A Report on

ENERGY AUDIT

HIGHER AND TECHNICAL INSTITUTE, MIZORAM (HATIM)

Prepared By:

Power & Electricity Department
Government of Mizoram: Lunglei District

Prepared For:
The Higher and Technical Institute, Mizoram (HATIM)

A REPORT ON

ENERGY AUDIT

AT

HIGHER AND TECHNICAL INSTITUTE, MIZORAM (HATIM)

Submitted to

The Principal

Higher and Technical Institute, Mizoram (HATIM)

Submitted by

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PREFACE

Data collection for energy audit of the Higher and Technical Institute, Mizoram (HATIM) was conceded by team for the period of July, 2022 to June, 2023.

This audit was intended to enquire about convenience to advance the campus's energy competence. All data were collected from each classroom, laboratory, and other spaces available. The task is performed by determining the number of tube lights & bulbs, fans, air conditioners, electrical appliances, and so on, that are available in each room and other areas. The extent to which each component contributed to total electricity use was also investigated.

We appreciate the effort made by the college administration to raise knowledge of Energy Audit, the usage of renewable energy such as solar energy, and their importance in efficient energy savings and protecting our environment.

We really appreciate the Principal and IQAC of the college for encouraging the initiatives to do the energy audit. Through this, we have cleared the vision of the Institution towards the Green campus and towards saving our green nature.

ENERGY AUDIT ASSESSMENT TEAM

Internal Team:

1. Vuansanga Vanchhawng	Principal: HATIM	
2. Dr.John C Lalduhsaka	Co-ordinator: IQAC	
3. K.Lalmuanpuia	Asst. Co-ordinator: IQAC	
4. H.Lalruatkima	Asst. Professor: HATIM	
5. R.Lalramzauha	Maintenance Staff (Electrician)	
6. T.Lalrinmuana	Work Supervisor	

External Team:

1. J.V. LALTHANGLUAIA	SDO (Electrick)	
2. A.C. ZOSANGLIANA	JE (Electric)	

Sub-Divisional Officer
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EXECUTIVE SUMMARY

The objective of the audit was to study the energy consumption pattern of the facility, identify the areas where potential for energy/cost saving exists and prepare proposals for energy/cost saving along with investment and payback periods.

The salient observations and recommendations are given below.

1. **Energy sources of Higher and Technical Institute, Mizoram (HATIM) are in the following forms:**

   a) From Power and Electric Department, Govt. of Mizoram
   b) High Speed Diesel Generator (HSDG)
   c) Solar panel
   d) Other, If any

Electrical energy is used for various applications, like: Computers, Lighting, Fans Other Laboratory Equipment, Printers, Xerox machines, CCTV, UPS, LCD Projector, Router system, Floodlight, Pumping motor etc.

2. The average cost of energy is around Rs. 27434.92 per month

3. After the measurement and analysis, we propose here with following Energy Efficiency Improvement measures.

INTRODUCTION

The Higher and Technical Institute, Mizoram (HATIM), entrusted the work of conducting a detailed Energy Audit of campus with the objectives given as bellow:

- To study the present pattern of energy consumption
- To identify potential areas for energy optimization
- To recommend energy conservation proposals with recommendation.

Energy Audit:

The objective of Energy Audit is to balance the total energy inputs with its use and to identify the energy conservation opportunities in the stream. Energy Audit also gives focused attention to energy cost and cost involved in achieving higher performance with analysis.

The energy audit began with the teams walking through all the different facilities at the college, determining the different types of appliances and utilities (lights, taps, toilets, fridges, etc.) as well as measuring usage per item (watts indicated on appliances) and identifying the relevant consumption patterns (such as how often an applicant is used) and their impacts.

Data Collection:

In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements.

Following steps were taken for data collection:

a) The team went to each department, centres, library, canteen etc.
b) Data about the general information was collected by observation and interview.
c) The power consumption of appliances was recorded by taking an average value in some cases

Data Analysis:

Detailed analysis of data collected include: calculation of energy consumption, analysis of latest electricity bill of campus.

Recommendation:

On the basis of results of data analysis and observations, some steps for reducing power and water consumption were recommended. Proper treatments for e-waste were also suggested.

ENERGY CONSUMPTION PROFILE (Source of Energy):

1. ***Electricity from Power and Electricity Department, Govt. of Mizoram (P&E Dept.)***

   Electricity bill of Higher and Technical Institute, Mizoram (HATIM) for the period from July 2022 to June 2023.

