

Empirical Exergy Private Limited (EEPL)

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CIN No: U74999MP2018PTC045751

Ref No: EEPL/2018-19/JUNE/C-05

Date: 28/06/2018

ENERGY AUDIT CERTIFICATE

This is certified that the Energy audit was conducted at **Mewar University, Chittorgarh (Rajasthan)** dated 18/06/2018 to 21/06/2018 (Four Days) and the audit report has been submitted by **Empirical Exergy Private Limited (EEPL), Indore**

We avail this opportunity to express our deep and sincere gratitude to the management for their wholehearted support and co-operations during the energy audit.

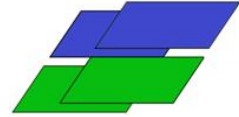
This certificate is being issued based on the Energy Audit conducted by EEPL.

For- **Empirical Exergy Private Limited**

Rajesh Kumar Singadiya (Director)
M.Tech (Energy Management),
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Lead Auditor ISO50001:2011 [EnMS] from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)



**Energy Audit Report
Mewar University, Gangrar Chittorgarh
(Rajasthan) Year 2017-18**



ENERGY AUDIT REPORT



MEWAR UNIVERSITY
Gangrar Chittorgarh (Rajasthan)

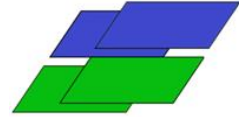
PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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(2017-18)



Energy Audit Report
Mewar University, Gangrar Chittorgarh
(Rajasthan) Year 2017-18

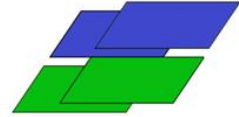


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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Mewar University Gangrar Chittorgarh** for allowing us to conduct an energy audit for the university.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation during the course of study.

Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD (Research Scholar)

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]



Green Monitoring Committee.

**OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJ.)**

Ref. No.MU/RO (Admin)/2018/308(A)


Date:- 17th March, 2018

OFFICE ORDER

**Sub:- Reconstitution of Green, Environment & Energy Auditing
Committee.**

Green Audit, Environment Audit & Energy Audit Committee is reconstituted to conduct the necessary audit in due course. An Audit Committee is constituted with the following officials:-

Sr. No.	Name	Designation	Committee
1	Dr. R C Tiwari	Professor / Dean Department of Agriculture	Co-Ordinator
2	Mr. Rakesh Kumar Singadiya	Director, Empirical Energy Pvt.Ltd.	External Auditor
3	Mr. K.K. Bhati	Asst. Professor, Department of Agriculture	Internal Auditor
4	Dr. Satish Kumar Ameta	Asst. Professor, Department of Life Science	Internal Auditor
5	Mr. Deepak Kumar Joshi	Asst. Professor, Department of Electrical Engineering	Internal Auditor
6	Dr. Mohammad Ashid	Asst. Professor, Department of Chemistry	Member
7	Mr. Suraj Kumhar	Asst. Professor, Department of Electrical Engineering	Member
8	Mr. Brijesh Kumar Meena	Asst. Professor, Department of Agriculture	Member
9	Mr. H. Widhani	OSD	Member
10	Mr. Kripal Singh	Non-Teaching Staff	Member
11	Mr. Rajesh Sharma	Non-Teaching Staff	Member

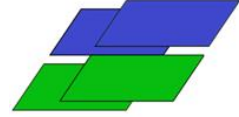

 Registrar
 Mewar University
 Gangrar, (Chittorgarh)

Copy to:

1. PS to Hon'ble Chancellor (for kind information)
2. PS to Hon'ble President/Vice Chancellor(for kind information)
3. All Officers/Deans/Directors/Hod's
4. IT Section/Accounts Dept./All Staff
5. Coordinator – IQAC Cell
6. Record File



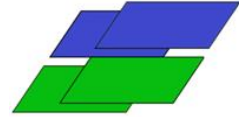
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The Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- ✚ **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- ✚ **Mr. Rakesh Pathak,** [Director & Electrical Expert]
- ✚ **Dr. Suresh Kumar Soni** [Certified Energy Auditor & Energy Expert]
- ✚ **Mr. Sachin Kumawat** [Sr. Project Engineer]
- ✚ **Mr. Lokesh Kumar Varma** [Project Engineer]
- ✚ **Mr. Mohit Malviya** [Fire safety Engineer]
- ✚ **Mr. Aakash Kumawat** [Site Engineer]
- ✚ **Mr. Ajay Nahra,** [Sr. Accountant & admin]



EXECUTIVE SUMMARY

AREA OF IMPROVEMENT

POWER FACTOR IMPROVEMENT.

- The average power factor for the year 2017-18 was 0.934 on university feeder. **There is good potential for power factor improvement.**
- The average power factor for the year 2017-18 was 0.881 on residency feeder. **There is good potential for power factor improvement.**

LIGHTING SYSTEM

- ✚ Replacement of “**conventional T-12 (40 Watt) and T-12 (36 Watt)**” tube light by Energy efficient LED lighting fixture T-5 (12 Watt or 18 Watt) in “ **class rooms, laboratories and faculties cabin**” have great potential for energy saving. Expected energy saving and simply payback period is subject of load factor and annual operating hours.
- ✚ Installation of “**Timer control on high mast**” in campus recommended for energy saving in the campus.
- ✚ Installation of “**Solar Alone System**” on Street lighting, campus Lighting and Building focus lighting are having good potential for energy saving as well as **sustainable development and conservation of natural resources.**

CEILING FAN AND EXHAUST FAN

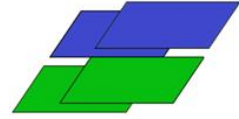
- ✚ Replacement of “**conventional ceiling fan (80 Watt to 150Watt)**” by Energy efficient star rated fan or BLDC based energy efficient Fan (20 to 25 Watt) in “**class rooms, laboratories and faculties cabin**” have great potential for energy saving. Expected energy saving and simply payback period is subject of load factor and annual operating hours.

