

ENERGY AUDIT REPORT

of

MIT ART, DESIGN AND TECHNOLOGY UNIVERSITY

Loni Kalbhor, Pune 412201



Year: 2021-22

Prepared by



ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society
Near Mukhtangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com

REGISTRATION CERTIFICATES

Regn. No. EA-8192		No. 2942
National Productivity Council (National Certifying Agency)		
PROVISIONAL CERTIFICATE		
This is to certify that Mr. / Ms. <u>Achyut Yashavant Mehendale</u> son / daughter of Mr. <u>Yashavant</u> 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 fulfillment 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		 Controller of Examination
Date : 10 th August 2007		

BEE 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	10 th 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 Muktangam 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.
<ul style="list-style-type: none">• 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 REGIATRATION CERTIFICATE

ENGRESS SERVICES

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

Ref: EC/MITADT/21-22/01

Date: 19/7/2022

ENERGY AUDIT CERTIFICATE

This is to certify that we have conducted Energy Audit at MIT Art, Design and Technology University, Loni Kalbhor, Pune 412 201, in the year 2021-22.

The University has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings.
- Installation of 752.95 kWp Roof Top Solar PV Plant.
- Installation of 77500 LPD Solar Thermal Water Heating System at Hostel blocks.
- Usage of BEE STAR Rated Equipment
- Maximum Usage of Day Lighting

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

For Engress Services,

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	7
1	Introduction	8
2	Study of Connected Load	9
3	Study of Present Energy Consumption	11
4	Study of Carbon Foot printing	13
5	Study of Usage of Alternate Energy	15
6	Study of Usage of LED Lights	17

ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of MIT Art, Design and Technology University, Loni Kalbhor, Pune, for awarding us the assignment of Energy Audit of their Loni Kalbhor Campus for the Year: 2021-22.

We are thankful to all staff members for helping us in the Field Study.

EXECUTIVE SUMMARY

1. MIT Art, Design and Technology University, Loni Kalbhor, Pune consumes Energy in the form of **Electrical Energy**; used for various Equipment.

2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	3615957	3254.36
2	Maximum	448101	403.29
3	Minimum	166305	149.67
4	Average	301329.75	271.20

3. Initiatives adopted for Energy Conservation:

- Usage of LED Lights
- Installation of **752.95 kWp** Roof Top Solar PV Plant.
- Installation of **77500 LPD** Solar Thermal Water Heating System.

4. Usage of Renewable Energy:

- The Energy purchased in 21-22 is **3615957 kWh**.
- The University has installed Roof Top Solar PV Plant of Capacity **752.95 kWp**.
- Energy generated by Solar PV Plant in 21-22 is **826534 kWh**.
- Total Annual Electrical Energy Requirement is **4442491 kWh**.
- The percentage of Renewable Energy to Annual Energy requirement is **18.61 %**.

5. Study of Lighting:

- The Total LED Lighting Load of the University is **258.78 kW**.
- The Total Lighting Load of the University is **264.18 kW**.
- The % of LEDs to Total Lighting Load is **98 %**

6. Assumption:

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

7. Reference:

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

ABBREVIATIONS

AC	: Air conditioner
ADT	: Art, Design and Technology
MANET	: Maharashtra Academy of Naval Education & Training
DL	: 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
LPD	: Liters Per Day
LPG	: Liquefied Petroleum Gas