Sl.No.	Month	Bill Amount	Unit Consumed (Kwh)
1	21-7-2022	₹ 19,550.00	2150
2	18-8-2022	₹ 26,940.00	2967
3	24-9-2022	₹ 29,455.00	3270
4	19-10-2022	₹ 25,655.00	2938
5	21-11-2022	₹ 24,435.00	1882
6	14-12-2022	₹ 43,490.00	3233
7	17-01-2023	₹ 28,024.00	3169
8	13-02-2023	₹ 12,480.00	1260
9	15-03-2023	₹ 21,900.00	2425
10	16-04-2023	₹ 28,630.00	3178
11	17-05-2023	₹ 34,150.00	3792
12	19-05-2023	₹ 34,510.00	3832
Total		**₹ 329,219.00**	**34096 units**
Average		**₹ 27,434.92**	**2841 units**

Out of total electricity bill paid, **53 percentage** are actual energy utilized charges and remaining expense belongs to additional taxes on energy consumption

2. DIESEL GENERATOR (DG):

The institution has two Diesel Generators

(i) 10 KVA Diesel Generator

Generator Specifications

1. COMPANY - KIRLOSKAR OIL LIMITED
2. MODEL - SE KG 10 A S5
3. MACHINE NO. - D8.1612.92/1200217
4. KVA - 10
5. KW - 8.8
6. VOLTAGE - 230 V
7. CURRENT - .A
8. POWER FACTOR - 0.8

(ii) 25 KVA Diesel Generator

Generator Specifications

1. COMPANY - FG WILSON
2. MODEL NO -
3. MACHINE NUMBER - E1807168
4. KVA - 25
5. KW - 31.4
6. VOLTAGE - 415 V
7. CURRENT - A

3. *SOLAR PANEL:*

The Higher and Technical Institute, Mizoram (HATIM) has the following Solar Power supply

(a) Solar Power Station with 35 panels and an output of 10 KW.

(b) Six Integrated Solar Street Lamps around the campus

(c) Solar Water Heater in Boys Hostel

4. *Major Consumers of Electricity on the Campus*

(a) Computers

(b) Lighting

(c) Fansa

(d) Printers

(e) Xerox Machines

(f) CCTV

(g) LCD Projectors

(h) UPS

(i) Router System

(j) Pumping Motor

ACTUAL MEASUREMENT AND ITS ANALYSIS

List of Electrical and Electronic Equipment's used in Higher and Technical Institute, Mizoram (HATIM)

List of Electrical and Electronic Equipment's used in Higher and Technical Institute, Mizoram (HATIM)

S.N	Room	Name of the equipment	Power Rating (watt)	Qty.	Power consumption (watt/hr)	Used per Day (hr)	Power Consumption per day (watt)
1	**Administrative Block**	Fan	55	14	770	3	2310
		LED Tube	20	7	140	1	140
		Desktop	170	10	1700	2	3400
		Printer	259	8	2072	1	2072
		Photocopier	1200	1	1200	1	1200
		Panel LED	12	50	600	1	600
		Projector	296	1	296	1	296
		CCTV	10	4	40	24	960
		Water cooler	750	0	0	0	0
		Water filter	25	3	75	2	150
		Inverter	10.5	3	31.5	2	63
		AC	0	0	0	0	0
		LED Bulb	9	5	45	1	45
2	**Library**	Fan	55	8	440	3	1320
		LED Tube	20	33	660	4	2640
		LED Panel	15	0	0	4	0
		Desktop	210	7	1470	2	2940
		Printer	340	2	680	1	680
		Water filter	25	1	25	3	75
		Photocopier	800	2	1600	1	1600
		Projector	0	0	0	0	0
		CCTV	10	2	20	24	480
		AC	0	0	0	0	0
		Inverter	10.5	1	10.5	2	21
		Warmer	150	2	300	1	300
3	**Academic Block 'A'**	Fan	55	16	880	3	2640
		LED Tubelight	20	20	400	1	400
		LED Bulb	9	6	54	1	54