SOLAR SYSTEM

- ✚ There are good potential of Installation of grid connected solar system in the university



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CHAPTER-1 INTRODUCTION

1.1 About University

Mewar University is an autonomous body set up by the Government of Rajasthan through Act. No. 4 of 2009 passed by the Rajasthan Legislative Assembly (Government of Rajasthan). The University is recognized by the UGC u/s 2(f) of UGC Act with powers to confer degrees u/s 22(1) of the UGC Act, 1956 vide their letter no. F.9-15/2009(CPP-I) dated 30th March 2009. This is the only private and self-financed University in Rajasthan which is also approved by the UGC u/s 12B of the UGC Act vide their letter no. F.9-15/2009 (CPP-I/PU) dated 15th October 2018. The University is also NAAC accredited.

Mewar University has never affiliated any institution, nor has the University ever set up any study centre in any part of the country other than its main campus at Gangrar in Chittorgarh (Rajasthan).

Mewar University is promoted by the Mewar Education Society (MES). It is controlled by a Board of Management, constituted by the MES, which is headed by Chairperson Shri Ashok Kumar Gadiya, a great visionary, educationist, and nationalist, who translated his ideas and dreams of promoting higher education into reality by setting up institutes of learning in various subjects. In no time, he has carved out a niche for himself as an educationist, who believes in the inculcation of values through education in the young generation.

The group, under the able leadership of Dr. Ashok Kumar Gadiya and the active support and association of renowned academicians, experienced professionals, and technocrats, has established a chain of Institutes of higher education and learning:

Mewar Institute of Management

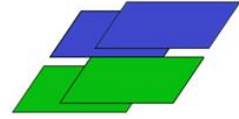
Mewar Institute of Management, Vasundhara, Ghaziabad (U.P.) [Approved by the UGC and affiliated with C.C.S. University, Meerut, conducting courses for B.B.A., M.B.A., B.C.A., M.C.S., M.I.S., B.Ed, B.Lib, and M.Sc. (Biotech)]

Mewar Law Institute

Mewar Law Institute, Vasundhara, Ghaziabad (U.P.) [Approved by the UGC, Bar Council of India and affiliated to C.C.S. University, Meerut, conducting courses for L.L.B. (3Yrs) & L.L.B. (5Yrs)]



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+ Mewar Girls Business School

MewarGirls Business School, Vasundhara, Ghaziabad (U.P.) [Approved by the AICTE and affiliated to UP Tech University, Lucknow, conducting M.B.A. courses for Girls]

+ Mewar Girls College

MewarGirls College, Chittorgarh [Approved by Government of Rajasthan and affiliated to Mohan Lal Sukhadia University, Udaipur, conducting courses for M.I.B., B.Sc (Biotech.), B.B.M., B.C.A. & P.G.D.C.A.]

+ Mewar Girls Ayurved Nursing Centre

Mewar Girls Ayurved Nursing Centre, Chittorgarh [Approved by Government of Rajasthan and affiliated to Rajasthan Ayurved University, Jodhpur, conducting courses for Ayurved Nursing]

+ Mewar Girls Industrial Training Centre

Mewar Girls Industrial Training Centre, Chittorgarh [Approved by Government of India (NCVT) and Board of Technical Education, Jodhpur, (SCVT), conducting courses for Computer Operator and Programming Assistant, Interior Decoration, Fashion Designing, Dress Making, English Language Proficiency and Personality Development]

+ Mewar Girls College of Teachers Training

Mewar Girls College of Teachers Training, Chittorgarh [Approved by Government of India (NCTE) and affiliated to Mohan Lal Sukhadia University, Udaipur, conducting courses for B.Ed., N.T.T, S.T.C]

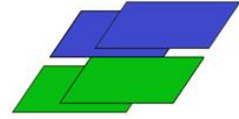
These centers of learning exemplify the group's mission to promote quality technical and higher education. And as a result, the number of students has gone up considerably, and now it has more than 10,000 students on its campuses.

The group, continuing with its mission to provide higher and technical education to a larger section of people, has touched a new height by promoting and sponsoring Mewar University. The promoting body, with its honest efforts and unstinting dedication, has the conviction to build a strong partnership with the Government of Rajasthan for ensuring the spread of higher and technical education in the state.

Mewar's culture, ethos, tradition, and values are so ingrained in its soil that it is bestowed with the magical powers to sprout prodigious talent and genius. Anyone groomed in this environment will undergo a steady transformation to blossom in life and imbibe the traits of greatness associated with this historical place.



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VISION:-

To develop a center of excellence for technical, professional and vocational education and research at par with national and international standards.

MISSION:-

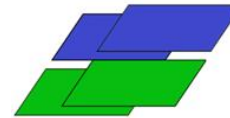
To develop the framework for effectively conducting various educational and research programmes of the highest standards to produce confident, self-reliant, and responsible youth for society and outstanding professionals for government, industry, and business. The mission is to "**Reach the unreached**"

OBJECTIVE:-

- ❖ Provide easy access to high-quality education in Management, Engineering, as well as other academic & professional fields to its students, irrespective of their caste, creed, age, gender, region, or country, at an affordable cost.
- ❖ To offer a conducive environment for pursuing research and vocational studies with a market-driven orientation.
- ❖ To expose students to new ideas, fresh vision, and pragmatic ambition and enhance their competency in the ever-changing business environment.
- ❖ To provide a flexible choice-based credit system of education and dual-degree programmes while flexible adopting modes of delivery to suit students' requirements of learning.
- ❖ To prepare and assist students in improving their prospects through career counselling and placement support, on-the-job training, industrial visits, presentations, and group discussions.
- ❖ To Promote and practice a convenient distance education concept in India and abroad.
- ❖ To spread job-oriented Skill Development education in rural and tribal areas



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1.2 About Campus: -

Table 1.1 Details are the total build-up area given in the table:-

TOTAL GROUND COVERED. =20856.78 SQ.MT									
TOTAL OVERALL BUILT-UP ALL FLOORS AREA:- 76024.72 SQ.MT									
S.NO	BLOCK	FAR AREA				BUILT AREA			
		GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR AREA IN SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT	GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT
1	ADMINISTRATIVE AND ACADEMIC BLOCK	8890.84	8519.33	8675.24	8675.24	8966.05	9050.97	9206.74	9206.74
2	EDUCATION BLOCK	1062.08	1170.08	1062.08	1062.1	1193.08	1253.27	1126.29	1126.29
3	ENGINEERING BLOCK	1979.9	11979.9	1979.9	0	2126.84	2093.74	2093.74	0
4	MEWAR HOSPITAL	1337.03	1337.03	0	0	1590.91	1590.91	0	0
5	BHAMASHAH HOSTEL	1382.11	1382.11	1382.11	1382.1	1601.64	1572.82	1572.82	1572.82
6	SANGA HOSTEL	1189.78	1189.78	1189.78	1189.8	1359.6	1341.62	1341.62	1341.62
7	KUMBHA HOSTEL	602.71	602.71	620.65	620.65	709.19	697.35	697.35	697.35
8	PRATAP HOSTEL	640.52	640.52	665.78	665.78	749.38	739.64	739.64	739.64



