



**Energy Audit Report
Malwanchal University, Indore
Year 2021-22**



**ENERGY AUDIT REPORT
CONSULTATION REPORT**



Malwanchal University
Nemawar Road NH59A, Indore
Madhya Pradesh
452016

PREPARED BY

EBST SOLUTIONS PRIVATE LIMITED

Office Add: 41, Sector B Nyay Nagar Extension Behind
Malviya Petrol Pump, Indore 452010 (M.P.)
Contact: +91- 78693-27256, 98261-77621
E-mail: ebstsolutions@gmail.com
(2021-22)

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Malwanchal University
Indore (M.P.)

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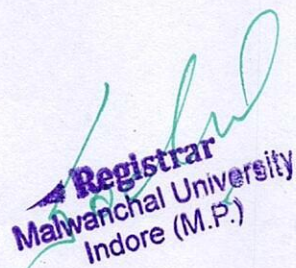
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ACKNOWLEDGEMENT

EBST Solutions Private Limited (ESPL), Indore (M.P) takes this opportunity to appreciate & thank the management of Malwanchal University, Indore for giving us an opportunity to conduct energy audit for the company.

We are indeed touched by the helpful attitude and co-operation of all administrative and technical staff, who rendered their valuable assistance and co-operation during the energy audit in your premises.




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Rajesh Kumar Singadiya
(Director)

M.Tech (Energy Management)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS] from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

Certificate of Accreditation

**BUREAU OF ENERGY EFFICIENCY**

Examination Registration No.: **EA-7271**
Accreditation Registration No.: **AEA-284**



Certificate of Accreditation

This is to certify that Mr./Ms. **Shri. Rajesh Kumar Singadiya** having its trade/registered office at has been given accreditation as accredited energy auditor. The certificate shall be effective from **9th** day of **May, 2018**


The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.


This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **284** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **5th** day of **October, 2018**

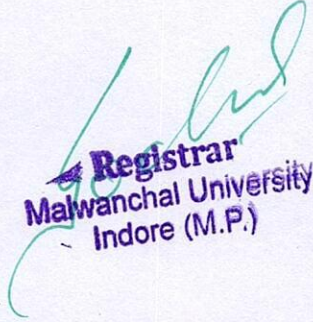

Secretary,
Bureau of Energy Efficiency
New Delhi


Registrar
Malwanchal University
Indore (M.P.)

Energy Audit Team

The study team constituted of the following senior technical executives from **EBST Solutions Private Limited Indore (M.P)**

- **Mr. Rakesh Pathak**, [Director & Electrical Expert]
- **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- **Mr. Hemendra Khadekar** [Executive Director & Electrical Engineer]
- **Mrs. Laxmi Raikwar Singadiya** [HR & Admin]
- **Mr. Lalit Jain** [A Class Contractor & Engineer]


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EXECUTIVE SUMMARY

The executive summary of the energy audit report furnished in this section briefly gives the identified energy conservation measures and other recommendation during the project that can be implemented in a phased manner to conserve energy, increase productivity inside the Company campus.

INITIATIVES TAKEN BY COMPANY

➤ ENERGY EFFICIENT

- University has installed some LED lights in premises to save energy-**Its Appreciable**

➤ SOLAR ENERGY

- **237.6 KWp** Solar photovoltaic rooftop installation-**Its Appreciable**

ENERGY AUDIT RECOMMENDATIONS:-

➤ CEILING FAN

- It is recommended to replacement of “conventional ceiling Fans (60 Watt)” by energy efficient star rated BLDC fans (28 Watt). It has great potential for energy saving. Expected energy saving potential is 65,89,977 kWh/Year.

➤ LED light

- It is recommended to replacement of “conventional Tube light (40 Watt)” by energy efficient LED light (28 Watt). It has good potential for energy saving. Expected energy saving potential is 10,09,734 kWh/Year.

OTHER RECOMMENDATIONS:-

➤ TIMER CONTROLLED ON STREET LIGHTS

- It is recommended to Installation of stand alone solar street lights with auto ON-Off timer control for Company campus.

➤ MOTION SENSOR

- It is recommended to installation of motion sensor in officers cabins, toilets and non-working areas to save energy.

➤ IOT BASED ENERGY MONITORING SYSTEM.

- Installation of “Cloud based (IoT technology) energy monitoring system” including harmonic measurement (total voltage and current harmonic distortion %).

CHAPTER-1 INTRODUCTION

1.1 About Malwanchal University

Malwanchal University has world-class facilities that are equipped with the latest technologies and tools, offering a computer lab to give experiences in the industry and practical experience. In addition to providing internet access and various other services for its staff and students as well. Separate hostels for girls and boys: there are distinct areas for students of all ages to stay in. The college receives a lot of students each year, which is why it has great accommodation for male and female students throughout its campuses. In addition, it offers double and single rooms and double rooms. Rooms are equipped with all the essential amenities, including electric and water. The campus also features an in-built medical facility to provide any medical emergency students might require.

The campus is also home to a cafeteria that serves a wide range of beverages and food items for students. It's definitely a clean and well-stocked cafeteria which allows students to eat whenever they wish. The beautiful greenery of the university as well as its top-of-the-line infrastructure can be observed through the well-maintained and well-equipped campus. There are ample areas and fields for students to enjoy and take part in any outdoor pursuit they would like to engage in. The university definitely provided moot courts for the practical experience that law student. The university specifically created a massive and well-stocked library that contains new books magazines, newspapers, and other publications for students to browse through and broaden their knowledge. It's certainly an electronic database of high-quality for teachers and students.



Fig.-1.1 Malwanchal University Campus

Mission

The mission of Malwanchal University is to provide quality education and training in all its courses with the state of art infrastructure. We educate the citizens and citizen-leaders of our society. We do this through our commitment to the transformative power of education.