		Water Cooler	390	1	390	2	780
		Water Filter	25	1	25	2	50
		Desktop	210	1	210	2	420
		Printer	340	1	340	0.5	170
		CCTV	10	3	30	24	720
		Projector	296	4	1184	2	2368
4	**Academic Block C**	LED Bulb	9	3	27	2	54
		Fan	55	17	935	3	2805
		LED Tubelight	18	41	738	2	1476
		CCTV	10	0	0	0	0
		Water Cooler	390	1	390	2	780
		Water Filter	25	2	50	2	100
		AC	0	0	0	0	0
		Projector	181	5	905	2	1810
		Desktop	210	1	210	3	630
		Printer	340	3	1020	1	1020
5	**Cafeteria**	LED tubelight	20	6	120	0.5	60
		Fan	70	4	280	3	840
		CCTV	0	0	0	0	0
		Refrigerator	350	1	350	8	2800
		Water filter	0	0	0	0	0
6	**Students Center**	Fan	55	2	110	2	220
		LED Tubelight	20	4	80	0.5	40
		LED bulb	9	4	36	0.5	18
		Refrigerator	350	1	350	8	2800
		Coffee Machine	500	2	1000	1	1000
7	**Girls Hostel**	AC	0	0	0	0	0
		Fan	55	48	2640	2	5280
		LED Tubelight	18	81	1458	4	5832
		LED Bulb	7	86	602	4	2408
		Water cooler	392	1	392	2	784
		Water filter	0	0	0	0	0
		Refrigerator	350	1	350	8	2800
		Inverter	10.5	1	10.5	6	63
		TV	124	1	124	2	248
		Desktop	150	1	150	2	300
8	**Boys Hostel**	LED Bulb	9	33	297	4	1188
		Fan	55	12	660	3	1980

		LED Tubelight	18	75	1350	4	5400
		CCTV	10.5	6	63	24	1512
		Projector	0	0	0	0	0
		Water Cooler	392	1	392	6	2352
		Refrigerator	350	1	350	8	2800
		Water Filter	0	0	0	0	0
		AC	0	0	0	0	0
		TV	124	1	124	3	372
		Desktop	210	1	210	2	420
9	**Guard Room**	Fan	55	1	55	3	165
		LED Panel	15	3	45	4	180
		LED Tubelight	20	2	40	4	160
		CCTV	10.5	2	21	24	504
10	**Auditorium**	LED bulb	12	1	12	0.5	6
		Panel LED	18	32	576	0.5	288
		Sound Mixer	1100	1	1100	0.5	550
		Amplifier	255	1	255	0.5	127.5
		Speaker	200	10	2000	0.5	1000
		Fan	55	6	330	1	330
		Projector	181	1	181	1	181
		Musical Keyboard	28	1	28	0.5	14
		E-Drums	800	1	800	0.5	400
11	**IT CENTER**	Desktop	210	37	7770	2	15540
		Fan	55	7	385	2	770
		Projector	296	1	296	1	296
		UPS (10 KVA)	4000	1	4000	1	4000
		Printer	340	1	340	0.5	170
		LED tubelight	18	9	162	2	324
12	**Museum**	LED Tubelight	18	9	162	2	324
13	**Language Lab.**	Fan	55	5	275	1	275
		LED Tubelight	18	5	90	1	90
14	**Psychology Lab.**	Fan	55	2	110	0.5	55
		LED Tubelight	18	4	72	0.5	36
Total energy consumed per day = 104871 watt/day							

LIGHTING SYSTEM

Observations

- The whole campus is LED equipped.
- The highest watt used is 50 W for street Light and the lowest watt used is 7 W for bathrooms and smaller rooms.
- Two three phase connection (Boys Hostel and Administrative Block) and the rest are single Phase Connection.
- Three Back-up System – Two Diesel Generators and 10 KW solar Station

Suggestions:

Don't forget to power down the settings when not in use:

- Lights
- Heaters and fans
- Printers and scanners
- Battery and phone chargers
- Computers
- Kitchen gadgets such as blenders, kettles, toasters etc.

Study of Air Conditioners

Air conditioners can have many advantages, including improved air quality, better sleep, and humidity control. However, they also have some disadvantages, such as high energy consumption and environmental impact.

The higher and technical institute Mizoram (HATIM) has one very good noteworthy practice for energy conservation and contributing to the environment against any negative impact is that there is no installed Air Conditioner in any of the classrooms and offices or in any spaces inside the campus. Almost all rooms are well ventilated with plenty of windows and ventilators for sufficient air flow.