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S.NO	BLOCK	FAR AREA				BUILT AREA			
		GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR AREA IN SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT	GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT
9	PANNA DHAI HOSTEL	376.53	376.53	382.3	382.3	447.6	435.97	435.97	435.97
10	MEERA HOSTEL	323.13	323.13	323.13	323.13	386.87	381.68	381.68	381.68
11	GUEST HOUSE	229.94	223.58	223.58	223.58	295.78	258.82	258.82	258.82
12	STAFF QUARTERS(1 BHK)	285.11	285.11	285.11	285.11	367.6	362.67	362.67	362.67
13	STAFF QUARTER	276.99	276.99	276.99	276.99	353.84	349.18	349.18	349.18
14	ANNAPURNA MESS	613.7	0	0	0	708.4	0	0	0
	TOTAL	19190.37	28306.8	17066.65	15086.78	20856.78	20128.64	18566.52	16472.78



Satellite Image of Mewar University from Google map

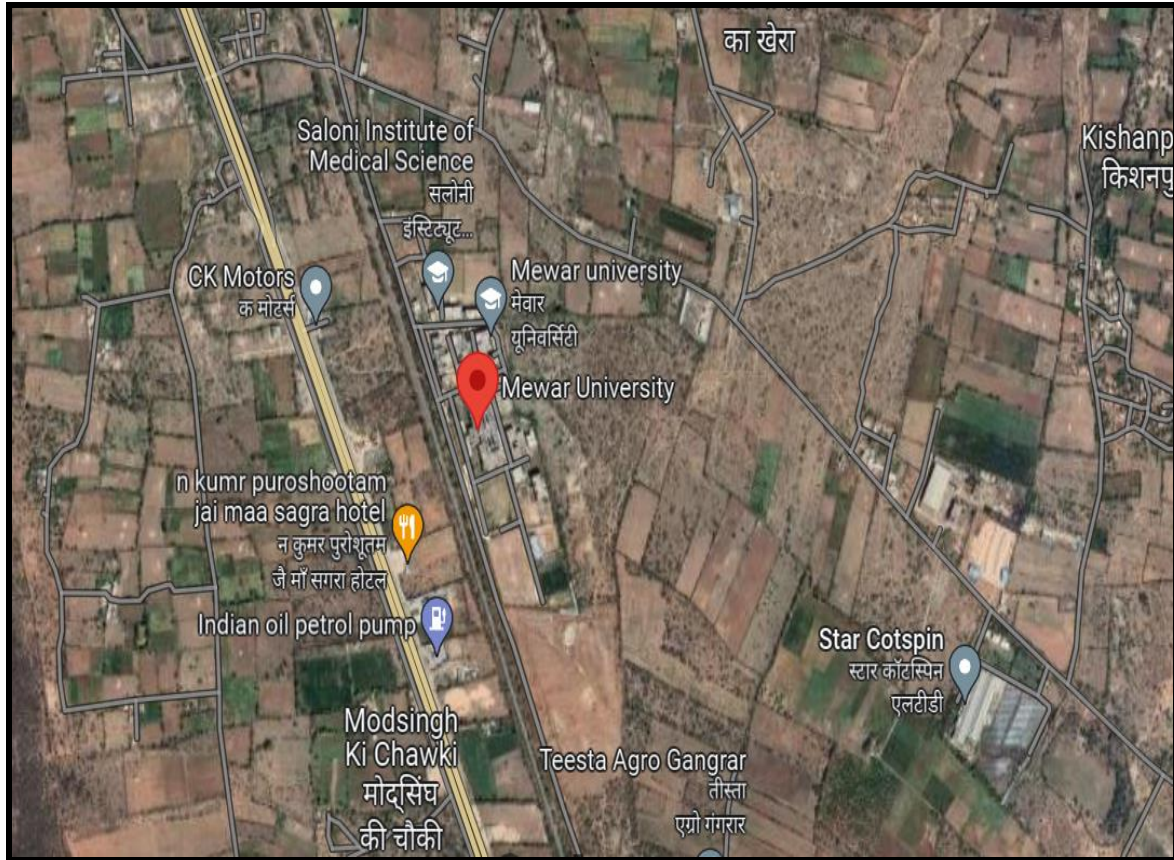
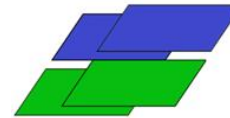
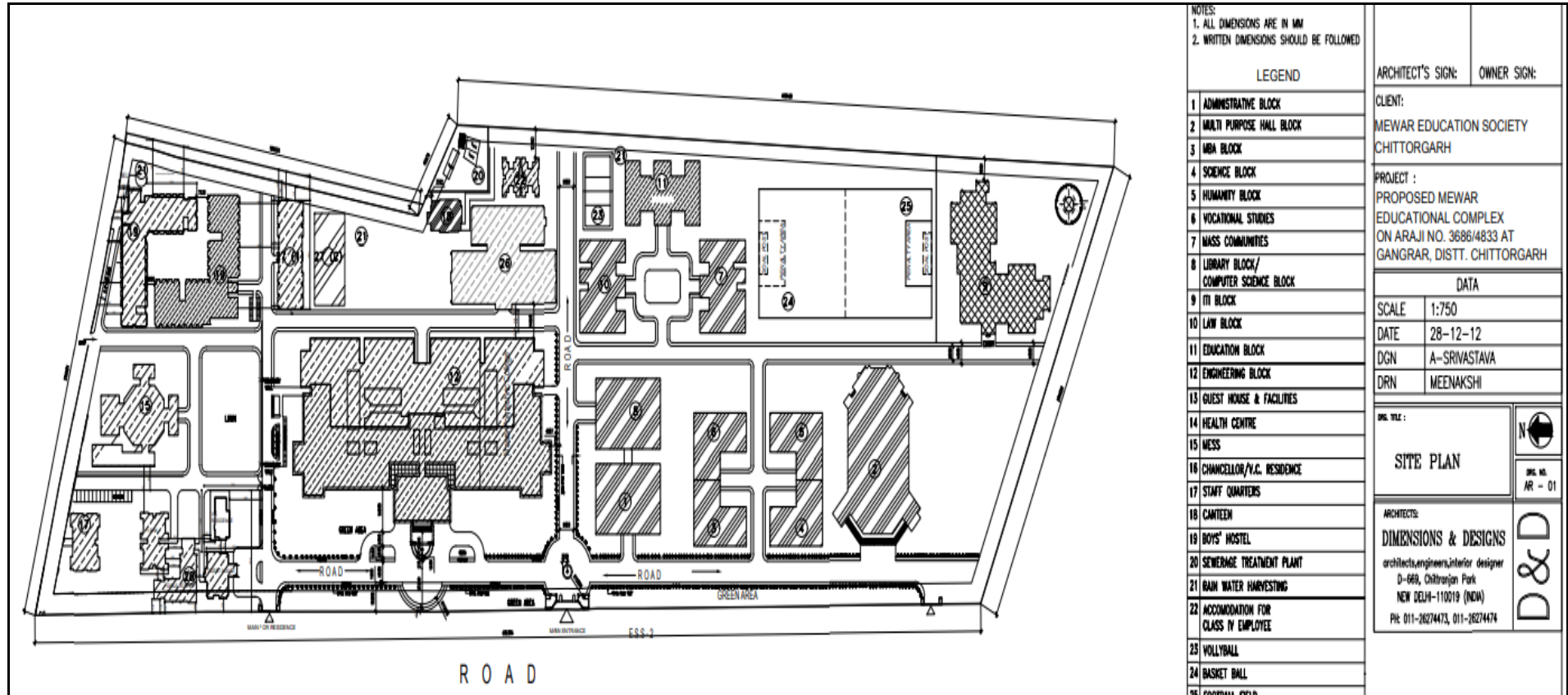


