2019-20:

No	Month	Energy Consumed, Churchgate Campus, kWh	Energy Consumed, Juhu Campus, kWh	Energy Consumed, Pune Campus, kWh	Total Energy Consumed, kWh
1	Jul-19	21793	53496	16731	92020
2	Aug-19	26096	39594	21814	87504
3	Sep-19	24423	45642	17064	87129
4	Oct-19	23690	39048	6405	69143
5	Nov-19	23630	24372	14158	62160
6	Dec-19	26915	25248	14793	66956
7	Jan-20	25150	13194	17966	56310
8	Feb-20	19435	11536	16204	47175
9	Mar-20	19444	7932	16204	43580
10	Apr-20	20642	3780	16321	40743
11	May-20	19444	4074	16321	39839
12	Jun-20	18945	3102	25064	47111
13	Total	269607	271018	199045	739670
14	Maximum	26915	53496	25064	92020
15	Minimum	18945	3102	6405	39839
16	Average	22467.25	22584.8	16587.1	61639.17

Chart No 2 : Study of variation of Monthly Electrical Energy Consumption, kWh:



Certified True Copy/
Registrar
SNDT Women's University,

ENRICH CONSULTANTS Pune

Table No 4: Various Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh
1	Total	739670
2	Maximum	92020
3	Minimum	39839
4	Average	61639.17

CHAPTER-IV
STUDY OF CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas Emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the University for performing its day to day activities. The University uses Electrical Energy for day to day activities.

Basis for computation of CO_2 Emissions:

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

Table No 5: Month wise CO_2 Emissions:

No	Month	Energy Consumed, Churchgate Campus, kWh	Energy Consumed, Juhu Campus, kWh	Energy Consumed, Pune Campus, kWh	Total Energy Consumed, kWh	CO2 Emissions, MT
1	Jul-19	21793	53496	16731	92020	73.62
2	Aug-19	26096	39594	21814	87504	70.00
3	Sep-19	24423	45642	17064	87129	69.70
4	Oct-19	23690	39048	6405	69143	55.31
5	Nov-19	23630	24372	14158	62160	49.73
6	Dec-19	26915	25248	14793	66956	53.56
7	Jan-20	25150	13194	17966	56310	45.05
8	Feb-20	19435	11536	16204	47175	37.74
9	Mar-20	19444	7932	16204	43580	34.86
10	Apr-20	20642	3780	16321	40743	32.59
11	May-20	19444	4074	16321	39839	31.87
12	Jun-20	18945	3102	25064	47111	37.69
13	Total	269607	271018	199045	739670	591.74
14	Maximum	26915	53496	25064	92020	73.62
15	Minimum	18945	3102	6405	39839	31.87
16	Average	22467.25	22584.8	16587.1	61639.17	49.31

Chart No 3: Representation of Month wise CO_2 Emissions:

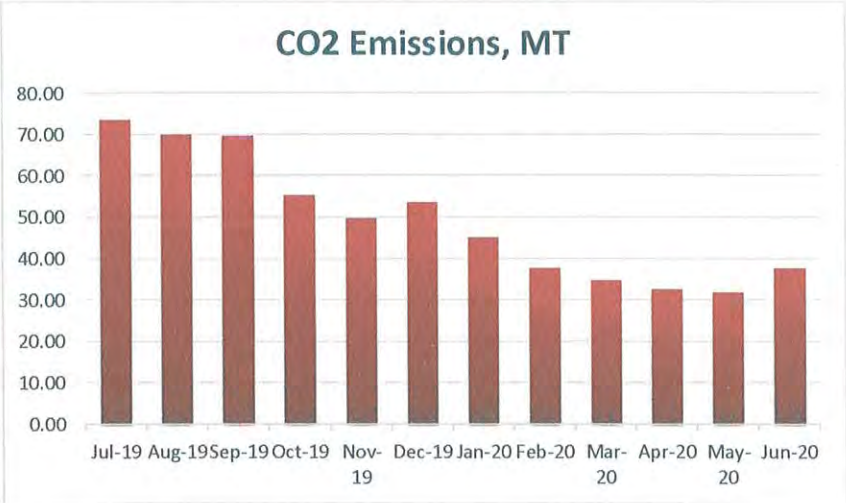


Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	739670	591.74
2	Maximum	92020	73.62
3	Minimum	39839	31.87
4	Average	61639.17	49.31

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The University has installed Roof Top Solar PV Plant, on various buildings at Juhu Campus. The University has also installed Solar Thermal Water Heating System at Hostel blocks at Juhu campus and Pune campus respectively. In the following Table, we present the details of Building wise Solar PV Plants installed and Solar Thermal Water Heating Systems installed.

Table No 7: Details of Building wise Roof Top Solar PV Plant at Juhu Campus:

No	Name of Building/Location	Plant Capacity, kWp
1	Administrative Block	200
2	Usha Mittal Block	80
3	Library Building	80
4	Law & Pharmacy Building	90
5	Polytechnic Building	50
6	**Total**	**500**

Table No 8: Details of Solar Thermal Water Heating Systems installed:

No	Location	Capacity in LPD
1	Juhu Campus	8000
2	Pune Campus	8000
3	**Total**	**16000**

In the following Table, we present the percentage of usage of Renewable Energy to Annual Power requirement.