Vision

Malwanchal University sets the standard for high quality sciences and liberal arts education. We impart world class knowledge, training and professional experience to students and professional interested in making a career in Health and Technical Sciences, and other subjects related to humanities. For this, we are committed towards creating and sustaining the conditions that enable students to experience an unparalleled educational journey that is intellectually,

CORE VALUES OF MALWANCHAL UNIVERSITY

Keeping in view our Malwanchal University's vision, we commit ourselves to the following core values:

- Being **respectful** by embracing diversity and treating others collegially with openness, professionalism and courteously in all interactions and activities.
- Being **accountable** by ensuring academic, professional, fiscal integrity and value through prudent management of resources provided.
- Maintaining one's **integrity** by being honest, fair and ethical thereby creating a culture of trust during all University activities and decision making.
- Encouraging, considering and supporting new ideas and supporting **innovation** by fostering individual ingenuity and creativity to in turn create an environment with opportunities for growth and progress.
- A sense of **inclusion** through cultivating an inclusive living, learning and working community thereby facilitating progress and success of all those involved and thus supporting all individuals.
- Exhibiting **excellence** through serving the scholarly community by delivering high quality teaching, service and extended educational as well as extracurricular programmes.
- **Collaborating** to work towards common goals with others in the University and the community while valuing teamwork, participation and diversity of ideas and perspectives.
- To contribute towards nurturing **leadership** qualities amongst the students and staff who eventually will become well educated leaders and global citizens thus excelling in addressing the challenges of the future.

OUR INSTITUTIONS:

- Index Medical College, Hospital & Research Centre
- Index Institute of Dental Sciences
- Index Nursing College
- Department of Physiotherapy and Paramedical Sciences
- Department of Pharmacy
- Index Institute of Pharmacy

ACCREDITATIONS & AFFILIATIONS

- NABH Certification - PEH-2019-0966
- ISO 9001:2015
- NABL Certificate
- Recognition from UGC
- Approval from INC for PhD in Nursing

Membership of AIU Malwanchal University has become the member of the Association of Indian Universities(AIU). A lot of good information and scholarly articles are sent by AIU through its website and magazines. All members of the faculties will be benefited by the material sent by it and attending future conferences and seminars.

Additional services

The campus does provide transportation to move around the campus, as it covers a vast area. It is a free service for faculty and students. There is also a convenience store on the campus where students can purchase anything they want to purchase. It has items for everyday necessities and other items. The campus has an auditorium that is world class with audio and lighting systems for shows or gatherings that are performed by students, as well as for official gatherings. Gym and exercise equipment specifically for students who want to exercise or train in any way, and is specifically built within the university within the university itself. The campus has an area for dance and music for students who want to learn about dancing or music as an extracurricular pursuit.

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1.2 About Energy Audit

Energy audit helps to understand more about the ways energy is used in any plant and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to final consumer becomes 50%. Hence one unit saved in the end user is equivalent to two units generated in the power plant.

Energy audit is the most efficient way to identify the strength and weakness of energy management practices and to find a way to solve problems. Energy audit is a professional approach in utilizing economic, financial, and social and natural resources responsibility. Energy audits “adds value” to management control and is a way of evaluating the system.

EBST Solutions Private Limited (ESPL), Indore M.P. carried out the “Energy Audit” at the site to find gaps in the energy consumption pattern for Hind Filters Private Limited, Dewas. A technical report is prepared as per the need and the requirement of the company.

1.3 Objectives of Energy Auditing

An energy audit provides vital information base for overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures. It aims at

- Identifying the quality and cost of various energy inputs.
- Assessing present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of thermal and electrical energy economy.
- Highlighting wastage in major areas.
- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.

1.4 Methodology

Methodology adopted for achieving the desired objectives viz.: Assessment of the current operational status and energy savings include the following.

- Discussions with the concerned officials for identification of major areas of focus and other related systems.
- Capacity and efficiency test of major utility equipment's, wherever applicable.
- Trend analysis of costs and consumptions.

- Team of engineers visited the site and had discussions with the concerned officials / supervisors to collect data / information on the operations and load distribution within the plant and same for the overall premises. The data was analyzed to arrive at a base line energy consumption pattern.
- Measurements and monitoring with the help of appropriate instruments including continuous and / or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- Estimation of various losses
- Computation and in-depth analysis of the collected data, including utilization of computerized analysis and other techniques as appropriate were done to draw inferences and to evolve suitable energy conservation plan/s for improvements/ reduction in specific energy consumption.

1.5 Present Energy Scenario.

The source of electrical power supply to Malwanchal University is grid (MPPKVCL) and solar system. University contract demand with grid MPPKVCL is 500 KVA. The electricity bill is based on the MPPKVCL, 33 KV supply and Tariff Category HV-3.2B Non-Industrial. The total solar system installed capacity is 237.6 KWp rooftop mounted.

Total billing amount Rs. 2,66,95,183/- of electricity bills of Malwanchal University has been found for consumed units 29,18,300- for last 12 months analysis period from April-21 to March-22.

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CHAPTER- 2 POWER SUPPLY SYSTEM

2.1 Power system & Transformer

The power supply for University is from MPPKVCL with the help of 33 KV feeders under and Tariff category HV-3.2.B Non-Industrial. University has contract demand 500 KVA. There is one step down transformer with 950 KVA capacities. The details are given in tables.