Figure 1.1: - Satellite Image of Mewar University from Google map



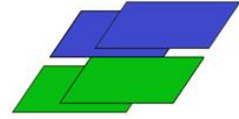
1.3 MEWAR UNIVERSITY LAYOUTS OF VARIOUS BUILDINGS

Layout map of Mewar University





Energy Audit Report Mewar University, Gangrar Chittorgarh (Rajasthan) Year 2017-18



1.4 About Energy Audit

An 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 the final consumer becomes 50%. Hence one unit saved in the end user is equivalent to two units generated in the power plant.

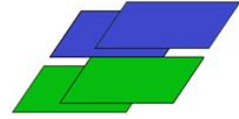
An energy audit is the most efficient way to identify the strength and weaknesses of energy management practices and to find a way to solve problems. An energy audit is a professional approach to utilizing economic, financial, social, and natural resources responsibly. Energy audits “adds value” to management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

Empirical Exergy Private Limited (EEPL), Indore M.P. carried out the “Energy Audit” at the site to find gaps in the energy consumption pattern for **Mewar University, Chittorgarh**. A technical report is prepared as per the need and the requirement of the project.

1.5 Objectives of Energy Auditing

An energy audit provides a vital information base for an 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 the present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of the 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.



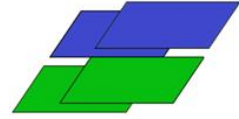
1.6 Methodology

The methodology adopted for achieving the desired objectives viz.: Assessment of the current operational status and energy savings includes the following:

- ✚ Discussions with the concerned officials for identification of major areas of focus and other related systems.
- ✚ A 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 the same for the overall premises. The data were analyzed to arrive at a baseline 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.
- ✚ Trend analysis of costs and consumptions.
- ✚ Capacity and efficiency test of major utility equipment's, wherever applicable.
- ✚ 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.



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1.7 Mewar University Present Energy Scenario

Mewar University uses energy in the form of electricity purchased from the grid. There are two feeders one is for education building and the other for residency.

The annual energy consumption of **Mewar University** campus is about **4, 38,636** units on residency feeder in July-2017 to jun-2018.

The annual energy consumption of **Mewar University** campus is about **4, 41,148** units on University feeder in July-2017 to jun-2018.



CHAPTER- 2 POWER SUPPLY SYSTEM

2.1 Transformer and substation

The power supply for the Mewar University is from AVVNL with the help of 11 kV feeders. There are 3 electricity connections. One is a university feeder under Tariff 2620G 11 KV Non-Industrial with sanctioned load of 425 kW. The second is a residency feeder under tariff 1011, 11 KV Non-Industrial with sanctioned load of 400 kW, and the third are bank feeder with 14 kW. There are two step-down transformers having capacities are 630 KVA and 500 KVA. University and residential respectively. The details are given in following table 2.1

Table: 2. 1 Nameplate details of transformers -01 and 02

Sr. No.	Items	Technical Specification of Transformer -01 (University Feeder)	Technical Specification of Transformer -02 (Residency Feeder)
1	Make	Ganga Sagar Agro Pipes Private Limited	Uttam (Bharat) Electrical Private Limited
2	Year	2008	2012
3	Rating (kVA)	630	500
4	Voltage (HV/ LV)	11000/433	11000/433
5	Current Rating (HV/ LV)	33.10 / 838	26.24/666.71
6	Frequency (Hz)	50	50
7	Impedance at 75°C (%)	4 %	4 %
8	Vector group	Dyn-11	Dyn-11
9	Type of cooling	ONAN	ONAN
10	Total no of Tap	5	5



Figure 2.1:- 11 kV Feeder and 630 kVA and 500 kVA

2.2 DG Set:-

There are 2 DG sets on the university campus. Details of the DG Sets are given table. 2.4

Table 2.4 Technical specifications for DG sets- 01 and 02

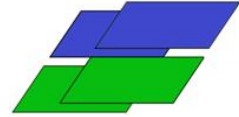
Sr. No.	Parameter	Technical Specification DG Set-01 (University Feeder)	Technical Specification DG Set-02 (Residency Feeder)
1	Make	Stamford	Stamford
2	M/C No	N136288779	N02609855
3	Capacity (KVA)	250	200
4	Rated Voltage	415	415
5	Full load current	347.8	278
6	Frequency	50	50
7	Power factor	0.8	0.8
8	RPM	1500	1500
9	Phase	3	3



Figure 2.4:- DG set in university

Observation & Suggestion:

- DG set is used only in case of grid power failure.
- There is no system to monitor fuel consumption w.r.t. unit generation.