Table No 9: Computation of Usage of Alternate Energy to Annual Power requirement:

No	Particulars	Value	Unit
1	Total Energy Purchased by the three campuses in 19-20	**739670**	**kWh**
2	Installed Roof Top Solar PV Plant Capacity	500	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated, in 19-20	**600000**	**kWh**
6	Solar Water Heating System at Hostel Block	18000	LPD
7	Equivalent Electrical Energy saved by100 LPD System in 365 days	270000	kWh

8	Energy saved by 18000 LPD System in 200 Days	147945	kWh
9	Equivalent Electrical Energy saved by 18000 LPD System in 19-20	**147945**	**kWh**
10	Total Renewable Energy usage = **(5) + (9)**	**747945**	**kWh**
11	**Total Energy Requirement = (1) + (5) + (9)**	**1487615**	**kWh**
12	**% of Usage of Alternate Energy = (10) *100/ (12)**	**50.28**	**%**

Photograph of Roof Top Solar PV Plant:

Certified True Copy

Registrar
SNDT Women's University
Mumbai-20

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 10: Computation of % of Annual LED Lighting Load:

No	Particulars	Value	Unit
1	No of FTL Fittings	4662	Nos
2	Load/Unit of FTL Fitting	40	W/Unit
3	Total Load of FTL Fittings	**186.48**	kW
4	No of 20 W LED Fittings	1307	Nos
5	Load/Unit of LED Fitting	20	W/Unit
6	Total Load of 20 W LED Fittings	**26.14**	kW
7	No of 2*20 W LED Fittings	17	Nos
8	Load/Unit of 2*20 W LED Fitting	40	W/Unit
9	Total Load of 2*20 W LED Fittings	**0.68**	kW
10	No of 16 W LED D/L Fittings	361	Nos
11	Load/Unit of 16 W LED D/L Fitting	16	W/Unit
12	Total Load of 16 W LED D/L Fittings	**5.776**	kW
13	No of 18 W LED Fittings	120	Nos
14	Load/Unit of 18 W LED Fitting	40	W/Unit
15	Total Load of 18 W LED Fittings	**4.8**	kW
16	No of 22 W Sq. LED Fittings	23	Nos
17	Load/Unit of 22 W Sq. LED Fitting	22	W/Unit
18	Total Load of 22 W Sq. LED Fittings	**0.506**	kW
19	No of 7 W LED Fittings	39	Nos
20	Load/Unit of 7 W LED Fitting	7	W/Unit
21	Total Load of 7 W LED Fittings	**0.273**	kW

22	No of 50 W LED Fittings	2	Nos
23	Load/Unit of 50 W LED Fitting	50	W/Unit
24	Total Load of 50 W LED Fittings	**0.1**	kW
25	No of 40 W LED D/L Fittings	30	Nos
26	Load/Unit of 40 W LED D/L Fitting	40	W/Unit
27	Total Load of 40 W LED D/L Fittings	**1.2**	kW
28	No of CFL Fittings	53	Nos
29	Load/Unit of CFL Fitting	32	W/Unit
30	Total Load of CFL Fittings	**1.696**	kW
31	Total Lighting Load=3+6+9+12+15+18+21+24+27+30	**227.651**	kW
32	Total LED Lighting Load	**36.83**	kW
33	Average Daily Usage Period	4	Hrs/Day
34	Annual Working Days	200	Nos
35	**Annual Total Lighting Load=31*33*34**	**182121**	**kWh**
36	**Annual LED Lighting Load=32*33*34**	**29464**	**kWh**
37	**% of LED Lighting to Annual Lighting Load=36*100/35**	**16.18**	**%**

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

ENRICH CONSULTANTS * Pune *

GREEN AUDIT REPORT

of

SNDT WOMEN'S UNIVERSITY

MUMBAI

Year: 2019-20

Prepared by

Enrich Consultants

Yashashree, 26, Nirmal Bag Society

Near Muktangan English School, Parvati, Pune 411009

Phone: 09890444795, Email: enrichcons@gmail.com

Certified True Copy

Registrar

SNDT Women's University

Mumbai - 20.

ENRICH CONSULTANTS Pune

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006,
Ph No: 020-26614393/266144403
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174 — 19th September , 2018

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	:	**Enrich Consultants** Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Energy Conservation Programme*
Registration Number	:	***MEDA/ECN/CR-05/2018-19/EA-03***

- 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 the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31st March 2021** 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.

19/9/18
(Smita Kudarikar)
General Manager (EC)

Certified True Copy
Registrar
SNDT Women's University
Mumbai-20

ENRICH CONSULTANTS Pune

Enrich Consultants

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

Ref: EC/SNDT/19-20/02 Date: 25/8/2020

CERTIFICATE

This is to certify that we have conducted Green Audit at SNDT Women's University, Mumbai in the year 2019-20.

The University has adopted following Energy Efficient 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
- Implementation of Rain Water Harvesting
- Well maintained Garden in the campus

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

For Enrich Consultants,

A Mehendale

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENRICH CONSULTANTS * Pune *

Certified True Copy
Registrar

INDEX

No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	8
1	Introduction	9
2	Study of Present Energy Consumption	10
3	Study of CO_2 Emissions	12
4	Study of Usage of Renewable Energy	14
5	Study of Waste Management	16
6	Study of Rain Water Harvesting	17
7	Study of Green & Innovative Practices	18
8	Study of Trees & Plants	20

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 400 020.

ENRICH CONSULTANTS * Pune *

ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of SNDT Women's University, Mumbai for awarding us the assignment of Green Audit of their Churchgate, Juhu & Pune Campuses for the Academic Year: 2019-20.