CHAPTER-I INTRODUCTION

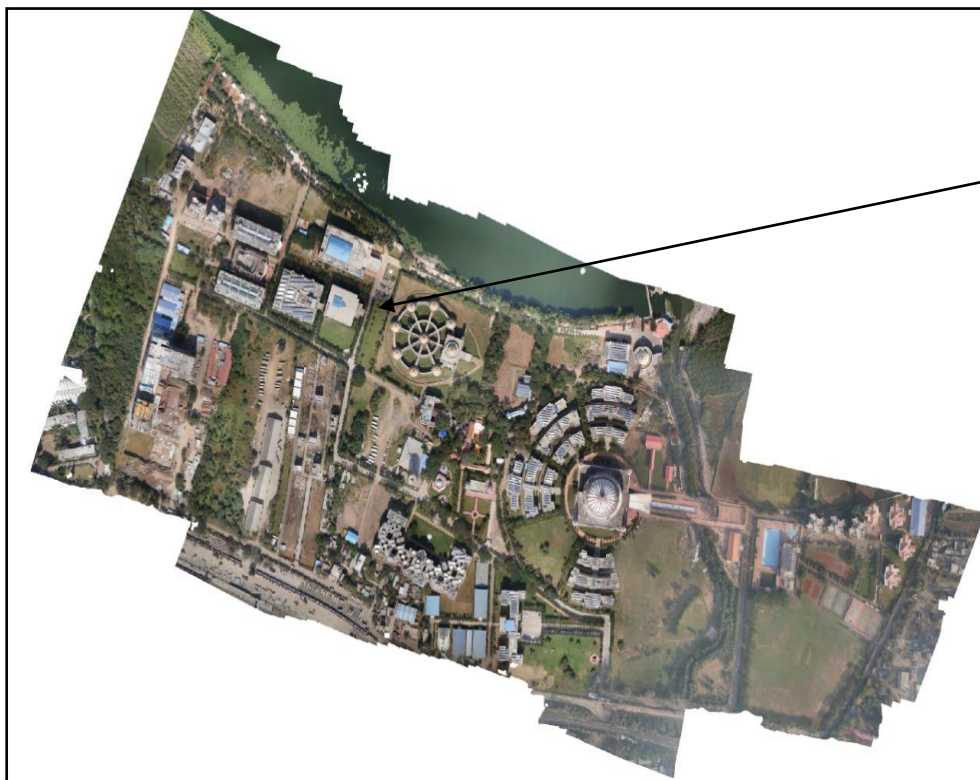
1.1 Objectives:

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 Table No 1: General Details of University:

No	Head	Particulars
1	Name of Institution	MIT Art Design and Technology University
2	Address	Loni Kalbhor, Pune 412 201
3	Latitude / Longitude	18.49 ⁰ / 74.02 ⁰

1.4 Google Earth Image:



University
Location

CHAPTER-II

STUDY OF CONNECTED LOAD

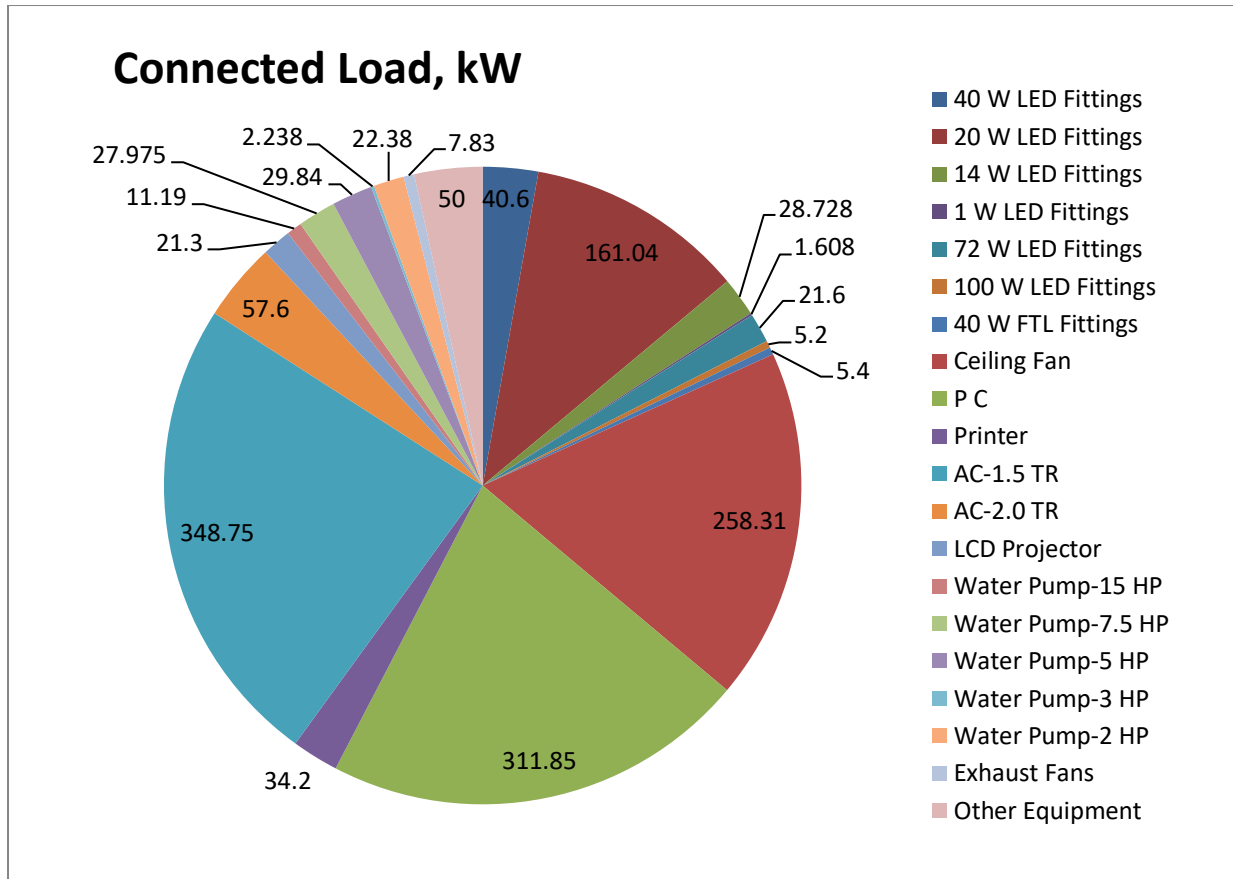
In this chapter, we present the details of various Electrical loads as under