2.3 Capacitor Bank

The energy audit team examine of existing capacitor bank at the powerhouse. Details of the capacitor are given in table 2.5

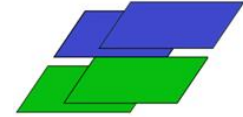
Table: 2.5 Details of capacitor bank

Sr. no	Capacitor no	Capacity	Location	Remark
1	Capacitor -01	5 kVAr	Main University Panel	Working
2	Capacitor -02	5 kVAr	Main University Panel	Working
3	Capacitor -03	5 kVAr	Main Residential Panel	Working
4	Capacitor -04	5 kVAr	Main Residential Panel	Working



Figure 2.5 Capacitor bank on main penal

Observation: - Energy audit team examined individual capacitors. It was found that all the capacitors are in working condition.



**CHAPTER- 3
ELECTRICITY BILL ANALYSIS**

3.1 Monthly electrical energy consumption 2017-18:- (University Feeder)

The monthly electrical consumption for the university is given in the table.

Table 3.1 Energy consumption and billing amount (the year 2017-18)

Sr. No.	Month & Year	Total Unit Consumption (kWh)	Total Amount (Rs/-)	Overall Per Unit Charge (Rs/kWh)
1	Jul-17	19,180	1,42,590/-	7.4
2	Aug-17	27,508	1,57,050/-	5.7
3	Sep-17	47,224	3,51,184/-	7.4
4	Oct-17	46,560	3,43,264/-	7.4
5	Nov-17	48,436	3,63,460/-	7.5
6	Dec-17	35,400	2,74,030/-	7.7
7	Jan-18	34,180	2,43,875/-	7.1
8	Feb-18	20,428	1,58,438/-	7.8
9	Mar-18	20,788	1,89,214/-	9.1
10	Apr-18	33,672	2,82,720/-	8.4
11	May-18	49,388	3,73,591/-	7.6
12	Jun-18	58,384	4,19,252/-	7.2
	Total	4,41,148	32,98,668/-	7.5

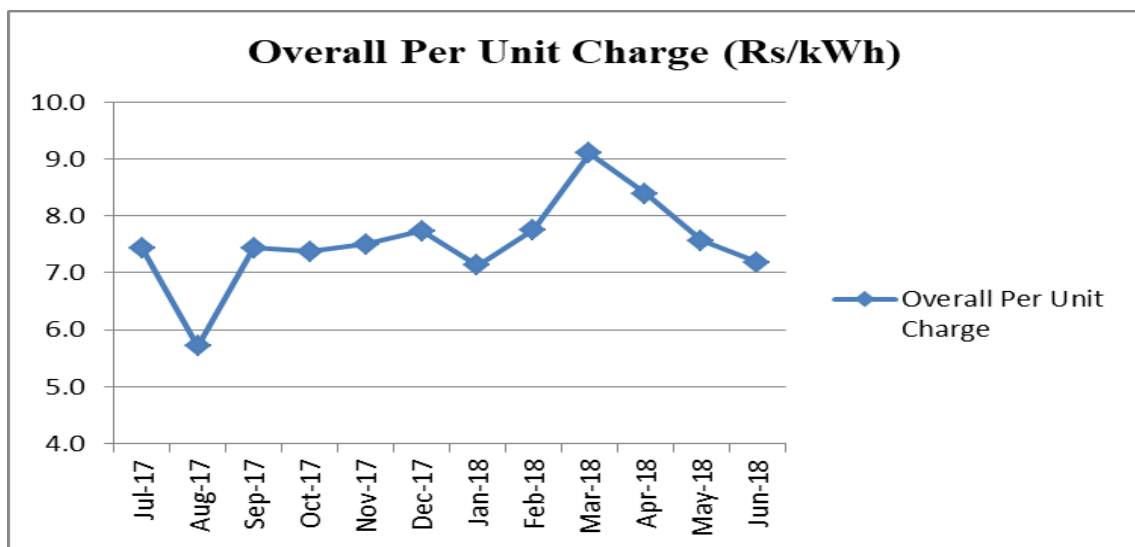
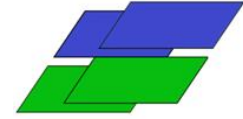


Figure 3.1:- Graphical presentation of actual per-unit charges for the year 2017-18

Observation:

It was found that total energy consumption in the last 12 months was 4, 41,148 units. The average annual energy charge is Rs 7.5 Rs /kWh.



3.2 Monthly demand analysis (2017-18) at University feeder.

The monthly demand consumption for the university is given in the table.

Table 3.2:- Monthly demand analysis (KVA) consumption pattern year 2017-18

Sr. No.	Month & Year	Contract Demand (KVA)	Billing Demand (KVA)	Maximum Demand (KVA)
1	Jul-17	300	225	81
2	Aug-17	300	225	72
3	Sep-17	300	225	107
4	Oct-17	300	225	107
5	Nov-17	300	225	145
6	Dec-17	300	225	122
7	Jan-18	300	225	142
8	Feb-18	300	225	59
9	Mar-18	300	225	91
10	Apr-18	300	225	119
11	May-18	300	225	139
12	Jun-18	300	225	134
	Minimum Demand (KVA)			59
	Maximum Demand (KVA)			145
	Average Demand (KVA)			109