.

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20

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. Present Energy Usage & CO_2 Emissions:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	739670	591.74
2	Maximum	92020	73.62
3	Minimum	39839	31.87
4	Average	61639.17	49.31

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 Source & CO_2 Emission Reduction:

- The University has installed **500 kWp** Roof Top Solar PV Plant and **16000 LPD** Solar Thermal Water Heating System at the Hostel Blocks.
- Annual Energy generated by Roof Top Solar PV Plant is **600000 kWh.**
- Annual Energy saved by Solar Thermal Plant is: **147945 kWh.**
- The reduction in Annual CO_2 Emissions is **598 MT.**

5. Waste Management:

5.1 Solid Waste Management:

The Waste is segregated at source and is further disposed of through Government Authorities.

5.2 E- Waste Management:

It is recommended to dispose of the E-Waste through Authorized vendors.

6. Rain Water Harvesting:

The University has implemented Rain Water Harvesting Project at Churchgate campus. The water collected is used to recharge the ring well.

Certified True Copy

Registrar

SNDT Women's University

ENRICH CONSULTANTS Pune

7. Green, Innovative and Sustainable Practices:

- The University has well maintained internal roads for easy movement in the campus.
- The University has well maintained Garden in the premises.
- Ramps are provided for easy movement of Divyanga students. Also dedicated wash rooms are provided for those students
- The University has made provision for Sanitary Pad Dispenser as well as Sanitary Waste Incinerator.

8. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere.
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh** of Electrical Energy /Day
3. Annual Energy Generation Days: For Solar PV Plant: **300 Nos**
4. Annual Solar Thermal Water System Usage Period: **200 Nos**

9. References:

1. For Electrical Energy saved by Solar Thermal Plant: www.mahaurja.com
2. For Energy Generated by Solar PV Plant: www.solarrooftop.gov.in

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

ENRICH CONSULTANTS * Pune *

ABBREVIATIONS

SNDT	:	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

Certified True Copy

ENRICH CONSULTANTS Pune

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Present Energy Usage
2. To Study CO_2 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

1.2 General Details of University:

Table No 1: General Details:

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
3	Year of Establishment	1916

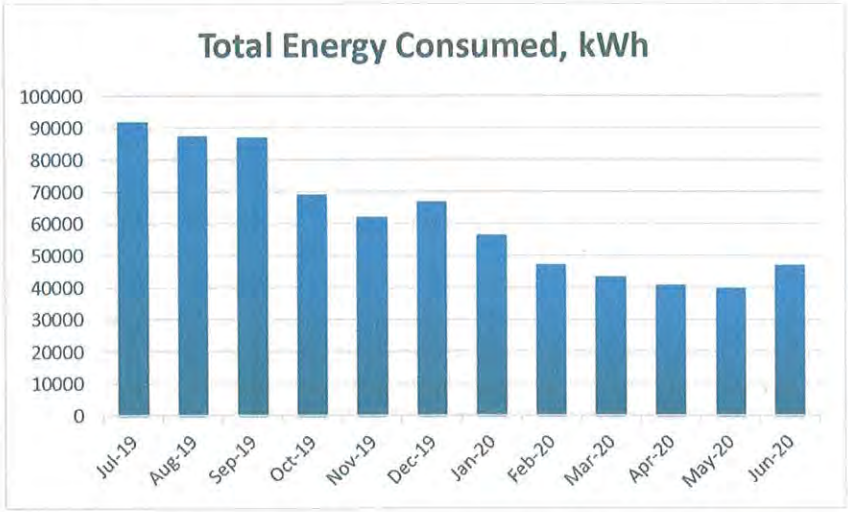
CHAPTER-II
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the consumption of Electrical Energy for the Academic Year: 2019-20.

Table No 2: Study of Consumption of Electrical Energy: 2019-20:

No	Month	Energy Consumed, Churchgate Campus, kWh	Energy Consumed, Juhu Campus, kWh	Energy Consumed, Pune Campus, kWh	Total Energy Consumed, kWh
1	Jul-19	21793	53496	16731	92020
2	Aug-19	26096	39594	21814	87504
3	Sep-19	24423	45642	17064	87129
4	Oct-19	23690	39048	6405	69143
5	Nov-19	23630	24372	14158	62160
6	Dec-19	26915	25248	14793	66956
7	Jan-20	25150	13194	17966	56310
8	Feb-20	19435	11536	16204	47175
9	Mar-20	19444	7932	16204	43580
10	Apr-20	20642	3780	16321	40743
11	May-20	19444	4074	16321	39839
12	Jun-20	18945	3102	25064	47111
13	Total	269607	271018	199045	739670
14	Maximum	26915	53496	25064	92020
15	Minimum	18945	3102	6405	39839
16	Average	22467.25	22584.8	16587.1	61639.17

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



ENRICH CONSULTANTS Pune

Certified True Copy
Registrar

Key Observations:

Table No 3: Various Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh
1	Total	739670
2	Maximum	92020
3	Minimum	39839
4	Average	61639.17

CHAPTER-III
STUDY OF CO_2 EMISSIONS

A Carbon Foot print is defined as the Total Greenhouse Gas Emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the University for performing its day to day activities. The University uses Electrical Energy for Day to Day activities.