CONCLUSIONS:

The Higher and Technical Institute, Mizoram (HATIM) has implemented quite a commendable approach towards energy consumption and conservation. Noteworthy points are as under:

- Well-ventilated and naturally well-lit classroom using windows and ventilators and wide doors.
- The campus is eco-friendly and endowed with lots of plantations.
- None of the classrooms, offices, and other spaces is fitted with Air Conditioners, thereby saving lots of energy consumption using Air conditioning.
- The institution has independent solar panel-charged street lights
- The institution has installed all power-saving lightings such as LED panel lights, LED tubes and etc.
- It is equipped with 3 power backup system

General Recommendations

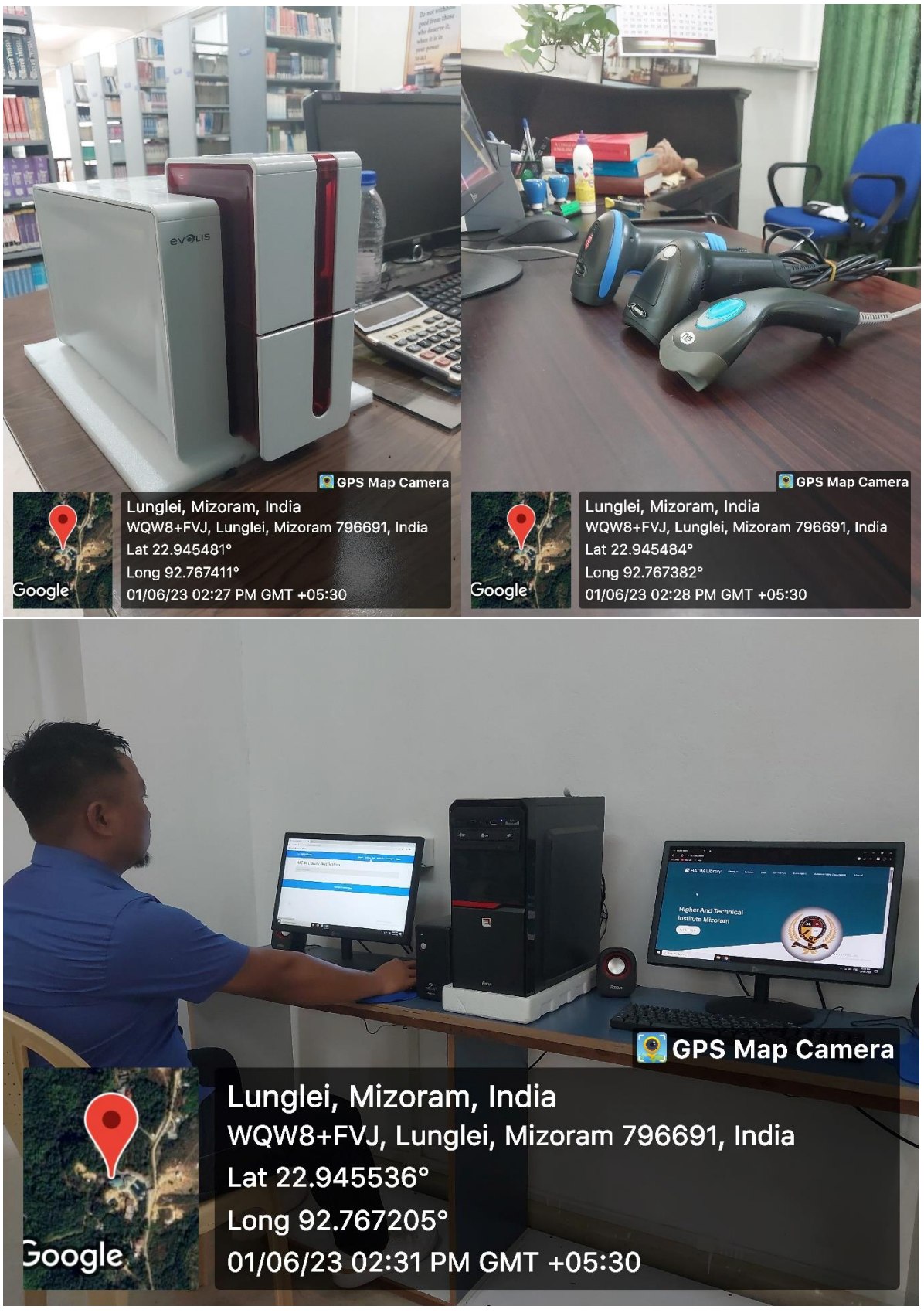
- All Classrooms and labs to have Display Messages regarding the optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Display Stickers or chars or images depicting “save electricity, save nature” everywhere on campus. So that all stakeholders are encouraged to save electricity.
- Most of the time, all the tube lights in a class room are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF.
- Lights in toilets may be kept OFF during daytime and when not in use
- Recently govt. has declared the exemption on electricity duty charges for school and colleges trying to get the benefit of the same as soon as possible.

PHOTOGRAPHS:

Pic: Solar Panels near Men's Residence

Pic: 25 KVA Diesel Generator

Pic: Xerox Machine & Printers at the LIBRARY

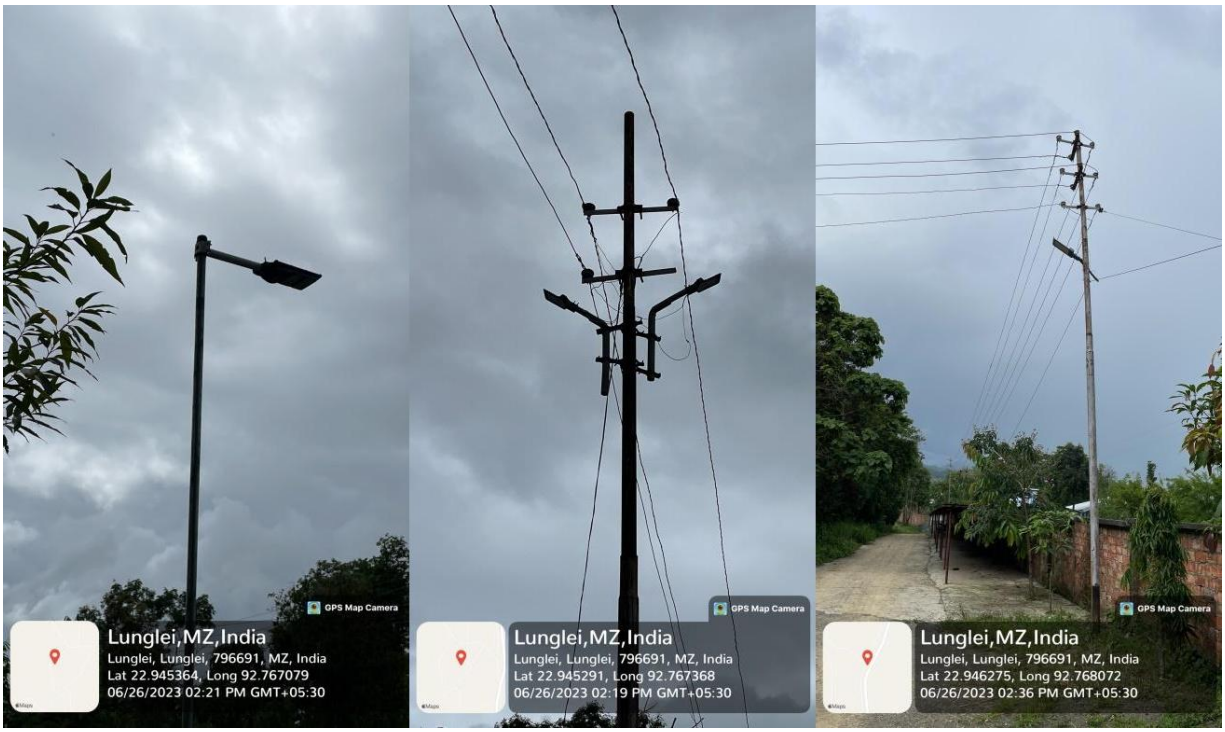


Pic: Computer System & Bar Code Reader at Library.

Pic: Solar Panels near Men's Residence

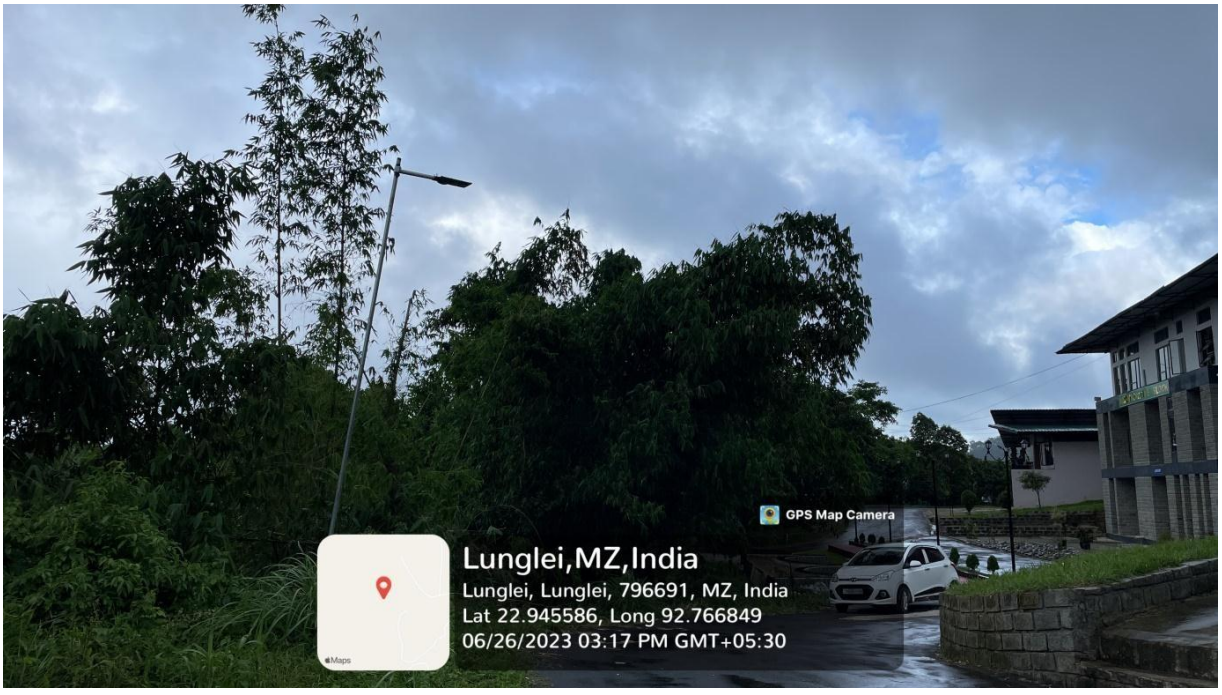
Pic: Solar Panels near Men's Residence

Pic: Solar Street Light at Sculpture Garden



Pic: Solar Street Light at Students Parking lot

Pic: Solar Street Light at College Campus

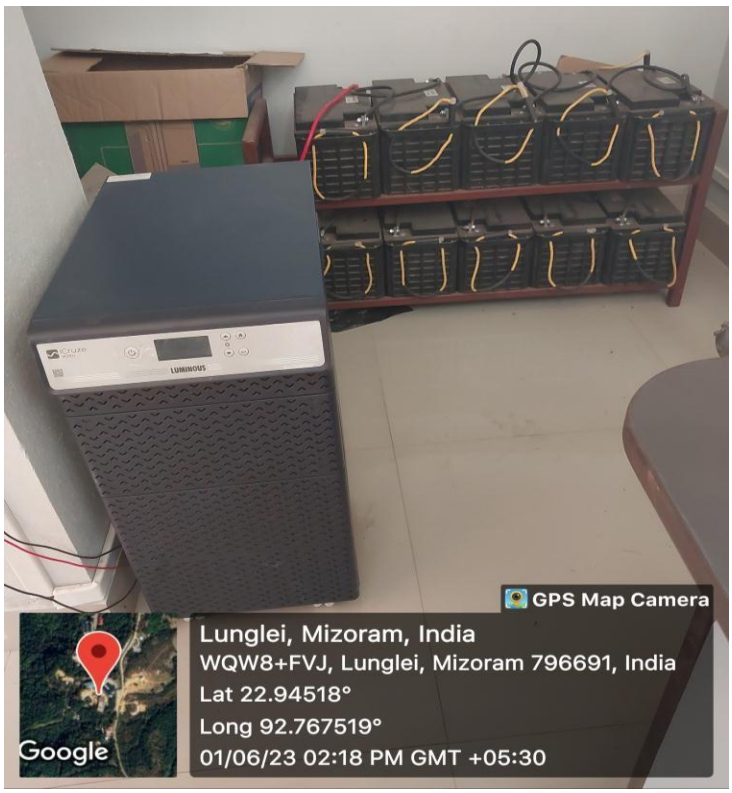


Pic: Solar Street Light at College Campus

Pic: Solar Powered Street lights

Pic: 10 KVA Kirloskar Diesel Generator

Pic: 25 KVA Diesel Generator



Pic: 10 KVA UPS with Battery at IT CENTER