Table 2.1: - Technical Specifications of Transformer

Sr. No.	Items	Technical Detail
1	Make	Power Star
2	Year	2021
3	Sr. No	PSI-950/2140
4	Rating (kVA)	950
5	Voltage (HV/ LV)	33000/433
6	Current Rating (HV/ LV)	16.62/1266.74
7	Frequency (Hz)	50
8	Impedance at 75°C	5.0%
9	Vector group	Dyn-11
10	Type of cooling	ONAN
11	Total no of Tap	5
12	Ideal Tap Position	3
13	Actual Tap position	3

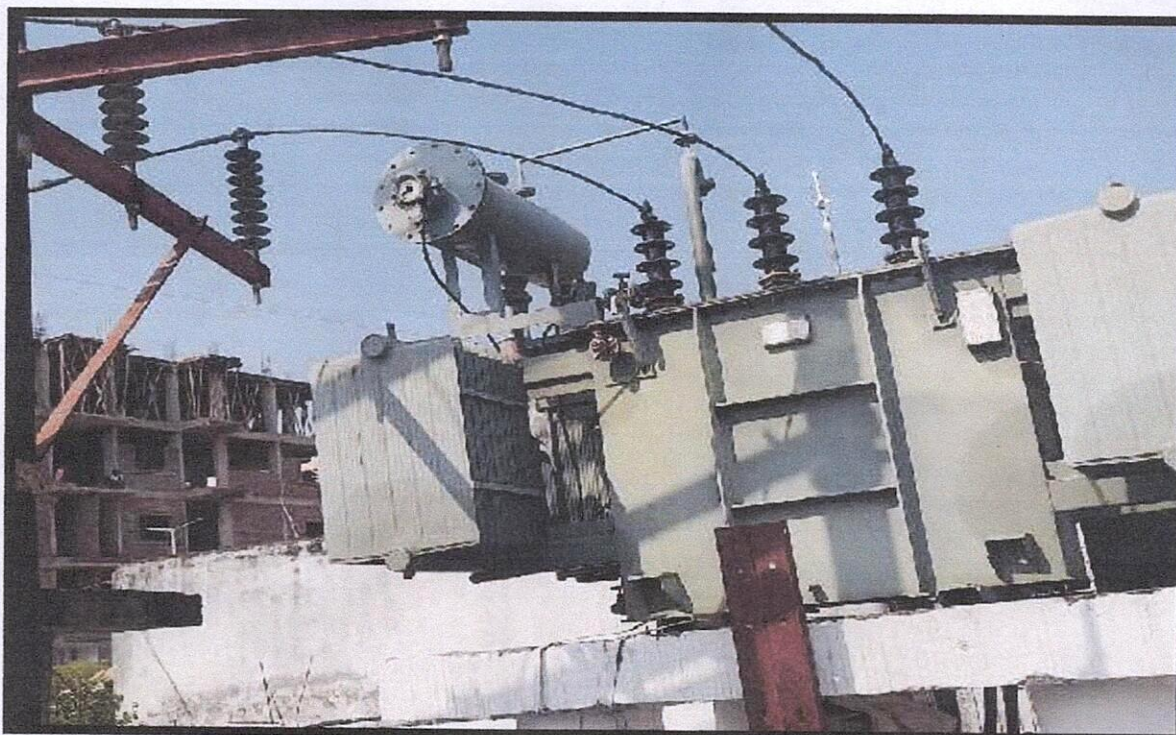


Fig.2.1- Malwanchal University Transformer

Table 2.2 - Loading of the Transformer

Sr.No	Month & Year	Transformer Capacity (KVA)	Contract Demand (KVA)	Maximum Demand (KVA)	TR Loading (%)
1	April-21	950	500	613	65
2	May-21	950	500	539	57
3	June-21	950	500	648	68
4	July-21	950	500	751	79
5	Aug-21	950	500	687	72
6	Sept-21	950	500	709	75
7	Oct-21	950	500	693	73
8	Nov-21	950	500	515	54
9	Dec-21	950	500	631	66
10	Jan-22	950	500	667	70
11	Feb-22	950	500	616	65
12	Mar-22	950	500	665	70
Average Transformer Loading %					68

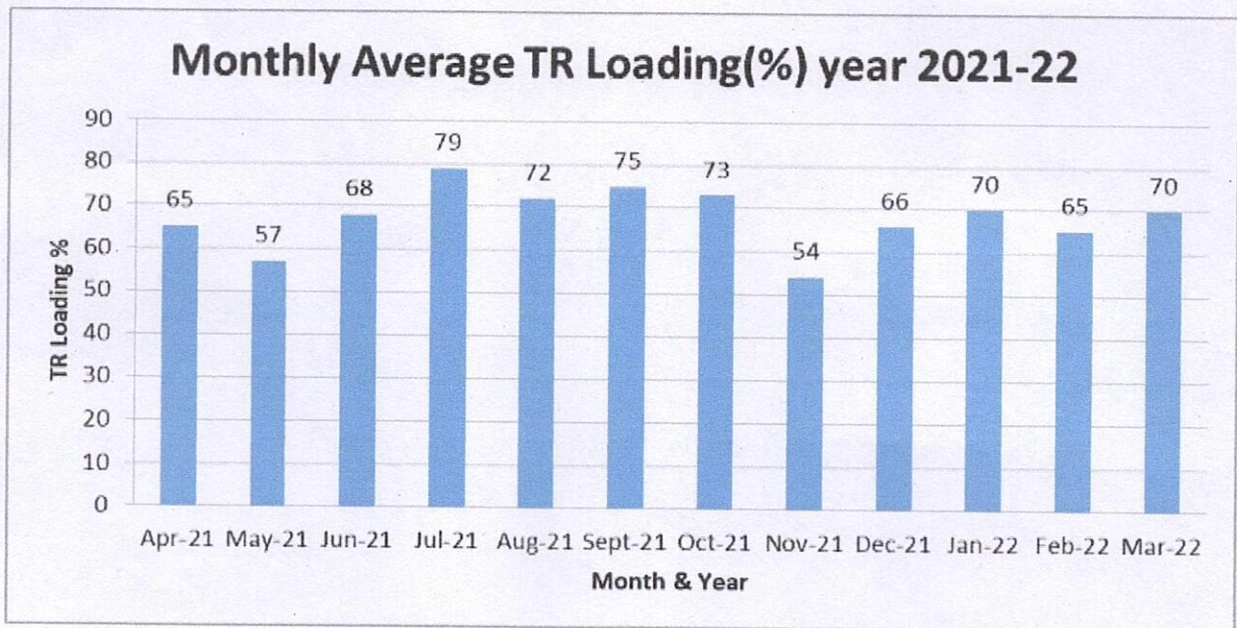


Fig. 2.2- Graphical presentation of monthly transformer loading %

Observation: -

The average loading of the transformer is 68 % of transformer capacity (950 KVA).