Table No 2: Overall Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W LED Fittings	1015	40	40.6
2	20 W LED Fittings	8052	20	161.04
3	14 W LED Fittings	2052	14	28.728
4	1 W LED Fittings	1608	1	1.608
5	72 W LED Fittings	300	72	21.6
6	100 W LED Fittings	52	100	5.2
7	40 W FTL Fittings	135	40	5.4
8	Ceiling Fan	3974	65	258.31
9	P C	2079	150	311.85
10	Printer	228	150	34.2
11	AC-1.5 TR	186	1875	348.75
12	AC-2.0 TR	24	2400	57.6
13	LCD Projector	142	150	21.3
14	Water Pump-15 HP	1	11190	11.19
15	Water Pump-7.5 HP	5	5595	27.975
16	Water Pump-5 HP	8	3730	29.84
17	Water Pump-3 HP	1	2238	2.238
18	Water Pump-2 HP	15	1492	22.38
19	Exhaust Fans	435	18	7.83
20	Other Equipment	200	250	50
21	Total			1448

We present the same in a PIE Chart as under:

Chart No 1: Overall Connected Load:



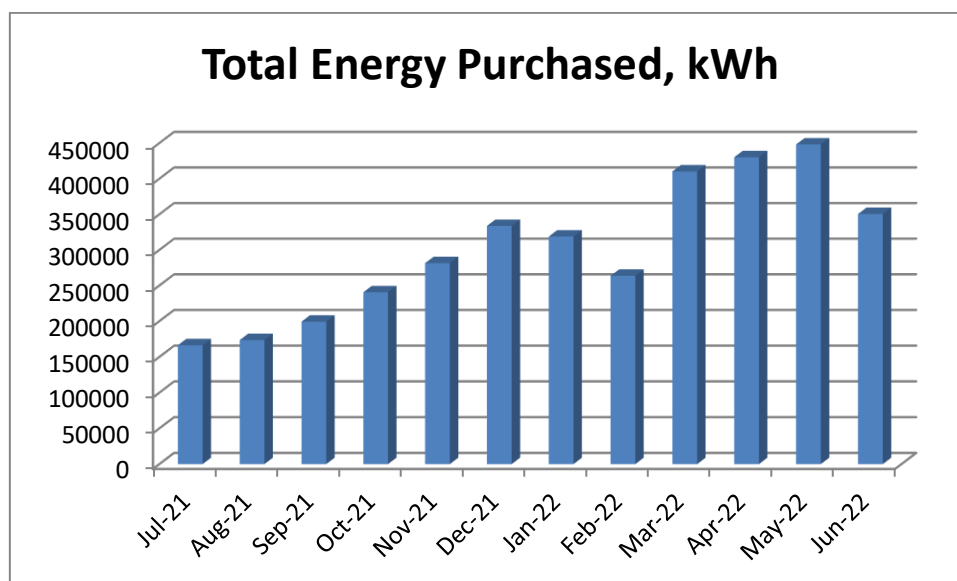
CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 3: Study of Consumption of Electrical Energy: 2021-22:

No	Month	Energy Purchased-Meter-1, kWh	Energy Purchased, Meter-2, kWh	Total Energy Purchased, kWh
1	Jul-21	92001	74304	166305
2	Aug-21	97300	76268	173568
3	Sep-21	109147	90151	199298
4	Oct-21	126712	113742	240454
5	Nov-21	137671	143775	281446
6	Dec-21	160813	172813	333626
7	Jan-22	171943	146826	318769
8	Feb-22	121060	142599	263659
9	Mar-22	193201	216964	410165
10	Apr-22	184975	245146	430121
11	May-22	223056	225045	448101
12	Jun-22	164420	186025	350445
13	Total	1782299	1833658	3615957
14	Maximum	223056	245146	448101
15	Minimum	92001	74304	166305
16	Average	148524.9167	152804.83	301329.75

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



Key Observations:

Table No 4: Various Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh
1	Total	3615957
2	Maximum	448101
3	Minimum	166305
4	Average	301329.75

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 various Equipment.