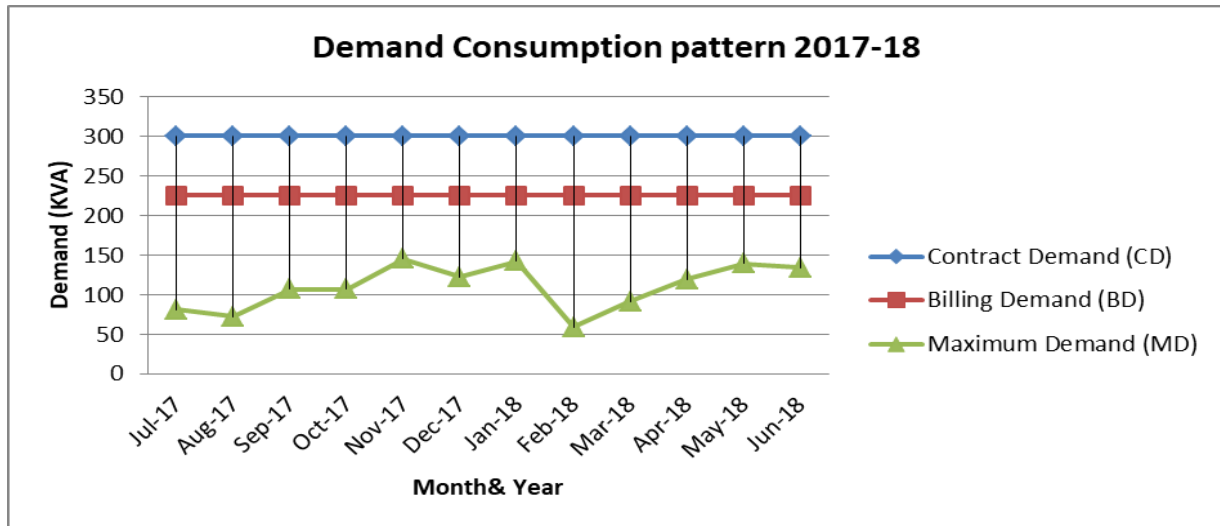
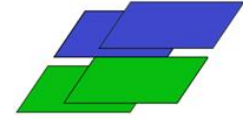


Figure 3.2:- Graphical presentation of demand consumption in the university year 2017-18

Observation: It was observed that the contract demand of the university is 300 kVA. There is a large variation in maximum demand. It is a maximum of 145 kVA in the Month of Nov-2017 and a minimum of 59 kVA in Feb-2018.



3.3 Monthly Power factor analysis Year-2017-18 (University Feeder)

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

Table 3.3:- Power factor of the university year 2017-18

Sr. No.	Month & Year	Power Factor (PF)	PF Incentive (Rs/-)	PF Surcharge (Rs/-)
1	Jul-17	0.969	2,600	0
2	Aug-17	0.975	4,905	0
3	Sep-17	0.968	6,069	0
4	Oct-17	0.977	8,975	0
5	Nov-17	0.976	8,991	0
6	Dec-17	0.932	0	0
7	Jan-18	0.931	0	0
8	Feb-18	0.876	0	3,494
9	Mar-18	0.843	0	8,445
10	Apr-18	0.927	0	0
11	May-18	0.928	0	0
12	Jun-18	0.914	0	0
	Average	0.935	31,540	11,939

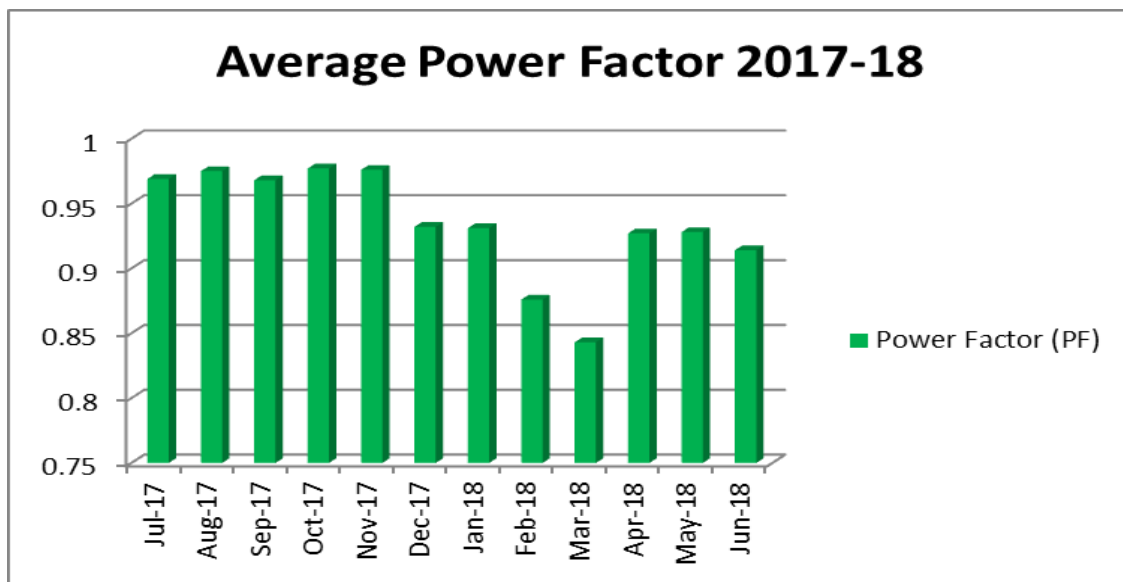


Figure 3.3 Graphical presentation of average power factor year 2017-18

Observation:

The average power factor was 0.935 for the year 2017-18. It is recommended to maintain power factor unity.



3.4 Monthly electrical energy consumption 2017-18 at (Residency Feeder)

The monthly electrical consumption for the university is given in the table.