Basis for computation of CO_2 Emissions:

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

Table No 4: Month wise CO_2 Emissions:

No	Month	Energy Consumed, Churchgate Campus, kWh	Energy Consumed, Juhu Campus, kWh	Energy Consumed, Pune Campus, kWh	Total Energy Consumed, kWh	CO2 Emissions, MT
1	Jul-19	21793	53496	16731	92020	73.62
2	Aug-19	26096	39594	21814	87504	70.00
3	Sep-19	24423	45642	17064	87129	69.70
4	Oct-19	23690	39048	6405	69143	55.31
5	Nov-19	23630	24372	14158	62160	49.73
6	Dec-19	26915	25248	14793	66956	53.56
7	Jan-20	25150	13194	17966	56310	45.05
8	Feb-20	19435	11536	16204	47175	37.74
9	Mar-20	19444	7932	16204	43580	34.86
10	Apr-20	20642	3780	16321	40743	32.59
11	May-20	19444	4074	16321	39839	31.87
12	Jun-20	18945	3102	25064	47111	37.69
13	Total	269607	271018	199045	739670	591.74
14	Maximum	26915	53496	25064	92020	73.62
15	Minimum	18945	3102	6405	39839	31.87
16	Average	22467.25	22584.8	16587.1	61639.17	49.31

Chart No 2: Representation of Month wise CO_2 Emissions:

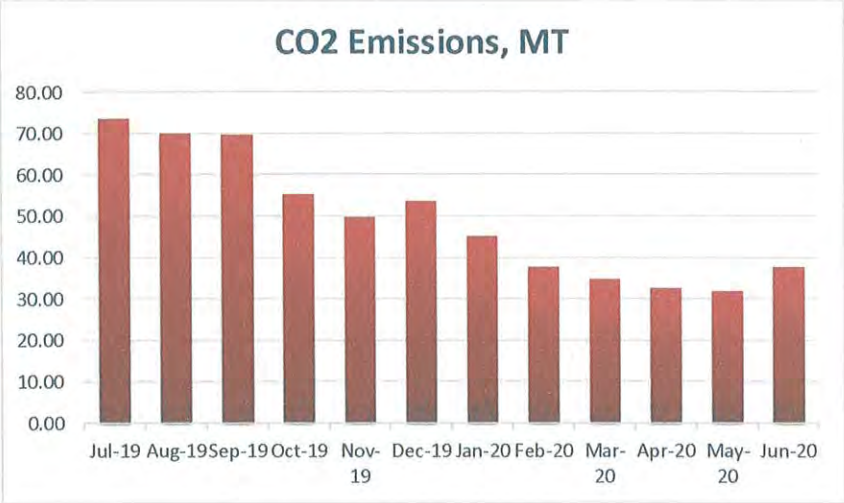


Table No 5: Various Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	739670	591.74
2	Maximum	92020	73.62
3	Minimum	39839	31.87
4	Average	61639.17	49.31

Certified True Copy

Registrar
SNDT Women's University
Mumbai-20.

CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

The University has installed Roof Top Solar PV Plant, on various buildings at Juhu Campus. The University has also installed Solar Thermal Water Heating System at Hostel blocks at Juhu campus and Pune campus respectively. In the following Table, we present the details of Building wise Solar PV Plants installed and Solar Thermal Water Heating Systems installed. In 20-21, due to lockdown, we do not take into account the Solar Thermal Water Heating System saving into account.

Table No 6: Details of Building wise Roof Top Solar PV Plant at Juhu Campus:

No	Name of Building/Location	Plant Capacity, kWp
1	Administrative Block	200
2	Usha Mittal Block	80
3	Library Building	80
4	Law & Pharmacy Building	90
5	Polytechnic Building	50
6	**Total**	**500**

Table No 7: Details of Solar Thermal Water Heating Systems installed:

No	Location	Capacity in LPD
1	Juhu Campus	8000
2	Pune Campus	8000
3	**Total**	**16000**

In the following Table, we present the Reduction in Annual CO_2 Emissions

Table No 8: Computation of Reduction in Annual CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	500	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated	**600000**	**kWh**
5	Solar Water Heating System at Hostel Block	18000	LPD
6	Equivalent Electrical Energy saved by100 LPD System in 365 days	17985	kWh
7	Energy saved by 18000 LPD System in 200 Days	270000	kWh

8	Equivalent Electrical Energy saved by 18000 LPD System in 19-20=9855	147945	**kWh**
9	Total Renewable Energy usage = **(5) + (9)**	**747945**	**kWh**
10	1 kWh of Electrical Energy releases	0.8	Kg of CO_2
11	**Reduction in CO_2 Emissions in 19-20= (10) * 0.8/1000**	**598**	**MT**

Photograph of Roof Top Solar PV Plant:

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

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. It is further disposed through Government Authorities

Photograph of Waste Collection Bin:

5.2 E-Waste Management:

It is recommended to dispose of the E-Waste through Authorized Vendors.

CHAPTER-VI
RAIN WATER HARVESTING

The University has implemented Rain Water Harvesting Project at Churchgate campus. The water collected is used to recharge the ring well.