Basis for computation of CO₂ Emissions:

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

Table No 5: Month wise CO₂ Emissions:

No	Month	Energy Purchased-Meter-1, kWh	Energy Purchased, Meter-2, kWh	Total Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-21	92001	74304	166305	149.67
2	Aug-21	97300	76268	173568	156.21
3	Sep-21	109147	90151	199298	179.37
4	Oct-21	126712	113742	240454	216.41
5	Nov-21	137671	143775	281446	253.30
6	Dec-21	160813	172813	333626	300.26
7	Jan-22	171943	146826	318769	286.89
8	Feb-22	121060	142599	263659	237.29
9	Mar-22	193201	216964	410165	369.15
10	Apr-22	184975	245146	430121	387.11
11	May-22	223056	225045	448101	403.29
12	Jun-22	164420	186025	350445	315.40
13	Total	1782299	1833658	3615957	3254.36
14	Maximum	223056	245146	448101	403.29
15	Minimum	92001	74304	166305	149.67
16	Average	148524.9167	152804.83	301329.75	271.20

Chart No 3: Representation of Month wise CO₂ Emissions:

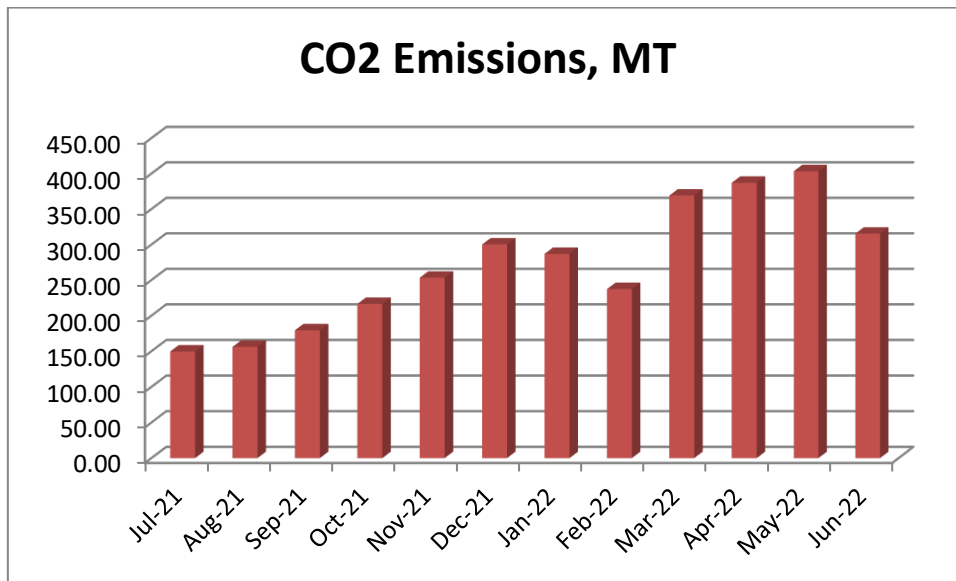


Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	3615957	3254.36
2	Maximum	448101	403.29
3	Minimum	166305	149.67
4	Average	301329.75	271.20

CHAPTER-V

STUDY OF USAGE OF RENEWABLE ENERGY

The University has installed Roof Top Solar PV Plant, on various buildings as well as Solar Water Heating System on Hostel Blocks. 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 Plants:

No.	Building Name	Installed Capacity, kW	Average Energy Generation, (Per year) KWh
1	MANET Administration Building	108.0	118,389.60
2	MANET Hostel Building (ABC Block)	80.8	88,740.00
	MANET Hostel Building (DEF Block)	80.8	88,740.00
4	MITSOER Building	54.0	59,194.80
5	Boat club Building	54.0	59,194.80
6	Carpenter Shed	27.0	29,649.60
7	Health Club or Sports Complex	54.0	59,194.80
8	Raj Auditorium or Amphi Theatre	54.0	59,194.80
9	School of Film and Television Building (1st Floor & 2nd Floor)	66.5	73,080.00
	MIT ISBJ (3rd Floor & 4th Floor)	66.5	73,080.00
10	IT Establishment SOE (Gr to 6th	35.2	38,628.00
	MIT COM (7 & 8 Floor)	8.6	9,500.40
10	Bakery Shade	47.5	52,200.00
11	Staff Quarter Loni	16.2	17,748.00
Total		752.95	826,534.80