Table 3.4 Energy consumption and billing amount year 2017-18

Sr. No.	Month & Year	Total Unit Consumption (kWh)	Total Amount (Rs/-)	Overall Per unit Charge (Rs/kWh)
1	Jul-17	40,460	3,80,000/-	9.39
2	Aug-17	24,376	2,31,379/-	9.49
3	Sep-17	40,816	4,06,916/-	9.97
4	Oct-17	44,144	4,35,061/-	9.86
5	Nov-17	43,388	4,31,733/-	9.95
6	Dec-17	35,680	3,63,517/-	10.19
7	Jan-18	29,232	3,02,753/-	10.36
8	Feb-18	25,912	2,83,573/-	10.94
9	Mar-18	27,956	3,28,129/-	11.74
10	Apr-18	33,112	2,59,018/-	7.82
11	May-18	43,660	4,84,330/-	11.09
12	Jun-18	49,900	5,13,144/-	10.28
	Total	4,38,636	44,19,553/-	10.09

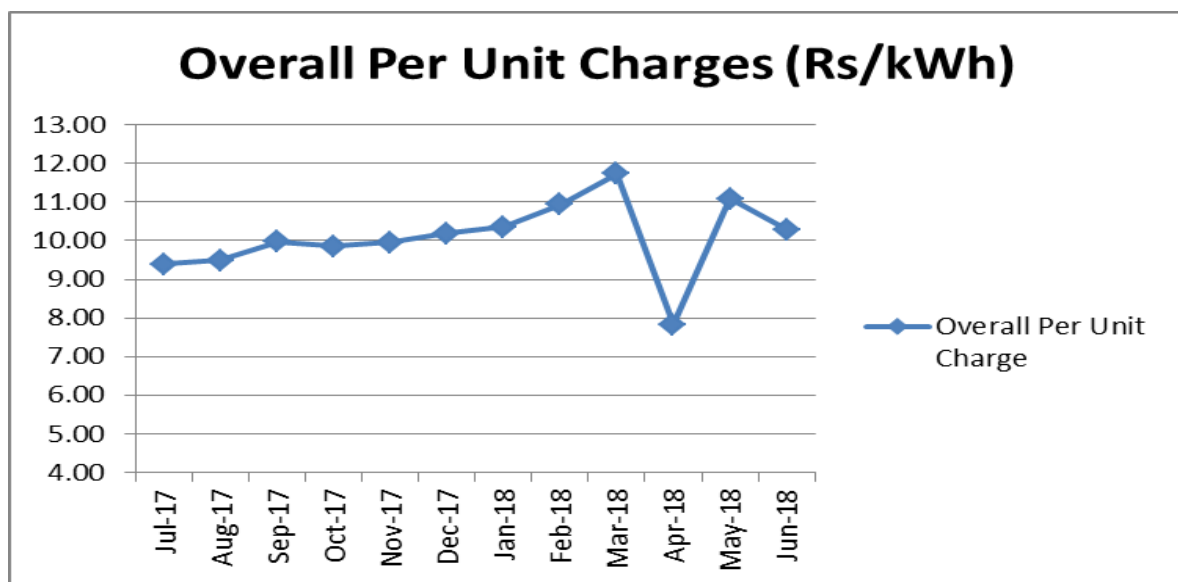
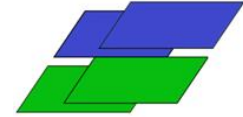


Figure 3.4:- Graphical presentation of actual per-unit charges for years 2017-18

Observation:

It was found that total energy consumption in the last 12 months was 4, 38,636/- units. The average annual energy charge is Rs 10.09 kWh.



3.5 Monthly Demand analysis (2017-18) on (Residency Feeder)

The monthly demand consumption for the residency feeder is given in the table.
Table 3.5 Monthly demand analysis (KVA) consumption pattern years 2017-18

Sr. No.	Month & Year	Contract Demand (KVA)	Billing Demand (KVA)	Maximum Demand (KVA)
1	Jul-17	300	225	135
2	Aug-17	300	225	138
3	Sep-17	300	225	184
4	Oct-17	300	225	200
5	Nov-17	300	225	172
6	Dec-17	300	225	118
7	Jan-18	300	225	100
8	Feb-18	300	225	120
9	Mar-18	300	225	128
10	Apr-18	300	225	128
11	May-18	300	225	180
12	Jun-18	300	225	189
	Minimum Demand (KVA)			100
	Maximum Demand (KVA)			200
	Average Demand (KVA)			149

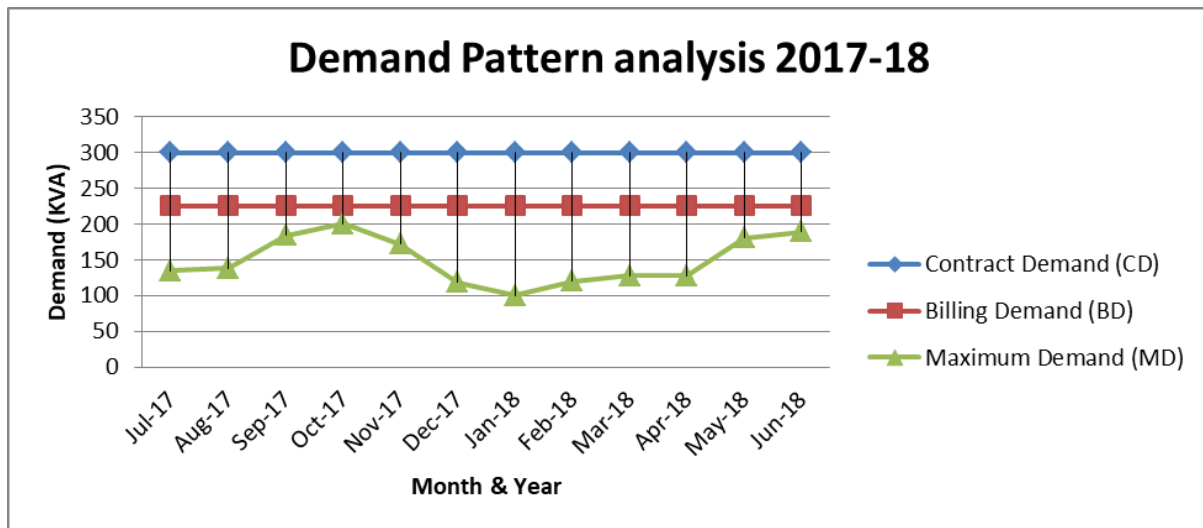
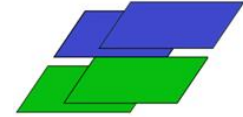


Figure 3.5:- Graphical presentation of demand consumption year 2017-18

Observation: It was observed that the contract demand of the university is 300 kVA. There is a large variation in maximum demand. It is a maximum of 200 kVA in the Month of Oct-2017 and a minimum of 100 kVA in Jan-2018...