- Maximum transformer loading is 79 % in the month of July-2021 & minimum transformer loading is 54% in the month of Nov-2021- **It's Acceptable**

2.2 Solar System

University has installed on-grid 237.6 KWp solar plant for power supply.

Solar Inverter:

1. Capacity- 50 KWP
2. Capacity- 50 KWP
3. Capacity- 50 KWP
4. Capacity- 50 KWP

Solar Panel:

Solar panel rating: 300 Watt
Total panel unit: 792 Unit
Total DC Power: 237600 watts

Solar Power Generation:

Table: 2.3 Solar power generation

S.No.	Month	Year	Generation(KWH)	Export (KVAH)
1	Sep	2022	10,337	14
2	Oct	2022	14,399	613
3	Nov	2022	10,977	1189

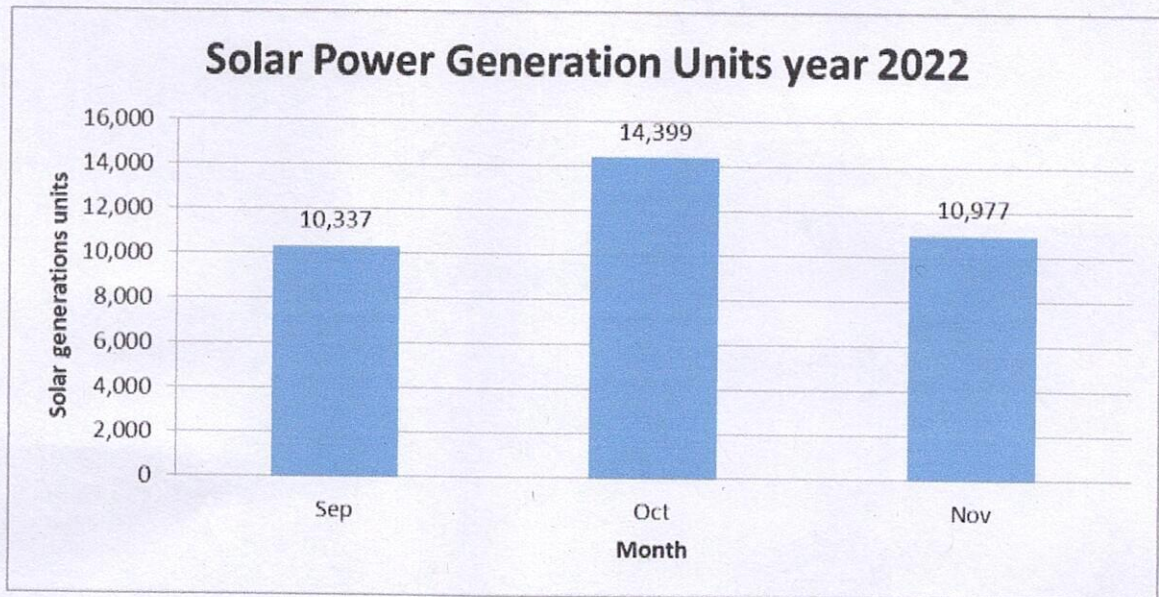


Fig. 2.3- Solar power generation



Fig. 2.4- Rooftop solar panels



Fig. 2.5- Google location of Malwanchal University

2.3 DG Set

There is one DG set in University campus used for backup power supply whenever grid power failures. Details of the DG Set is given in table.

Table -2.4 Technical Specification of diesel generator.

Sr. No.	Parameter	Technical Specification DG Set
1	Make	Jakson
2	Location	Near main building
3	Capacity (kVA)	250
4	Rated Voltage (V)	415
5	Full load current (A)	348
6	Frequency	50
7	Power factor	0.8
8	RPM	1500
9	Phase	3
10	Rated BHP	310



Fig. 2.6- 250 kVA DG Set

Observation- The DG set used, whenever grid fail power supply by DG set to continue the power.

The unit generation of DG set depends on loading & running hours.

CHAPTER- 3

ELECTRICITY BILL ANALYSIS

3.1 Monthly electrical energy consumption 2021-22

Electricity bills of last one year were analysed. Details of unit consumption, Demand analysis, power factor, load factor and annual per unit charges.