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

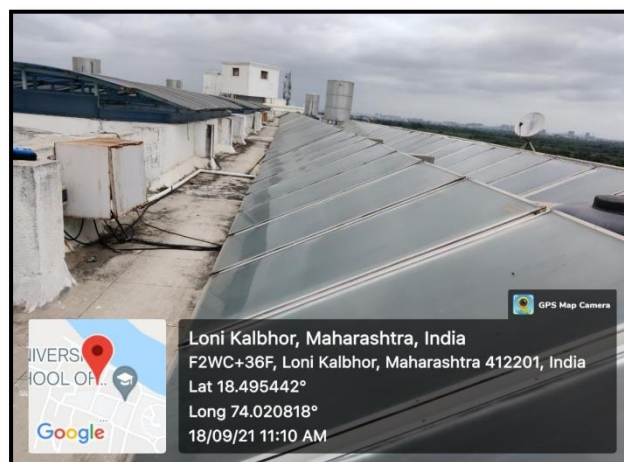
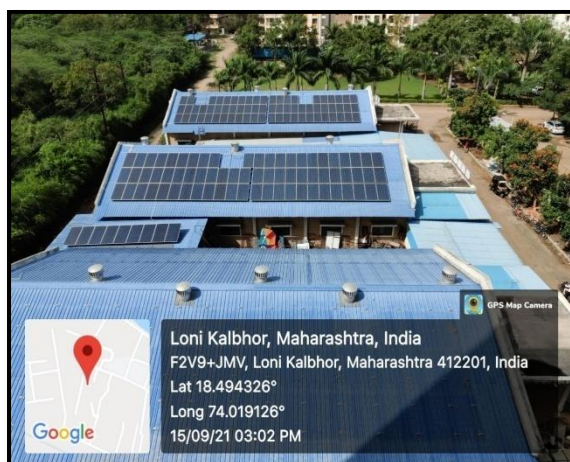
No	Location	Capacity in LPD
1	MANET-Hostel- G	6000
2	MANET-Hostel- E	5000
3	MANET-Hostel- F	5000
4	Guest House Building	2500
5	Staff Quarter-1	5000
6	Design College- Girls Hostel	36000
7	Design College- Boys Hostel	18000
8	Total	77500

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	Annual Energy Purchased from MSEDCL	3615957	kWh
2	Installed Solar PV Plant Capacity	752.95	kWp
3	Annual Electrical Energy generated by Solar PV Plant	826534	kWh
4	Total Annual Energy Requirement = (1) + (3)	4442491	kWh
5	% of Alternate Energy to Annual Energy Demand= (3)*100/ (4)	18.61	%

Photograph of Solar PV Plant & Solar Thermal Water Heating System:



CHAPTER VI

STUDY OF USAGE OF LED LIGHTS

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 40 W LED Fittings	1015	Nos
2	Load of 40 W LED Fitting	40	W
3	Total Load of 40 W LED Fittings	40.6	kW
4	No of 20 W LED Fittings	8052	Nos
5	Load of 20 W LED Fitting	20	W
6	Total Load of 20 W LED Fittings	161.04	kW
7	No of 14 W LED Fittings	2052	Nos
8	Load of 14 W LED Fitting	14	W
9	Total Load of 14 W LED Fittings	28.728	kW
10	No of 1 W LED Fittings	1608	Nos
11	Load of 1 W LED Fitting	1	W
12	Total Load of 1 W LED Fittings	1.608	kW
13	No of 72 W LED Fittings	300	Nos
14	Load of 72 W LED Fitting	72	W
15	Total Load of 72 W LED Fittings	21.6	kW
16	No of 100 W LED Fittings	52	Nos
17	Load of 100 W LED Fitting	100	W
18	Total Load of 100 W LED Fittings	5.2	kW
19	No of 40 W FTL Fittings	135	Nos
20	Load of 40 W FTL Fitting	40	W
21	Total Load of 40 W FTL Fittings	5.4	kW
22	Total LED Lighting Load =3+6+9+12+15+18	258.78	kW
23	Total Lighting Load = 3+6+9+12+15+18+21	264.18	kW
24	% of Usage of LED to Total Lighting Load = 22*100/23	98.0	%