3.6 Monthly Power factor analysis Year-2017-18 (Residency Feeder)

The monthly power factor is given in the following table.

Table 3.6 Power factor for the year 2017-18

Sr. No.	Month & Year	Power Factor (PF)	PF Incentive	PF Surcharge
1	Jul-17	0.954	1351	0
2	Aug-17	0.911	0	0
3	Sep-17	0.894	0	2044
4	Oct-17	0.898	0	737
5	Nov-17	0.911	0	0
6	Dec-17	0.903	0	0
7	Jan-18	0.901	0	0
8	Feb-18	0.851	0	10601
9	Mar-18	0.827	0	17040
10	Apr-18	0.943	0	0
11	May-18	0.752	0	56812
12	Jun-18	0.831	0	30714
	Average	0.881	1351	117948

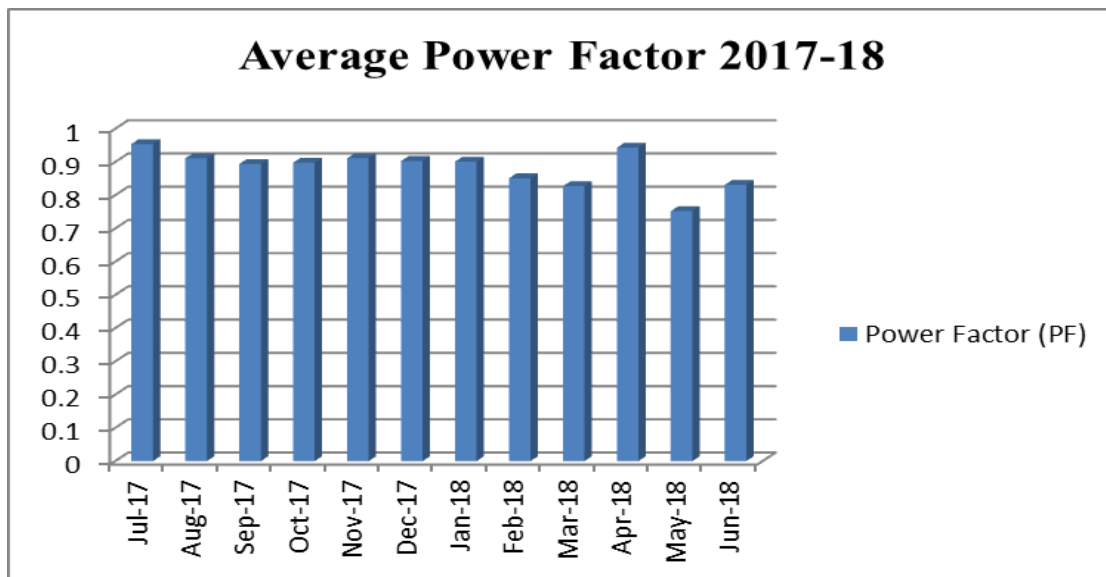
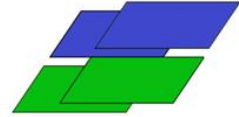


Figure 3.6 Graphical presentation of average power factor year 2017-18

Observation:

The average power factor for the year 2017-18 was 0.881.



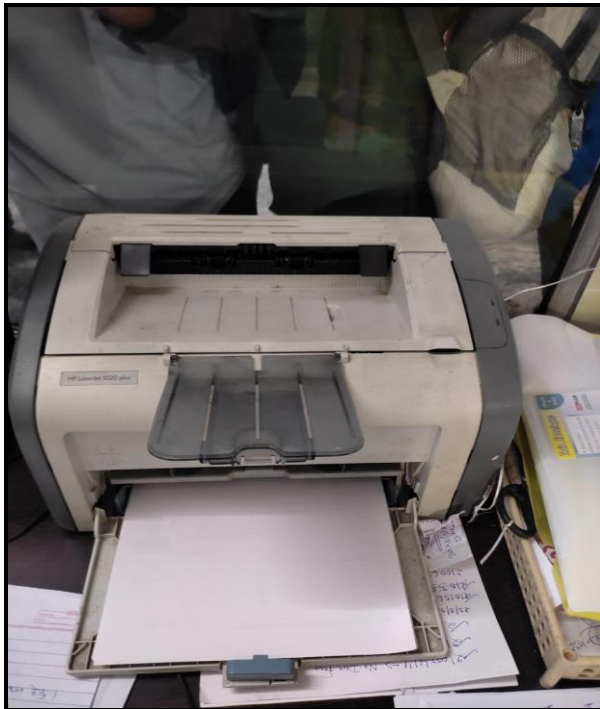
3.7 Some Photographs of Electrical Equipment's



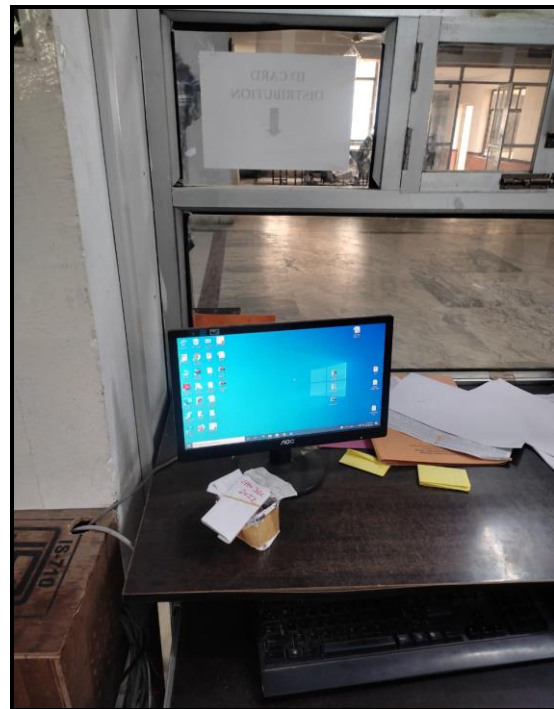
CFL (PL type)



Efficient light (LED Downlighter)



Printer



Computer System

Figure 3.9:- Electrical Equipment in Mewar university



**Energy Audit Report
Mewar University, Gangrar Chittorgarh
(Rajasthan) Year 2017-18**



END OF THE REPORT

THANKS