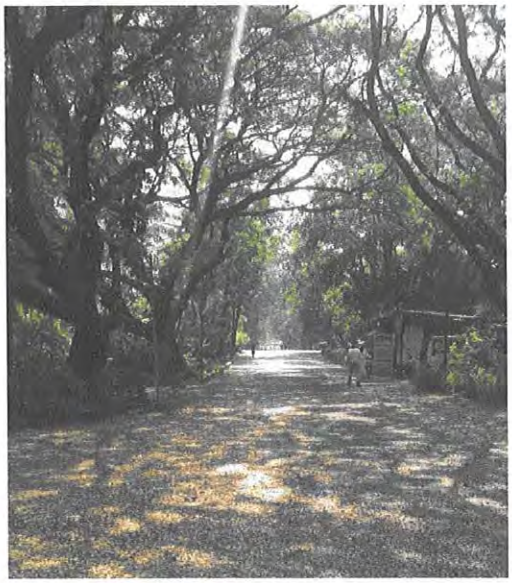
Photograph of Rain Water Harvesting Pipe at Churchgate campus:

CHAPTER-VII
STUDY OF GREEN & INNOVATIVE 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 Juhu Campus:



7.2 Internal Lawn:

The University is maintaining Clean Campus, inside the Buildings as well as outer areas.

Photograph of Internal Pond & Garden at Juhu Campus:

7.3 Provision of Ramp for Divyanga Students:

The University has made provision of Ramp, for easy movement of Divyanga students. Also dedicated washrooms are provided for Divyanga students.

Photograph of Ramp:

7.4 Sanitary Waste Incinerator: The University has installed sanitary pad Dispenser.

Photograph of Sanitary Waste Incinerator:

Certified True Copy
Registrar

ENRICH CONSULTANTS * Pune *

CHAPTER-VIII
STUDY OF TREES AND PLANTS

8.1 Plants define the habitat of a site, providing structure, shelter and food as well as contributing to the overall Biodiversity.
They include: Flowering Plants (Trees, Shrubs, Grasses and Herbaceous Plants).

8.2 List of Plants:

No.	Botanical Name	Name	Family	Habit	Benefits
1	*Aloe vera*	Korphad	Asphodelaceae	Herb	O/M
2	*Artocarpus heterophyllus*	Jackfruit	Moraceae	Tree	F
3	*Azadirachta indica*	Neem	Meliaceae	Tree	S/M
4	*Bambusa tulda*	Bamboo	Poaceae	Shrub	O/Fl
5	*Bauhinia variegata*	Kanchan	Fabaceae	Tree	S/M
6	*Bougainvillea spectabilis*	Paperflower	Nyctaginaceae	Shrub	O
7	*Butea monosperma*	Palas	Fabaceae	Tree	O/Fl
8	*Calliandra haematocephala*	Red Powder-puff	Fabaceae	Shrub	O
9	*Canna indica*	Saka Siri	Cannaceae	Herb	O
10	*Carica papaya*	Papaya	Caricaceae	Shrub	F
11	*Catharanthus roseus*	Sadaphuli	Apocynaceae	Shrub	O
12	*Citrus limetta*	Mosambi	Rutaceae	Tree	F
13	*Clitoria Ternatea*	Gokarana	Fabaceae	Climber	O
14	*Codiaeum Variegatum*	Crotan	Euphorbiaceae	Shrub	O
15	*Colocasia esculanta*	Taro Plant	Araceae	Herb	O
16	*Cosmos sulphureus*	Yellow cosmos	Asteraceae	Herb	O
17	*Crossandra infundibuliformis*	Aboli	Acanthaceae	Shrub	O/Fl
18	*Croton tiglium*	Jaipal	Euphorbiaceae	Herb	O
19	*Cynodon dactylon*	Scutch Grass	Poaceae	Herb	W/O/M
20	*Delonix regia*	Gulmohr	Fabaceae	Tree	O/S
21	*Duranta erecta*	Gold Duranta	Verbenaceae	Shrub	O
22	*Duranta erecta*	Silver Duranta	Verbenaceae	Shrub	O
23	*Dypsis lutescens*	Golden Cane Palm	Arecaceae	Shrub	O
24	*Eucalyptus globulus*	Nilgiri	Myrtaceae	Tree	S/M/F
25	*Ficus elastica*	Rubber Tree	Moraceae	Tree	S
26	*Ficus racemosa*	Cluster fig	Moraceae	Tree	S/N/F
27	*Ficus religiosa*	Sacred fig	Moraceae	Tree	S/N

28	*Hibiscus rosa-sinensis*	Jaswand	Malvaceae	Shrub	O/Fl
29	*Hyophorbe lagenicaulis*	Bottle palm	Aracaceae	Tree	O
30	*Impateins walleriana*	Balsam	Balsaminaceae	Shrub	O
31	*Ipomoea quamoclit*	Ganesh vel	Convolvulaceae	Climber	O
32	*Ixora coccinea*	Jungle flame	Rubiaceae	Shrub	O/Fl
33	*Jacaranda mimosifolia*	Neel gulmohr	Bignoniaceae	Tree	O
34	*Jasminum sambac*	Arabian jasmine	Oleaceae	Herb	Fl/O
35	*Jatropha podagrica*	Gout Stalk,	Euphorbiaceae	Herb	O
36	*Lantana camra*	Ghaneri	Verbenaceae	Shrub	O/Fl
37	*Lantana montevidensis*	Trailing Lantana	Verbenaceae	Herb	O
38	*Leucaena leucocephala*	Subabul	Fabaceae	Tree	O/Fl
39	*Magnolia alba*	White Champak	Magnoliaceae	Tree	O/Fl
40	*Magnolia champaca*	Champak	Magnoliaceae	Tree	O/Fl
41	*Mangifera indica*	Mango	Anacardiaceae	Tree	S/N
42	*Mesua ferrea*	Nag Chafa	Calophyllaceae	Tree	O/Fl
43	*Millingtonia hortensis*	Indian cork tree	Bignoniaceae	Tree	O/S/Fl
44	*Mirabilis jalpa*	four o'clock flower	Nyctaginaceae	Herb	O
45	*Muntingia calabura*	Jam Cherry	Malvaceae	Shrub	Fl/F
46	*Musa acuminata*	Banana	Musaceae	Herb	F
47	*Parthenium hysterophorus*	Congress grass	Asteraceae	Herb	W
48	*Phoenix dactylifera*	Date plant	Arecaceae	Tree	F
49	*Phyllanthus emblica*	Amla	Phyllanthaceae	Tree	F
50	*Platycladus orientalis*	Morpankhi	Cupressaceae	Tree	O
51	*Plumbago zeylanica*	Wild Leadwort	Plumbaginaceae	Herb	O
52	*Psidium guajava*	Guava	Myrtaceae	Tree	F
53	*Santalum album*	Chandan	Santalaceae	Tree	M
54	*Saraca asoca*	Ashoka	Fabaceae	Tree	O
55	*Syzygium cumini*	Jamun	Myrtaceae	Tree	F
56	*Tamarindus indica*	Tamarind	Fabaceae	Tree	S/F
57	*Terminalia catappa*	Badam	Combretaceae	Tree	F
58	*Turnera ulmifolia*	Yellow Alder	Passifloraceae	Herb	O