Table 3.1:- The monthly electrical consumption of company

Sr. No	Month & Year	Grid Unit Consumption (kWh)	Total Amount Rs/-	Overall Per unit charges (Rs/kWh)
1	April-21	260400	23,82,499/-	9.14
2	May-21	299620	21,79,723/-	7.27
3	Jun-21	278860	24,99,610/-	8.96
4	Jul-21	249060	23,88,612/-	9.59
5	Aug-21	245460	25,48,515/-	10.38
6	Sep-21	254520	25,91,426/-	10.18
7	Oct-21	241860	25,33,882/-	10.47
8	Nov-21	183820	15,42,568/-	8.39
9	Dec-21	231140	18,15,304/-	7.85
10	Jan-22	230480	22,03,009/-	9.55
11	Feb-22	195260	19,41,889/-	9.9
12	Mar-22	247820	20,68,146/-	8.3
	Total	29,18,300	2,66,95,183/-	9.16

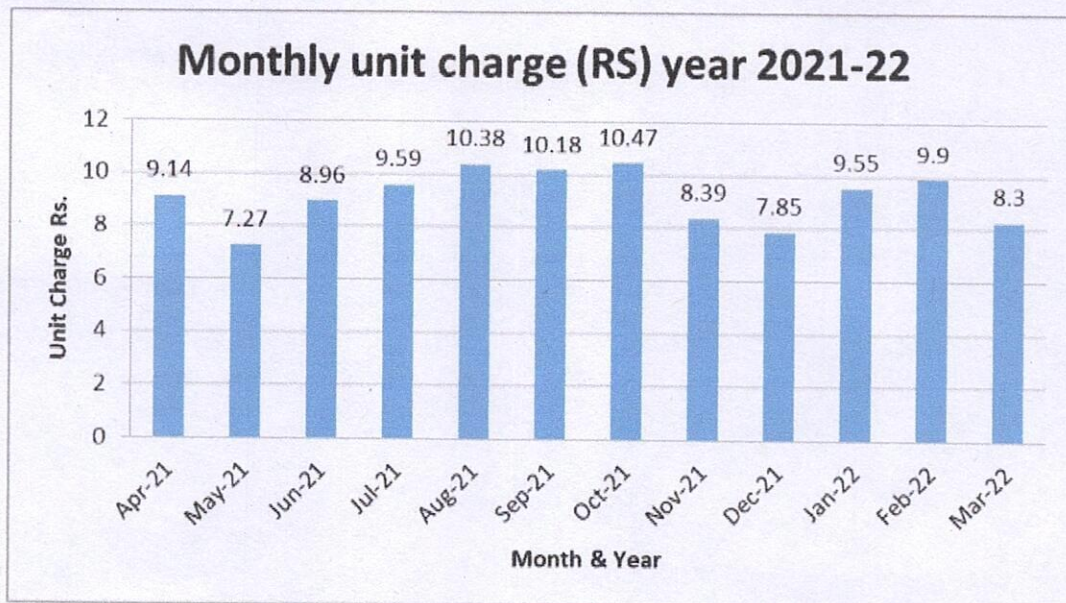


Figure3.1 Graphical presentation of overall per unit charges (Rs/kWh)

Observation:

It was found out that total energy consumption from grid in last 12 month was 29,18,300 units. Average annual energy unit charges are 9.16 Rs/kWh.

3.2 Monthly Power Factor Analysis 2021-22

The monthly power factor for the company is given in the following table.

Table3.2:-Power Factor of Company year 2021-22

Sr. No	Month & Year	Average Power Factor
1	Apr-21	0.988
2	May-21	0.988
3	Jun-21	0.991
4	Jul-21	0.990
5	Aug-21	0.985
6	Sep-21	0.976
7	Oct-21	0.964
8	Nov-21	0.952
9	Dec-21	0.968
10	Jan-22	0.970
11	Feb-22	0.984
12	Mar-22	0.967
Average PF		0.973

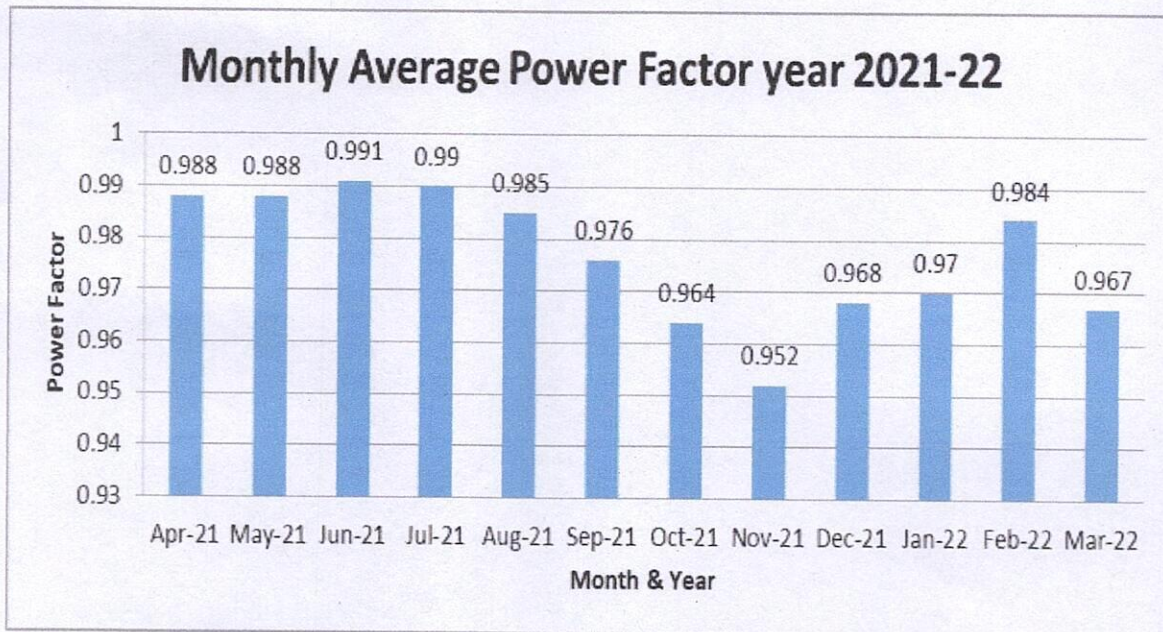


Figure 3.3 Graphical presentation of average power factor year 2021-22

Observation: It is recorded that the average power factor was 0.976 in last one year on the basis of electricity bill.

**Chapter-4
Utility Analysis**

4.1 Connected load

MALWANACHAL UNIVERSITY			
S. NO.	LOCATION	NUMBER OF A/C	TON
1	Chairman Office	2	2
2	Vice Chairman Office	1	2
3	Add. Register Office	1	1.5
4	Register Office	1	1.5
5	Conference Hall	2	1.5
6	Mahakal Sir Office	1	1.5
7	Office Ground Floor	1	1.5
8	Office F - 9	1	1.5
9	Office F - 11	1	1.5
10	Office F - 12	1	1.5
11	Private Rooms	6	1.5
			17.5

MALWANACHAL UNIVERSITY					
S. NO.	Pump Location	Type of Pump	Flow m3/hr	Motor Rating Kw	Hours of use/day
1	Near of D. G. Room	Submersible pump	11400 HRS	7.5 kw	2 HRS
2	Vipin House P.G. Hostel - 1	Submersible pump	11400 HRS	7.5 kw	12 HRS
3	Front of Intern Boys Hostel	Submersible pump	11400 HRS	7.5 kw	12 HRS
4	Vipin House P.G. Hostel - 2	Submersible pump	11400 HRS	7.5 kw	12 HRS
5	MBBS Medical College	Submersible pump	11400 HRS	6.0 kw	6 HRS
6	Back Side of Intern Girls Hostel	Submersible pump	11400 HRS	9.0 kw	14 HRS
7	Front of Dental Boys Hostel	Submersible pump	11400 HRS	7.5 kw	12 HRS
8	Near of Dental Boys Mess	Submersible pump	11400 HRS	9.25 kw	12 HRS
9	Ground Back of Hospital	Submersible pump	11400 HRS	7.5 kw	3 HRS
10	Near of Meera House	Submersible pump	11400 HRS	6.0 kw	6 HRS
11	Near of New Basera	Submersible pump	11400 HRS	7.5 kw	8 HRS



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12	Nursing Water Tank NO. 1	Open Well Submersible Pump	51000 HRS	7.5 kw	10 HRS
13	Hospital Water Tank NO. 1	Open Well Submersible Pump	51000 HRS	7.5 kw	12 HRS
14	Hospital Water Tank NO. 2	Open Well Submersible Pump	51000 HRS	7.5 kw	12 HRS
15	Girls Hostel Water Tank	Open Well Submersible Pump	51000 HRS	7.5 kw	14 HRS
16	Girls Hostel Water Tank For Basera	Open Well Submersible Pump	51000 HRS	7.5 kw	12 HRS
17	Nursing Water Tank NO. 2 For Dental Girls	Open Well Submersible Pump	51000 HRS	7.5 kw	10 HRS
18	MBBS Medical College Water Tank	Open Well Submersible Pump	51000 HRS	7.5 kw	4 HRS

MALWANCHAL UNIVERSITY						
S. NO	BLOCK	FLOOR	UNIT RATING	NO OF BATTERIES	RATING OF BATTERIES	POWER FLOW
1	X - Ray	Ground	60 KVA	40	65AH 12V	3 HRS
2	CT Scan	Ground	50 KVA	34	150AH 12V	3 HRS
3	DR - CR	Ground	5 KVA	15	26AH 12V	1 HRS
4	Sonography	Ground	5 KVA	15	42AH 12V	1 HRS
5	Sonography	Ground	3 KVA	Inbuilt	7AH 12V	15 MINT
6	ECHO	Ground	3 KVA	8	26AH 12V	30 MINT
7	Ophthal	Basement	5.5 KVA	16	42AH 12V	45 MINT
8	Server	Basement	5 KVA	15	7AH 12V	15 MINT
9	Pathology	Basement	5 KVA	15	65AH 12V	1 HRS
10	Blood Bank	Basement	3 KVA	8	18AH 12V	30 MINT
11	Dailysis	1st Floor	5 KVA	15	7AH 12V	15 MINT
12	IVF	1st Floor	3 KVA	6	18AH 12V	30 MINT
13	IVF	1st Floor	5 KVA	16	7AH 12V	15 MINT

MALWANCHAL UNIVERSITY

S. NO.	NURSING COLLEGE Department	No. of Tube	No. of fans	No of LED	No Wall fans	No Standing fans	No Exhaust fans	No Heaters	No of Coolers	No of Fridge
1	Lecture Hall	4	4							
2	Lecture Hall	6	7							
3	Lab	6	5							
4	HOD Office	2	1							
5	Passage	12								
6	Faculty Office HR	6	6							
7	HOD Office	2	1							
8	HOD Office	3	2							
9	Lab	5	5							1
10	O B G	6	5							
11	Fundamental Lab	6	5							
12	A N M Hall 1	4	5							
13	A N M Hall 2	4	5							
14	Lecture Hall	6	5							
15	Lecture Hall	6	7							
16	College Porch	4		4						
17	Principal Office	6	2	1						
18	Account Section	4	4							1
19	Passage	14								
20	Lecture Hall	6	7							
21	HOD Office	2	1							
22	Lecture Hall	2	4							
23	Pre- Clinical Lab	2	4							
24	Common Room Girls	3	2							
25	AV Aid Room	2	4							
26	Common Room Boys	3	5							
27	Faculty Rooms	6	8							
28	HOD Office	2	1							
29	Faculty Office	6	8							
30	Lecture Hall	3	6							
31	Lecture Hall	2	4							
32	Lecture Hall	6	7							
33	Computer Lab	10	9							
34	Library	15	9							

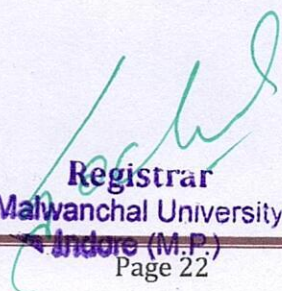
DENTAL COLLEGE

MALWANCHAL UNIVERSITY

S. NO.	LOCATION	NUMBER OF A/C	TON
1	Dean Office	1	1.5
2	Counselling Hall	2	1.5
3	O M DR No. 1	1	1.5
4	OPG Room	1	1.5
5	Oral Surgery	3	1.5
6	Prosto	2	1.5
7	Lecture Hall No. 1	2	1.5
8	Lecture Hall No. 3	3	2
9	Conservative No. 5	2	1.5
10	Periodontitis No. 7	2	1.5


MALWANCHAL UNIVERSITY

S. NO.	PHARMACY COLLEGE Department	Tube light	Fans	LED	Wall fans	Standing fans	Exhaust fans	Heaters	Coolers	Fridge
1	Principal Office	1	2							
2	Lecture Hall	6	7							
3	Passage	12								
4	Common Room	1	1							
5	Faculty	1	1							
6	Faculty	1	1							
7	Office	3	3							
8	Class Room	6	7							
9	Lab 1	1	1							
10	Lab 2	2	2				1			
11	Lab 3	2	2				1			
12	Lab 4	3	2							
13	Lab 5	2	2				1			
14	Store Room	1	1							
15	Library	4	6							


Registrar
Malwanchal University
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S. NO.	PERAMEDICAL COLLEGE Department	Tube light	Fans	LED	Wall fans	Standing fans	Exhaust fans	Heaters	Coolers	Fridge
1	Principal Office	3	2							
2	Class Room	6	8							
3	Passage	12								
4	Store Room	1	1							
5	Lab	3	3							
6	Waiting Area	2	3							
7	Faculty Office	2	4							
8	Library	6	7							
9	P P T 1	6	6							
10	Staff Room	2	1							
11	DMLT Class Room	6	6							
12	Pantry	1	1							
13	BPT 4 th	6	8							
14	BPT 3 th	1	5							
15	BPT 2 nd	2	4							
16	Office	1	1							
17	Common Room	3	5							
18	Store Room	1	1							
19	Museum	3	5							
20	Staff Office	2	3							
21	Nodal Office	1	1							
22	Electrotherapy	2	2							




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S. NO.	INDEX HOSPITAL Department	Tube light	Fans	LED	Wall fans	Standing fans	Exhaust fans	Heaters	Coolers	Fridge
1	OPD No. 1	1	1							
2	OPD No. 2 Dental	2	1							
3	Medicine OPD No 3	12	13	1				1		1
4	Super Speciality OPD No 4	4	4							
5	Ortho OPD No 5	20	11	7			1	2		1
6	Surgery OPD No 6	17	13				1	1		
7	Ophthal OPD No.7	20	14	8				1		1
8	ENT OPD No 8	19	11	5						
9	Psychiatric OPD No 9	13	8	1				1		
10	Padiatric OPD No 10	14	12					1		1
11	OBS OPD No 11	11	6					1		
12	Gynic OPD No 12	21	14	3						1
13	IPD Counter	4	1							
14	OPD Counter	3	1							
15	OPD No 14	2	1							
16	Janani Shurksha Yojna OPD No 15	2	1							
17	Skin OPD No 16	25	10				1			
18	T.B Chest OPD No 17	14	9				1	1		1
19	Waiting Area	5	5							
20	ICTC	1	1							
21	Medical Store Rooms	2	1							
22	Eye Optical			4						
23	Medical Store Private	6	2	8					1	2
24	Ayushman Bharat	5	4							
25	Telephone Department	1	1							
26	Blood Bank	24	10	1						8
27	Physiotherapy OPD Female	3	2							
28	Physiotherapy OPD Male	2	2							
29	ART Center	9	9							
30	Passage Basement	37	4							
31	Hospital Porch	8		40	1					
32	Post Office	1	1							
33	Passage Ground Floor	30	2							
34	Radiology X - Ray	46	28	21						
35	CT Scan	3	1	8						
36	Medical Store Index	11	4							2
37	Labour Room	20	15	7						
38	Casualty	25	15							1
39	ENT OT	6	4	10				1		1
40	Echocardiography	3	3							

41	ICU	67	29						
42	NICU / Waiting Area	6	10	15					1
43	PICU	12	8	10					1
44	Gynic OT	12	5	8					
45	Gynic Ward	23	23				1		
46	OBS Ward	30	30				1		
47	Gynic Department	10	4						
48	Old Gynic Ward	2	8	8					
49	Front of HR Passage	38	8	7					
50	Speech Pathologist & Audiologist	2	2	4					
51	Super Speciality	13	9						
52	HR Counselling Hall	6	5	1					
53	HR Office No 1 & 2	8	9	2					
54	Joshi ji Office	3	3						
55	Dave ji Office No 6	3	2						
56	Office No 7	2	2						
57	Office No 8	2	2						
58	Office No 9	2	2						
59	MRD Office No 10	6	4						
60	EDT Office	2	1						
61	Office No 11	1	1						
62	Office No 12	2	1						
63	Office No 13	2	2						
64	Office No 14	2	1						
65	Office No 15	3	1		1				
66	Office No 16	6	2						
67	Office No 17	4	3						
68	Store Central	11	4	3	1				
69	Ward No 11	16	17						
70	Ward No 12	17	19						
71	Ward No 14	18	17				1		
72	Padietric Department	22	17						1
73	Ward	23	17						
74	Cardio Ward 1	2	11	9			1		
75	Cardio Ward 2	2	10	8					
76	Passage front of Cardio Ward 2	4	2						
77	ICU 3		9	10					
78	Psychiatric Ward Male	2	10	13					
79	Psychiatric Ward Female	2	9	15					
80	Office Doctor Room	4	2						1
81	Nephrology ICU	8	5						
82	Nephrology Ward	6	7	1					
83	Ward No 15	15	18				1		
84	Ward No 16	15	20				1		
85	Ward No 17	16	17						

86	Ward No 18	18	21						
87	Ward No 19	6	7						
88	Ward No 20	2	11	12					
89	PAC Department	12	2						
90	Anaesthesia Derpartment	17	12						1
91	Born Unit	5	3						
92	Passage Born Unit	16							
93	Ortho Department 1 & 2	25	16	2					
94	Modular OT 1 & 2	16	8	4			1		
95	Cath Lab			7					
96	Ortho OT Modular	22	9	1			1		1
97	Surgery OT Modular 1 & 2	13	13	21					
98	Ortho Floor Passage	48					1		1
99	OBS ICU 2nd Floor	11	8						
100	CSSD	19	11				3		
101	ENT Department 2nd Floor	10	8						
102	Surgery Ward No 214	16	23						
103	Surgery Department	10	10						1
104	Skill Lab A	23	17						
105	Skill Lab B	16	17						
106	Radiodainosis	15	10						
107	Gynic Department Surgery	9	9						
108	Ward No 22 Surgery	24	21						
109	Ward No 23	15	21				1		
110	Ward No 24	17	19						
111	Ward No 25 Surgery	18	23						
112	Ward No 26	18	20						
113	Ward No 27	24	24						
114	Ward No 28	15	15						
115	Ward No 29	16	20						
116	Ward No 30	21	20				1		
117	Ward No 31	22	23				1		
118	Ward No 32	21	20						
119	Ward No 33	20	21						
120	Ward No 34	19	19						1
121	Ward No 35	24	23						
122	Ward No 36	19	22						
123	Ward No 37 5th Floor	22	22						
124	Ward No 38	17	23					1	
125	Ward No 39	19	21					1	1
126	Ward No 40	21	26					1	
127	Ward No 41	19	20				1		
128	Ward No 42	22	23						

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129	Ward No 43	20	18						
130	Passage Room S Lift	5	3						
131	Medicine Department	10	9						
132	Medicine Passage	23					1		
133	Lecture Hall	10	12	7					
134	Skin Ward Female	21	17						
135	Skin Ward Male	14	12						
136	Private Rooms 1 TO 10		19	63			7		1
137	Department	17	10	1				1	
138	Ophthal Department	13	9	1					
139	Store Room / Passage	30							
140	Psychiatric Department	10	6						
141	T.B Ward	19	18						
142	Central Laundry / Oxygen	30	8			3			
143	IVF	8	4	30					1

Summary of connected load

S.No.	Location	Fan(60W)	Tube Light(40W)
1	Nursing Girls Hostel RN-68	135	158
2	Nursing Boys Hostel RN-22	47	53
3	Dental Girls Hostel RN-119	212	254
4	Dental Boys Hostel RN-50	128	192
5	Hostel Load RN-52	102	128
6	Malwanchal Dept	97	130
7	Nursing College	176	148
8	Pharmacy College	46	32
9	Peramedical College	72	77
10	Index Hospital Dept	1876	1439
11	Index Medical College Dept	1221	1145
12	Dental College Dept	662	529
Total		4,774	4,285

CHAPTER- 5
ENERGY CONSERVATION MEASURES

Case Study No. 1

Replacement of 60W conventional 4,774 ceiling Fan by 28W BLDC Energy Efficient ceiling Fan in phase manner.

Replacing (60W) Ceiling Fan with Energy Efficient BLDC Fan (28 W)			
Calculated on existing system			
1	Ceiling Fan (60 W)	No.	4,774
2	Rated Power	Watt	60
3	Operating Hrs.	Hrs./day	20
4	Operating annual Days	Days/Year	360
5	Unit consumed annually	kWh/Year	20,62,368
6	Load Factor 0.8	kWh/Year	16,49,894
Calculated saving after replacement			
1	Replacement with 28 W BLDC Fan	Watt/unit	28
2	Unit consumed annually after replacement	kWh/Year	9,62,438
3	Total energy saving potential	kWh/Year	6,86,456
4	Total annual energy cost saving @ Rs.9.16 per unit	INR	65,89,977/-
Calculated on existing system			
1	Capital Cost (Rs.2600/- per Fan)	INR	12,41,2,400
2	Maintenance investment @ 5 %	INR	6,20,620
3	Total investment	INR	1,30,33,020
4	Simple payback (Investment/annual savings)	Year	1.9

Total Calculated Monetary Saving Potential per year in Ceiling Fan = Rs 65,89,977 /-

Note: - Energy savings depend on the operation hour per day and the load factor of the systems.

Case Study No. 2

Replacement of 40 W conventional Tube Lights by 28 W LED lights.

Replacing (40 W) Tube Light with Energy Efficient LED lights (28 W)			
Calculated on existing system			
1	Tube Light (40 W)	No.	4,285
2	Rated power	Watt	40
3	Operating Hrs.	Hrs./day	18
4	Operating annual Days	Days/Year	360
5	Unit consumed annually	kWh/Year	11,10,672
Calculated Saving after replacement			
1	Replacement with 28 W LED light	Watt/unit	28
2	Unit consumed annually after replacement	kWh/Year	7,77,470
3	Total Energy Saving	kWh/Year	110233
4	Total annual energy cost saving @ Rs.9.16 per unit	INR	10,09,734/-
Calculated on existing system			
1	Capital Cost (Rs.250/- per LED)	INR	10,71,250
2	Maintenance investment @0	INR	0
3	Total investment	INR	10,71,250
4	Simple payback (Investment/annual savings)	Year	1

Total Calculated Monetary Saving Potential per year in LED light = Rs 10,09,734/-

Note: - Energy savings depend on the operation hour per day and the load factor of the systems.


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