Benefits – O- Ornamental, N = Nesting, S = Shade, F = Flower and Fruit bearing, Fl = Nectar containing Flowers, M = Medicinal.
The total no. of **58 species** belongs to **51 genera** & **32 families** are recorded.

8.3 Population of Trees

Botanical Name	**Name**	**Family**	**Total**
Artocarpus heterophyllus	Jackfruit	Moraceae	9
Azadirachta indica	Neem	Meliaceae	23
Bambusa tulda	Bamboo	Poaceae	4
Bauhinia variegata	Kanchan	Fabaceae	5
Citrus limetta	Mosambi	Rutaceae	7
Delonix regia	Gulmohr	Fabaceae	14
Eucalyptus globulus	Nilgiri	Myrtaceae	3
Ficus elastica	Rubber Tree	Moraceae	7
Ficus racemosa	Cluster fig	Moraceae	2
Ficus religiosa	Sacred fig	Moraceae	5
Hyophorbe lagenicaulis	Bottle palm	Aracaceae	7
Jacaranda mimosifolia	Neel gulmohr	Bignoniaceae	2
Leucaena leucocephala	Subabul	Fabaceae	32
Magnolia alba	White Champak	Magnoliaceae	7
Magnolia champaca	Champak	Magnoliaceae	4
Mangifera indica	Mango	Anacardiaceae	5
Mesua ferrea	Nag Chafa	Calophyllaceae	1
Millingtonia hortensis	Indian cork tree	Bignoniaceae	6
Phoenix dactylifera	Date plant	Arecaceae	1
Phyllanthus emblica	Amla	Phyllanthaceae	6
Platycladus orientalis	Morpankhi	Cupressaceae	12
Psidium guajava	Guava	Myrtaceae	1
Santalum album	Chandan	Santalaceae	1
Saraca asoca	Ashoka	Fabaceae	17
Syzygium cumini	Jamun	Myrtaceae	3
Tamarindus indica	Tamarind	Fabaceae	27
Terminalia catappa	Badam	Combretaceae	6
Total			217

Photograph of Tree Plantation at Pune Campus:

ENVIRONMENTAL AUDIT REPORT
of
SNDT WOMEN'S UNIVERSITY
MUMBAI

Year: 2019-20

Prepared by

Enrich Consultants

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

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006,
Ph No: 020-26614393/266144403
Email: ece@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174 19th September , 2018

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	:	**Enrich Consultants** Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Energy Conservation Programme*
Registration Number	:	***MEDA/ECN/CR-05/2018-19/EA-03***

- 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 the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31st March 2021** 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.

19/9/18
(Smita Kudarikar)
General Manager (EC)

Certified True Copy
Registrar
SNDT Women's University

ENRICH CONSULTANTS * Pune *

Enrich Consultants

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

Ref: EC/SNDT/19-20/03 Date: 25/8/2020

CERTIFICATE

This is to certify that we have conducted Environmental Audit at SNDT Women's University, Mumbai in the year 2019-20.

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
- Implementation of Rain Water Harvesting Project

We appreciate the support of Management, involvement of faculty members and students in the process of making the Environment Friendly.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENRICH CONSULTANTS * Pune *

Certified True Copy
Registrar

INDEX

No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	8
1	Introduction	9
2	Study of Consumption of Various Resources and CO_2 Emission	11
3	Study of CO_2 Emission Reduction	14
4	Study of Waste Management	16
5	Study of Rain Water Harvesting	17
6	Study of Environment Friendly Initiatives	18

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

ACKNOWLEDGEMENT

We Enrich Consultants, 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: 2019-20.

Certified True Copy

Registrar
SNDT Women's University
Mumbai - 20.

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. Present Energy Usage & CO_2 Emissions:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	739670	591.74
2	Maximum	92020	73.62
3	Minimum	39839	31.87
4	Average	61639.17	49.31

3. Pollution caused by Day to Day Operation:

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

4. Usage of Renewable Energy & CO_2 Emission Reduction:

- The University has installed **500 kWp** Roof Top Solar PV Plant and **16000 LPD** Solar Thermal Water Heating System at the Hostel Blocks.
- Annual Energy generated by Roof Top Solar PV Plant is **600000 kWh.**
- Annual Energy saved by Solar Thermal Plant is: **147945 kWh.**
- The reduction in Annual CO_2 Emissions is **598 MT.**

5. Waste Management:

5.1 Solid Waste Management:

The Waste is segregated at source and is further disposed of through Government Authorities.

5.2 E- Waste Management:

It is recommended to dispose of the E-Waste through Authorized vendors.

6. Rain Water Harvesting:

The University has implemented Rain Water Harvesting Project at Churchgate campus. The water collected is used to recharge the ring well.

7. Environment Friendly Initiatives:

- Provision of Sanitary Waste Incinerator.
- Tree Plantation in the Campuses

8. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere.
2. **1 kWp** Roof Top Solar PV Plant generates **4 kWh** of Electrical Energy /Day
3. Annual Energy Generation Days: For Solar PV Plant: **300 Nos**
4. Annual Solar Thermal Water System Usage Period: **200 Nos**

9. References:

1. For Electrical Energy saved by Solar Thermal Plant: www.mahaurja.com
2. For Energy Generated by Solar PV Plant: www.solarrooftop.gov.in

ABBREVIATIONS

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

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 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.

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 & CO_2 Emissions
2. To Study Usage of Renewable Energy & CO_2 Emission Reduction
3. To Study Waste Management Practices
4. To Study Rain Water Harvesting
5. To study Eco Friendly & Sustainable Initiatives

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
3	Year of Establishment	1916

Certified True Copy
Registrar
SNDT Women's University

CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 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

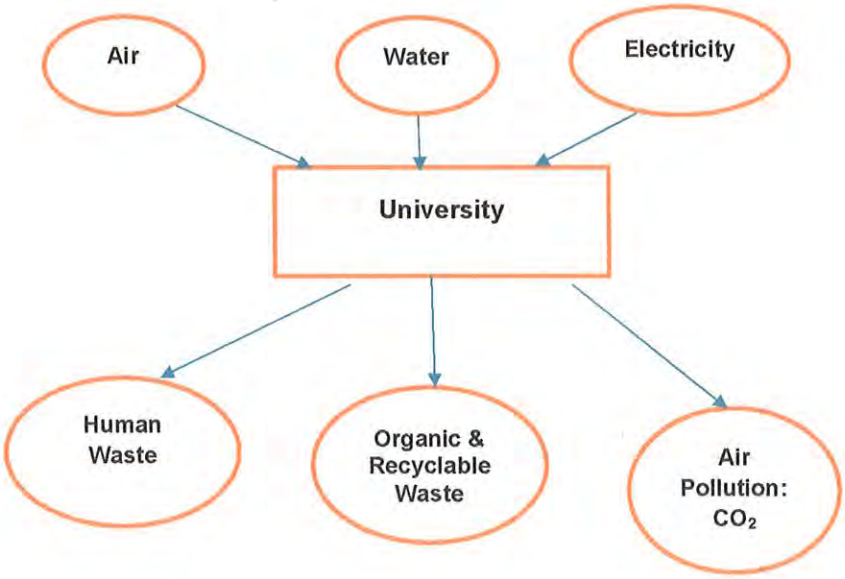


Chart No 1: Representation of University as a System & Environment

2.3 Computation of CO_2 Emissions: A Carbon Foot print is defined as the Total Greenhouse Gas Emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the University for performing its day to day activities. The University uses Electrical Energy for day to day activities.

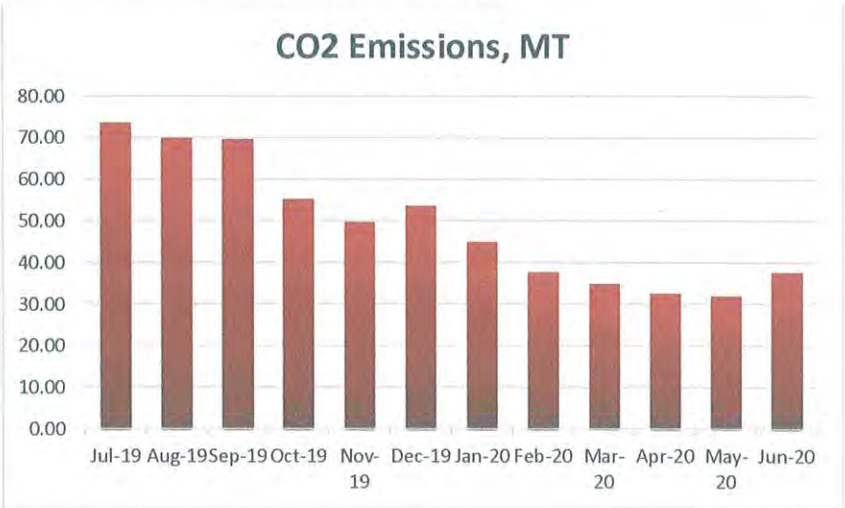
Basis for computation of CO_2 Emissions:

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

Table No 5: Month wise CO_2 Emissions:

No	Month	Energy Consumed, Churchgate Campus, kWh	Energy Consumed, Juhu Campus, kWh	Energy Consumed, Pune Campus, kWh	Total Energy Consumed, kWh	CO2 Emissions, MT
1	Jul-19	21793	53496	16731	92020	73.62
2	Aug-19	26096	39594	21814	87504	70.00
3	Sep-19	24423	45642	17064	87129	69.70
4	Oct-19	23690	39048	6405	69143	55.31
5	Nov-19	23630	24372	14158	62160	49.73
6	Dec-19	26915	25248	14793	66956	53.56
7	Jan-20	25150	13194	17966	56310	45.05
8	Feb-20	19435	11536	16204	47175	37.74
9	Mar-20	19444	7932	16204	43580	34.86
10	Apr-20	20642	3780	16321	40743	32.59
11	May-20	19444	4074	16321	39839	31.87
12	Jun-20	18945	3102	25064	47111	37.69
13	Total	269607	271018	199045	739670	591.74
14	Maximum	26915	53496	25064	92020	73.62
15	Minimum	18945	3102	6405	39839	31.87
16	Average	22467.25	22584.8	16587.1	61639.17	49.31

Chart No 2: Representation of Month wise CO_2 Emissions:



Certified True Copy
Registrar

ENRICH CONSULTANTS Pune

Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	739670	591.74
2	Maximum	92020	73.62
3	Minimum	39839	31.87
4	Average	61639.17	49.31

Certified True Copy

Registrar

SNDT Women's University

Mumbai

CHAPTER-III
STUDY OF CO_2 EMISSION REDUCTION

The University has installed Roof Top Solar PV Plant, on various buildings at Juhu Campus. The University has also installed Solar Thermal Water Heating System at Hostel blocks at Juhu campus and Pune campus respectively. In the following Table, we present the details of Building wise Solar PV Plants installed and Solar Thermal Water Heating Systems installed. In 20-21, due to lockdown, we do not take into account the Solar Thermal Water Heating System saving into account.

Table No 7: Details of Building wise Roof Top Solar PV Plant at Juhu Campus:

No	Name of Building/Location	Plant Capacity, kWp
1	Administrative Block	200
2	Usha Mittal Block	80
3	Library Building	80
4	Law & Pharmacy Building	90
5	Polytechnic Building	50
6	**Total**	**500**

Table No 8: Details of Solar Thermal Water Heating Systems installed:

No	Location	Capacity in LPD
1	Juhu Campus	8000
2	Pune Campus	8000
3	**Total**	**16000**

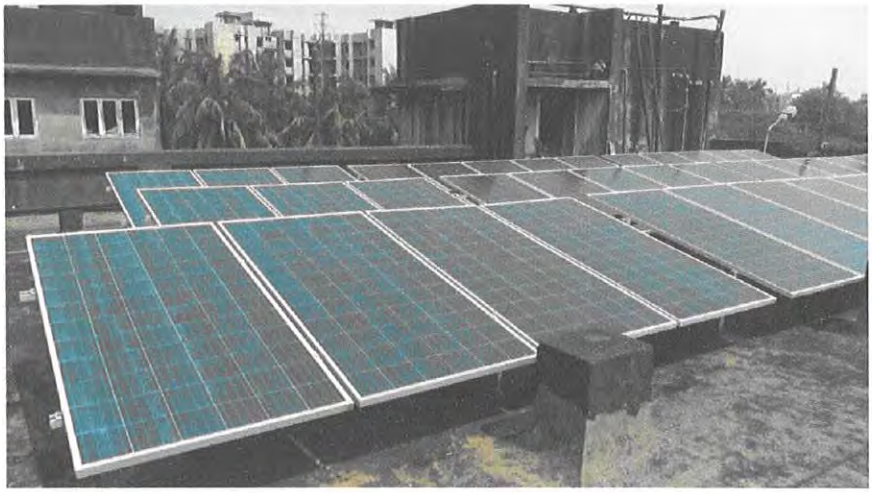
In the following Table, we present the reduction in CO_2 Emissions.

Table No 9: Computation of Reduction in Annual CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Roof Top Solar PV Plant Capacity	500	kWp
2	Average Daily Energy Generated	4	kWh/kWp
3	Annual Generation Days	300	Nos
4	Annual Solar Energy Generated	**600000**	**kWh**
5	Solar Water Heating System at Hostel Block	18000	LPD
6	Equivalent Electrical Energy saved by100 LPD System in 365 days	17985	kWh
7	Energy saved by 18000 LPD System in 200 Days	270000	kWh

8	Equivalent Electrical Energy saved by 18000 LPD System in 19-20=9855	147945	**kWh**
9	Total Renewable Energy usage = **(5) + (9)**	**747945**	**kWh**
10	1 kWh of Electrical Energy releases	0.8	Kg of CO_2
11	**Reduction in CO_2 Emissions in 19-20= (10) * 0.8/1000**	**598**	**MT**

Photograph of Roof Top Solar PV Plant:



Certified True Copy

Registrar
SNDT Women's University
Mumbai

CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 Solid Waste Management:

The Waste is segregated at source. Waste collection bins are placed at various locations to collect the Waste. It is further disposed through Government Authorities

Photograph of Waste Collection Bin:

4.2 E-Waste Management:

It is recommended to dispose of the E-Waste through Authorized Vendors.

Certified True Copy

Registrar
SNDT Women's University
Mumbai-20

CHAPTER-V
RAIN WATER HARVESTING

The University has implemented Rain Water Harvesting Project at Churchgate campus. The water collected is used to recharge the ring well.

Photograph of Rain Water Harvesting Pipe at Churchgate campus:

CHAPTER-VI
STUDY OF ENVIRONMENT FRIENDLY INITIATIVE

6.1 Sanitary Waste Incinerator: The University has installed as Sanitary Waste Incinerator.

Photograph of Sanitary Waste Incinerator: