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

No. MU/RO/Admin/2022/1057 Dated : 4/5/2022

OFFICE ORDER

Reconstitution of Green, Environment & Energy Auditing Committee

Green Audit, Environment Audit & Energy Audit Committee is reconstituted to conduct the necessary audit in due course. Members of the Audit Committee are mentioned below:

S. No.	Name	Designation	Committee Role
1	Dr. Y. Sudershan	Professor & Dean, Department of Agriculture	Co-Ordinator
2	Mr. Rakesh Kumar Singadiya	Director, Empirical Exergy Pvt. Ltd.	External Auditor
3	Dr. Neelu Jain	Associate 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 Engg.	Internal Auditor
6	Dr. Mohd. Ashid	Asst. Professor, Department of Chemistry	Member
7	Ms. Nirma Kumari Sharma	Asst. Professor, Department of Electrical Engg.	Member
8	Mr. Suraj Kumhar	Asst. Professor, Department of Electrical Engg	Member
9	Mr. H. Widhani	OSD	Member
10	Mr. Narendra Kumar Ved	Non-Teaching Staff	Member
11	Ms. Sanchita Karnik	Non-Teaching Staff	Member

Registrar

Copy to:
1. PS to Hon'ble Chairperson for Kind information.
2. PS to President/Pro President for kind information.
3. Deans/Directors/CoE for Information.
4. All HoDs for information.
5. Concerned Committee Members
6. Coordinator, IQAC Cell.
7. Admission/Accounts/Examination/Stores/IT Support/Library/
8. Wardens/Maint.I-C/Receptionist

OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY
GANGRAR (CHITTORGARH) RAJASTHAN

Ref. No.MU/RO/2022/ 1603

16th May, 2022

OFFICE ORDER

Subject: Electrical appliances turned off when not in use.

It has been observed that, light, fans, coolers, A.C. & other electrical appliances remains turned on when there is no one in the offices and classrooms as well.

All officials are requested to turn off all electrical appliances when not in use or before leaving the offices & classroom, to avoid unnecessary use of electricity.

Registrar
Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

1. PS to Hon'ble Chairperson (for kind inf)
2. PS to Hon'ble President/Pro-President (for kind inf)
3. All concerned Deans/Directors/HoD's (for kind inf. & Necessary action)
4. Accounts/ExAMination/Library/Store/Warden/Security/IT Head.
5. Coordinator, IQAC Cell.
6. Record file.

OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY, GANGRAR (CHITTORGARH) RAJASTHAN

No. MU/Admin(Gen)/2022/1638 May 19, 2022

REVISED ORDERS

Sub: Restricted use of Cell phones in University timings

In continuation of this office order No. 1616 dated 17-5-2022 ,it is to inform that the purpose of these orders is basically to advise the staff to use the cell phone during University timings, for urgent and important functions including the University working. It is an advisory only.

The teaching staff who are the counselors and some non-teaching staff of Admission Section, Students Section and Registrar's office have to make calls for official purposes and they will do the same as usual.

In the interest of all concerned, all staff members are hereby advised to minimize the use cell of phone for personal reasons and use it only when necessary.

Registrar
Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

1) PS to Hon'ble Chairperson for kind inf
2) PS to Vice Chancellor for kind inf
3) PS to Pro Vice Chancellors for kind inf
4) Shri Arpit Maheshwari, Advisor for kind inf
5) Deans/Directors/HoDs for information and circulation to all concerned
6) Accounts/Admission/Examination/Stores./Security/Warden

OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY, GANGRAR (CHITTORGARH) RAJASTHAN

Ref. No.MU/RO/2022/1641 19th May, 2022

OFFICE ORDER

Subject: Meeting regarding "Green Energy & Environment Audit".

All concerned are hereby informed that, today (19-05-2022) a meeting will be held in Maharana Pratap Seminar Hall at 3.00 PM with "Green Energy & Environment Auditors." The following committee's members and officials should be present during the meeting:

1. Joint Registrar
2. Dean, Academics
3. Deputy Regisgrar
4. Deputy COE
5. External Auditors
6. Internal Auditors
7. IQAC Coordinator
8. NAAC Committee Memers
9. NIRF Committee Members
10. Librarian
11. Student Section Head (Mr. Tabish Ali Khan)
12. Store Incharge (Mr. Kapil Chaturvedi)
13. Maintenance & Civil Incharge
    1) Mr. Kailash Porwal
    2) Mr. Rakesh Giri
    3) Mr. J. K. Rawal

Registrar
Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:
1. PS to Hon'ble Chairperson (for kind inf)
2. PS to Hon'ble President/Pro-President (for kind inf)
3. All concerned Deans/Directors/HoD's (for kind inf. & Necessary action)
4. Accounts/ExAMination/Library/Store/Warden/Security/IT Head.
5. Coordinator, IQAC Cell.
6. Record file.

OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY, GANGRAR (CHITTORGARH) RAJASTHAN

No. MU/Admin(NSS)/2021/ 1016

July 27,2021

OFFICE ORDERS

Sub: Tree Plantation on 29-7-21 (Thursday) at 11.30 AM at University campus

A tree plantation program has been arranged in the University on 29-7-21 (Thursday) at 11.30 AM at University campus. All the staff members are requested to attend the same, if they do not have any urgent work. The Chief Guest of the function will be Shri Govind Lal Gadiya, Hon'ble Chairman, MES and Member, BOM and Shri S.R.Chaudhary, Dy Conservator of Forest will chair the function. The SDM Gangrar, Dy SP Gangrar and Ranger Chittorgarh will be the Guests of Honor.

Registrar
Registrar
Mewar University
Gangrar, Chittorgarh

Copy to:

1) PS to Hon'ble chairperson (For Kind Inf)
2) PS to President/Pro President (for kind inf)
3) All concerned Deans/Directors/HoDs (for inf and Necessary action)
4) Controller of Examination (for kind inf)
5) Accounts/Examination/Library/Stores/Security/Hostel/Maintenance
6) Co-ordinator, IQAC Cell
7) Record File
8) Notice Board

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

Ref. No.: MU/RO/2022/1771 **03rd June, 2022**

OFFICE ORDER

Subject: Celebration of "World Environment Day" on 4th June, 2022.

The Department of Life Science is organizing Plantation drive on the occasion of "World Environment Day" on 4th June, 2022 at the back side of main Administrative Building of Mewar University. All the faculty, staff members and students are invited to join this Plantation drive.

The details of the Plantation Drive are as under:

Date : 4th June, 2022 (Saturday)
Time : 10.00 am to 12.00 pm
Venue: Back side of main Administrative Building

The following officials are advised to make necessary arrangement:

1) Plants-10 — Mr. Kailash Porwal
2) 2 Labour required for digging pits — Mr. Kailash Porwal
3) 1 Cameraman — Mr. Ankit Navalkha, IT Support

31-5-2022

Registrar

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

- PS to Hon'ble Chancellor (for kind information)
- PS to Hon'ble President/Vice Chancellor(for kind information)
- All Officers/Deans/Directors Hod's
- IT Section/Accounts Dept. All Staff
- Coordinator IQAC Cell
- Record File

OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY, GANGRAR, CHITTORGARH (RAJASTHAN)

Ref. No.: MU/RO/2022/1783

06th June, 2022

OFFICE ORDER

Subject: Plantation, Green Campus-Clean Campus, Save Water-Save Electricity Drive by Department of Education on 10th June, 2022 (Day-Friday).

The Department of Education [illegible] is organizing a Plantation, Green Campus - Clean Campus, Save Water - Save Electricity [illegible] (Friday) at 9.30 AM in University Campus [illegible].

All the Faculty, Staff members and Students are invited to [illegible].

06/6/2022
Registrar

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

- PS to Hon'ble Chancellor (for kind information)
- PS to Hon'ble President Vice Chancellor (for kind information)
- All Officers/Deans/Directors/HoDs
- IT Section, Accounts Dept., All Staff,
- Coordinator IQAC Cell
- Record File

OFFICE OF THE REGISTRAR
MEWAR UNIVERSITY
GANGRAR (CHITTORGARH) RAJASTHAN

Ref. No.MU/Admin /2022/ 268 29th January 2022

Office Order

Consquent to the approval of competent authority, committee of following members is hereby constituted for the purpose of landscape gardening of the campus or otherwise.

1. Dr. Vijay Kumar Yadav - Convener
2. Dr. R.S. Rana - Member
3. Dr. Manohar Meghwal - Member
4. Mr. Champa Lal Regar - Member
5. Mr. Om Prakash Regar - Member

Mr. Gautam Singh Dhaked, Associate Dean) will support for all necessary requirements for smooth functioning.

Registrar

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. Dean (Academics/Admission) /Director/Hod's
4. Accounts/Library/Warden/Store/Maintenance/IT

MEWAR UNIVERSITY

Gangrar, Chittorgarh (Raj.)
OFFICE OF THE REGISTRAR

Ref. No.MU/RO/2022/1040 — 26th March, 2022

OFFICE ORDER

Subject: Celebrating of 60+ Earth Hour

This is to inform to all the faculty/staff members and Students that Mewar University is going to participate in **60+ Earth Hour** on 26th March, 2022, being organised by WORLD WILDLIFE FUND FOR NATURE (WWF, India).

You all are, hereby, requested to switch-off lights from 8.30 PM to 9.30 PM (one hour) to protect natural world and safeguard our future.

Name of building are as below:

1. Pratap Hostel
2. Bhamashah Hostel
3. Panna Hostel
4. Meera Hostel
5. Sanga Hostel
6. Faculty quarters (1 & 2 BHK)
7. Guest House
8. Admin Block
9. B.Ed Block
10. Other all buildings

University Coordinator:
Dr. Vijay Kumar Yadav
Assistant Professor & Head
Department of Forestry

WWF, India-Coordinator:
Arun Soni
Office-In-Charge, WWF-India
Udaipur Division

24/03/22
Registrar

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

1. Ps to Hon'ble Chancellor for kind information
2. PS to Hon'ble President for kind information
3. Pro-President/OSD
4. Dean (Academics/Admission) /Director/Hod's
5. Accounts/Library/Warden/Store/Maintenance/IT

MEWAR UNIVERSITY

Gangrar, Chittorgarh (Raj.)

OFFICE OF THE REGISTRAR

Ref. No.MU/Admin/2022/1351 Date: 23/04/2022

Office Order

Sub.: Compliance of office order no. 2865 dated 03-09-2019.

All Deans, Directors, Heads of the Department, Faculty/staff members and students are hereby advised to ensure the compliance of earlier office order no. 2865 dated 03-09-2019 subjected – 'Restriction on automobiles in the campus'(enclosed).

Registrar

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

1. PS to Hon'ble Chairperson (for kind inf)
2. PS to Hon'ble President/Pro-President (for kind inf)
3. All concerned Deans/Directors/HoD's (for kind inf. & Necessary action)
4. Coordinator, IQAC Cell.

MEWAR UNIVERSITY

Gangrar, Chittorgarh (Raj.)
OFFICE OF THE REGISTRAR

Ref. No.MU/Admin/2022/1352 Date:23/04/2022

Office Order

Sub.: Compliance of office order no. 2902 dated 12-09-2019

All Deans, Directors, Heads of the Department, Faculty/staff members and students are hereby advised to ensure the compliance of earlier office order no. 2902 dated 12-09-2019 subjected – **'Ban on use of plastic at Mewar University Campus'**(enclosed).

Registrar
Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:

1. PS to Hon'ble Chairperson (for kind inf)
2. PS to Hon'ble President/Pro-President (for kind inf)
3. All concerned Deans/Directors/HoD's (for kind inf. & Necessary action)
4. Coordinator, IQAC Cell.

Empirical Exergy Private Limited

Registered Office: 18-E, Sudama Nagar, Indore -452009
Office (Indore): Flat No. 201, Om Apartment, 214 Indrapuri, Indore (M.P.),
Contact: +91-731-4948831, Mobile: +91-78693-27256, 88713-68108
www.eeplgroups.com, email:-eempirical18@gmail.com
CIN No: U74999MP2018PTC045751

Ref No: EEPL/2022-23/ENERGY/002 **Date: - 20-05-2022**

ENERGY AUDIT CERTIFICATE

This is certified that Empirical Exergy Private Limited (EEPL) Indore M.P. has conducted an Energy audit at **Mewar University, Chittorgarh (Rajasthan)** for the academic year 2021-22, and the audit report has been submitted.

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), 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)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

ENERGY AUDIT REPORT

MEWAR UNIVERSITY

Gangrar Chittorgarh (Rajasthan)

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, OM Apartment,214 Indrapuri Colony,
Bhawarkuan,Indore – 452 001 (M. P.), India
0731-4948831, 7869327256
Email ID:eempirical18@gmail.com
www.eeplgroups.com

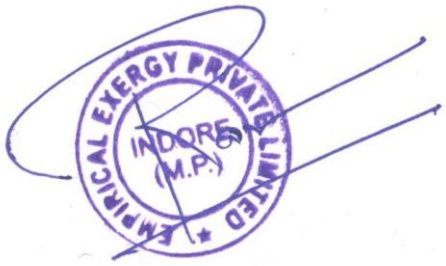
(2021-22)

CONTENT

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)
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(BEE, Ministry of Power, Govt. of India)
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Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

ENERGY IS LIFE
CONSERVE IT

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

Green Monitoring Committee.

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

No. MU/RO/Admin/2022/1450 Dated : 4/5/2022

OFFICE ORDER

Reconstitution of Green, Environment & Energy Auditing Committee

Green Audit, Environment Audit & Energy Audit Committee is reconstituted to conduct the necessary audit in due course. Members of the Audit Committee are mentioned below:

S. No.	Name	Designation	Committee Role
1	Dr. Y. Sudershan	Professor & Dean, Department of Agriculture	Co-Ordinator
2	Mr. Rakesh Kumar Singadiya	Director, Empirical Exergy Pvt. Ltd.	External Auditor
3	Dr. Neelu Jain	Associate 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 Engg.	Internal Auditor
6	Dr. Mohd. Ashid	Asst. Professor, Department of Chemistry	Member
7	Ms. Nirma Kumari Sharma	Asst. Professor, Department of Electrical Engg.	Member
8	Mr. Suraj Kumhar	Asst. Professor, Department of Electrical Engg	Member
9	Mr. H. Widhani	OSD	Member
10	Mr. Narendra Kumar Ved	Non-Teaching Staff	Member
11	Ms. Sanchita Karnik	Non-Teaching Staff	Member

Registrar
Mewar University
Gangrar, (Chittorgarh)

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3. Deans/Directors/CoE for Information.
4. All HoDs for information.
5. Concerned Committee Members
6. Coordinator, IQAC Cell.
7. Admission/Accounts/Examination/Stores/IT Support/Library/
8. Wardens/Maint.I-C/Receptionist

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 saftey Engineer]
- **Mr. Aakash Kumawat** [Site Engineer]
- **Mr. Ajay Nahra,** [Sr. Accountant & admin]

EXECUTIVE SUMMARY

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

ENERGY MANAGEMENT INITIATIVE TAKEN BY UNIVERSITY

- **480 KWp SOLAR PHOTOVOLTAIC ROOFTOP INSTALLATION:**

University has a 480 KWp solar photovoltaic rooftop grid-connected system installed on most of the buildings. Total unit generation from Sep-2018 to March- 2022 is **22,87,354** units. The solar unit generated for the year 2021-22 is 6,32,850 units. It is more than 50 % of the total unit consumption of the university campus.

RECOMMENDATION:-

- **POWER FACTOR IMPROVEMENT ON UNIVERSITY FEEDER**

  The average power factor for the year 2021-22 was 0.862 on the university feeder. It is recommended to maintain the power factor unity.

- **LIGHTING SYSTEM**

  University has already initiated the installation of energy-efficient lighting in new construction buildings and the replacement of "conventional tube light by an energy-efficient LED tube light and LED downlighter. **It's Appreciable.**

- **TIMER-CONTROLLED STREET LIGHTS**

  There are 3 high masts on the university campus. The high mast operated with the timer control system. **It's Appreciable.**

- **CEILING FAN AND EXHAUST FAN:**

  University is going to replace "conventional ceiling fan (60 Watt)" with an energy-efficient star-rated fan or BLDC-based energy-efficient fan (28 Watt) in classrooms, laboratories, and faculties cabin in phased mannerand has great potential for energy saving.

  University is going to replace the "conventional exhaust fan (180 Watt)" with an energy-efficient star-rated fan or BLDC-based energy-efficient Fan (40 Watt) in the university's

main building classrooms, laboratories, and faculties cabin has great energy-saving potential.

ENERGY CONSERVATION MEASURES FOR ELECTRICAL SYSTEM

Case Study	Section	Identification	Observation	Recommendation	Annual energy saving (kWh)	Annual cost saving (Rs.)	Investment (Rs.)	Simple payback Period (Year)
1	Lighting System	98 No. FTL tubelight	Power consumption by T-12 LED (08 to 10-watt blast power)	Replacement of conventional (T-12) with (T-5 Watt)	5,096	44,997	24,600	0.54
2	Lighting System	506 No CFL	Power consumption by CFL (18 Watt)	Replacement of conventional downlighter with 09 Watt.	9,108	81,334	80,900	01
3	Celling Fan	2702 No celling fan working with 60 Watt	Power consumption by exesting celling fan (60 Watt)	Replacement of 60W conventional ceiling fan by 28W BLDC energy efficient ceiling fan	1,72,928	15,44,247	68,55,000	4.43

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) dated15th October 2018. The University is also NAAC accredited.

Mewar University has never affiliated any institution, nor has the University ever set up any study center 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)]

- **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.

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 counseling 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

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

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

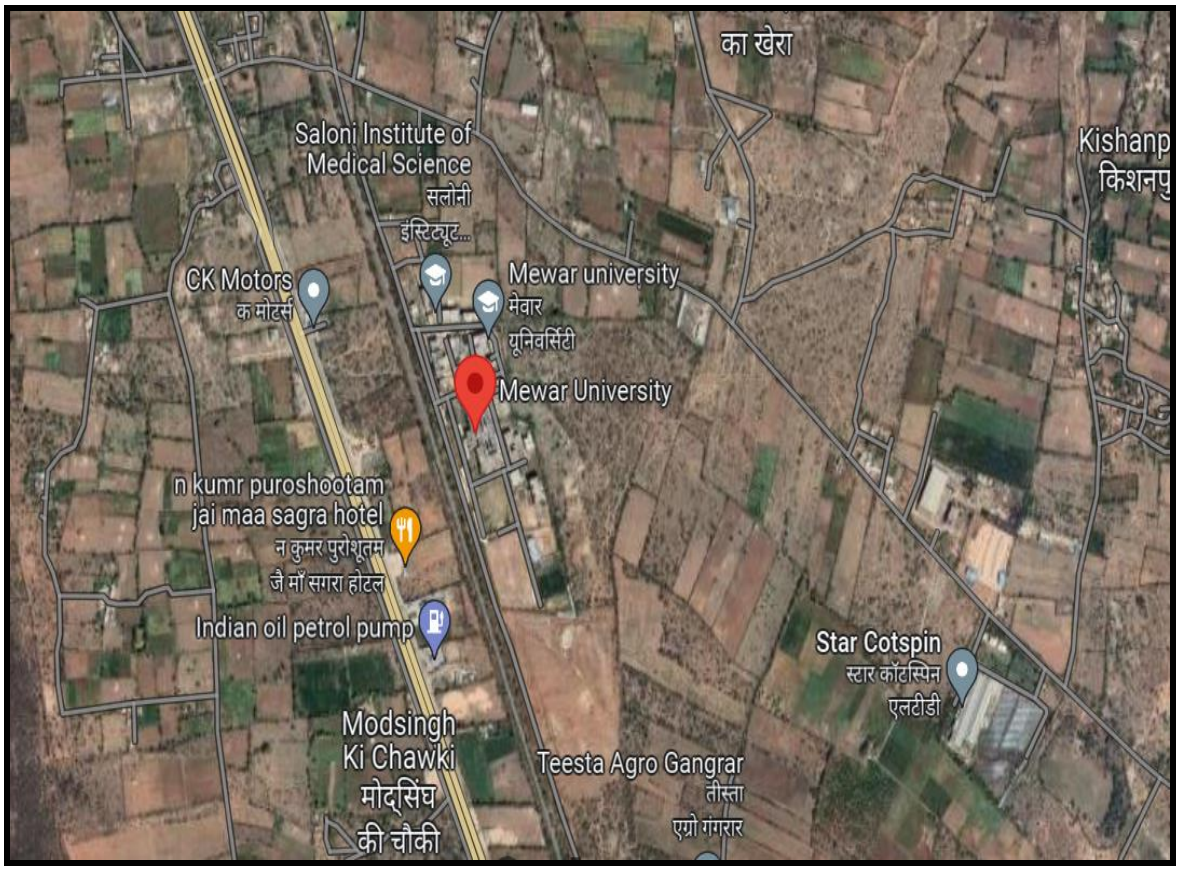
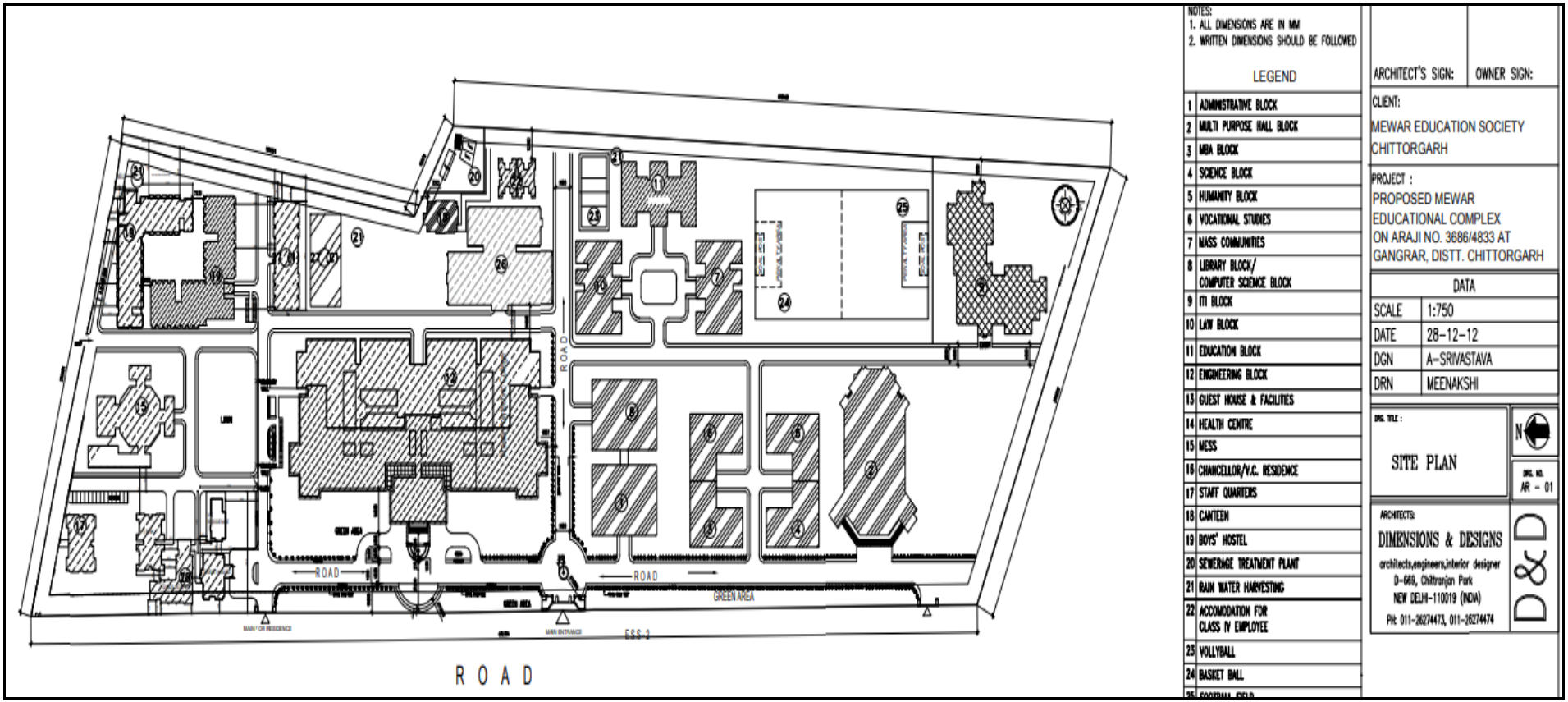


Figure 1.1: - Satellite Image of Mewar university from Google map

1.3 MEWAR UNIVERSITY LAYOUT OF VARIOUS BUILDINGS

Layout map of Mewar University



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:

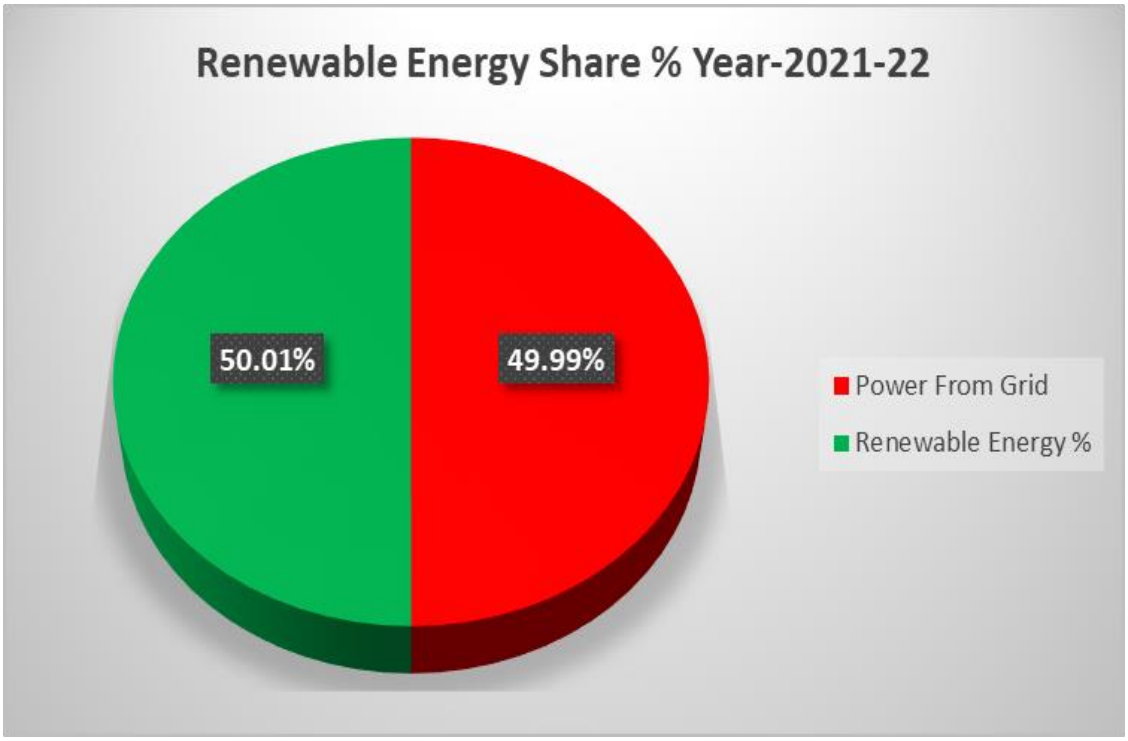
- Discussions with the concerned officials for identification of major areas of focus and other related systems.
- A team of engineers visited the site and had discussions with the concerned officials/supervisors to collect data/information on the operations and load distribution within the plant and 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 equipments, 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.

1.7 Mewar University Present Energy Scenario:

Mewar university uses energy in the form of electricity purchased from the grid and a 480 KWp solar grid-connected system for the university campus. There are two feeders one is for education building and the other for residency

The annual energy consumption of **Mewar University** campus is about **12,65,488** units (Grid + Solar) period from April - 2021 to March- 2022.

Mewar University has a 480 KWp solar photovoltaic rooftop grid-connected system installed on almost all buildings. Total Solar generation from Sep-2018 to March- 2022 is **22,87,345** units. Annual Solar unit generation for the year 2021-22 is 6,32,850 units.



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

Table 2.2: Calculated Transformer loading on university feeder loading % Year (2021-22)

Sr.No.	Month & Year	Transformer Capacity (KVA)	Maximum Demand (kVA)	Transformer loading %
1	Apr-21	630	63	9.97
2	May-21	630	64	10.16
3	Jun-21	630	84	13.33
4	Jul-21	630	109	17.30
5	Aug-21	630	114	18.10
6	Sep-21	630	120	19.05
7	Oct-21	630	92	14.54
8	Nov-21	630	92	14.54
9	Dec-21	630	82	13.02
10	Jan-22	630	73	11.56
11	Feb-22	630	70	11.11
12	Mar-22	630	72	11.49
	Average Transformer loading %			**13.68**

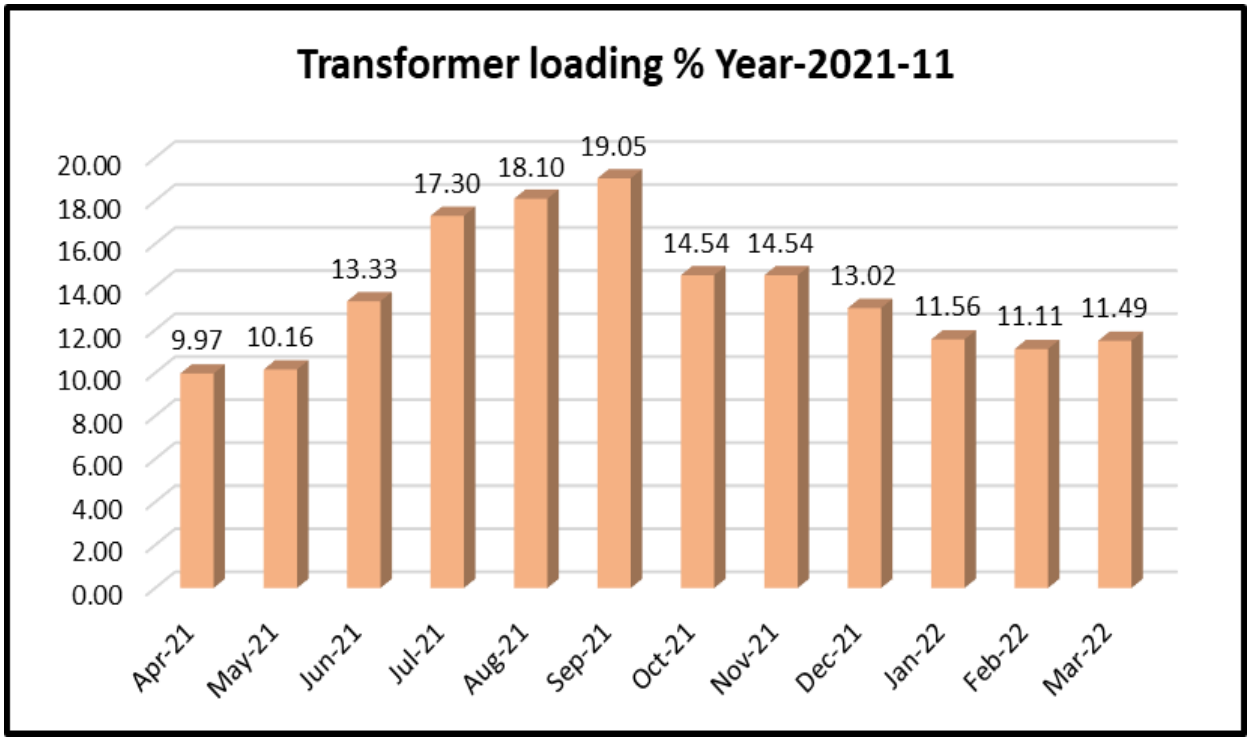


Figure 2.2:- Graphical presentation of TR loading percentage Year 2021-22

Observation: -

The average loading of the transformer is 13.68 %. It is acceptable.

Table 2.3: Calculated Transformer loading on residency Feeder Loading %
Year (2021-22)

Sr.No.	Month & Year	Transformer Capacity (KVA)	Maximum Demand (KVA)	Transformer loading %
1	Apr-21	500	136	27.28
2	May-21	500	96	19.20
3	Jun-21	500	102	20.40
4	Jul-21	500	79	15.76
5	Aug-21	500	92	18.40
6	Sep-21	500	71	14.16
7	Oct-21	500	79	15.76
8	Nov-21	500	106	21.20
9	Dec-21	500	137	27.36
10	Jan-22	500	195	38.96
11	Feb-22	500	200	39.92
12	Mar-22	500	140	28.08
	Average Transformer loading %			**23.87**

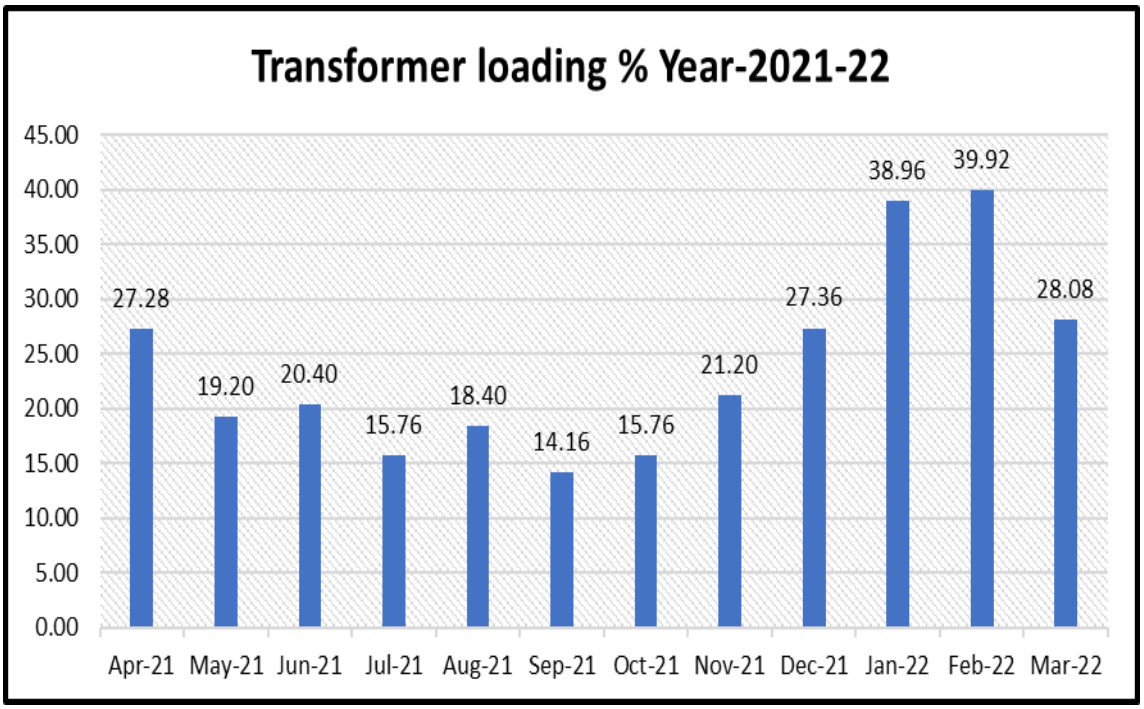


Figure 2.3:- Graphical presentation of TR loading percentage Year 2021-22

Observation: -

The average loading of the transformer is 23.67%. It is acceptable.

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 Power House

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 at the site. It was found that all the capacitors are in working condition.

2.4 Grid Connected Solar Photovoltaic System (490 Kwp)

There is a 480KWp solar photovoltaic rooftop grid-connected system installed on various buildings. System details are given below:

Table: - 2.6 Solar plant detailed

Sr. No	Description	Technical Specification
1	Plant Information	
1.1	Plant capacity	480 kWp
1.2	Locations	1. Administrative and Academic building 2. Kumbha Hostel building. 3. Pratap Hostel building. 4. Sanga Hostel building. 5. Mewar Hospital 6. Panna Dhai Girls Hostel . 7. Meera Girls Hostel.
1.3	Latitude & Longitude	23.3103 N & 77.3619 E
2	PV Panel Details	
2.1	Make	M/s. Goldi Green Technologies Pvt. Ltd
2.2	Panel Type	Poly-crystalline
2.3	Panel Wattage	320 Wp
2.4	No of PV Panels	1478
2.5	Total Capacity	480 kWp
3	Inverter Information	
3.1	Make	KSTAR
3.2	Model	1. KSG-50K = 04 2. KSG-20K = 06 3. KSG-15K = 01 4. KSG-20K =05
3.3	Capacity	480 Kw

Sr. No	Building Name	Total No of Inverter	Inverter Modal	No of Penal
1	Administrative and Academic building	2	KSG-20 K	730
		4	KSG-50 K	
2	Kumbha Hostel	2	KSG-20 K	110
3	Pratap Hostel	1	KSG-15 K	108
		1	KSG-20 K	
4	Sanga Hostel	2	KSG-30 K	190
5	Mewar Hospital	2	KSG-30 K	190
6	Panna Dhai Hostel	1	KSG-20 K	60
7	Meera Girls Hostel	1	KSG-30 K	90

Photographs of Solar Plant:-

Figure 2.6:- Solar Plant 480 KWp and Inverter System

Total Solar unit generation:-

Table 2.7:- Total Solar Unit generation Year-2018 to 2022

Sr. No	Year	Unit
1	2018-19	4,15,350
2	2019-20	5,69,087
3	2020-21	6,29,936
4	2021-22	6,20,672
	Total	**22,35,045**

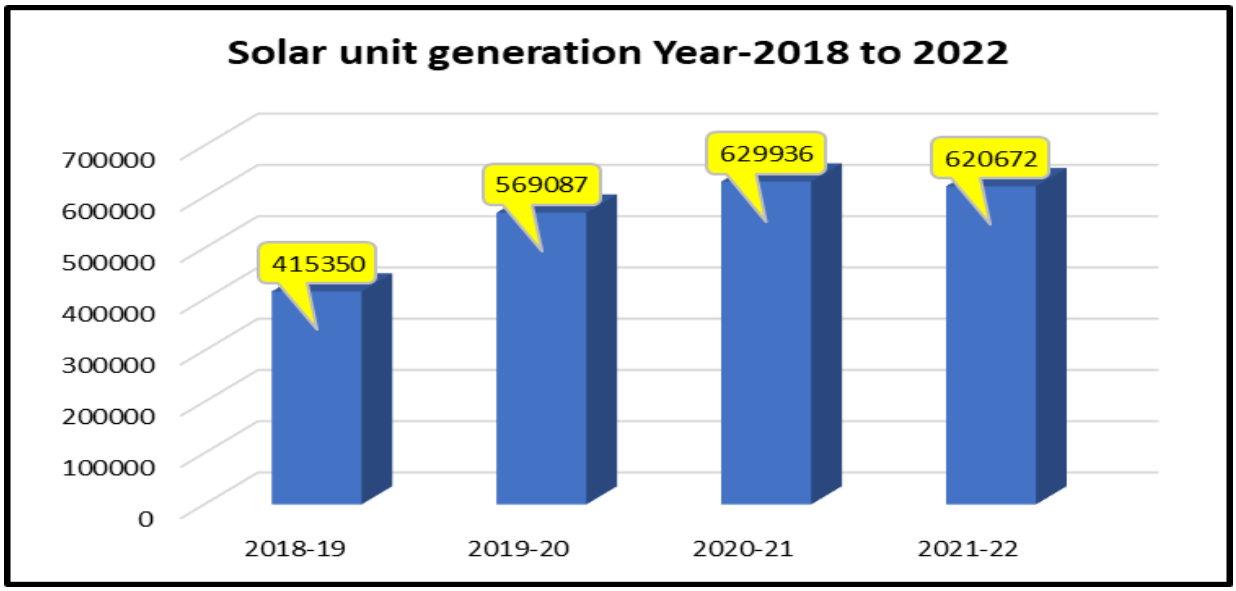


Figure: - 2.7 Graphical presentation of Solar unit generation

Observation: -

Total unit generation from the installation of the solar system up to march-2022 is 22,35,045 units.

Solar unit generation Year-2021-22:-

Table 2.8:- Monthly Solar unit generation Year-2022

Sr. No	Month & Year	Unit (kWh)	Amount (Rs/-)	per unit Charges (Rs/kWh)
1	Apr-21	64,125	2,88,563/-	4.50
2	May-21	56,511	2,54,300/-	4.50
3	Jun-21	52,918	2,38,131/-	4.50
4	Jul-21	46,334	2,08,501/-	4.50
5	Aug-21	44,791	2,01,560/-	4.50
6	Sep-21	41,335	1,86,008/-	4.50
7	Oct-21	60,348	2,71,568/-	4.50
8	Nov-21	47,370	2,13,165/-	4.50
9	Dec-21	42,208	1,89,936/-	4.50
10	Jan-22	50,107	2,25,479/-	4.50
11	Feb-22	52,226	2,35,015/-	4.50
12	Mar-22	62,401	2,80,802/-	4.50
	Total	**6,20,672**	**27,93,028/-**	**4.50**

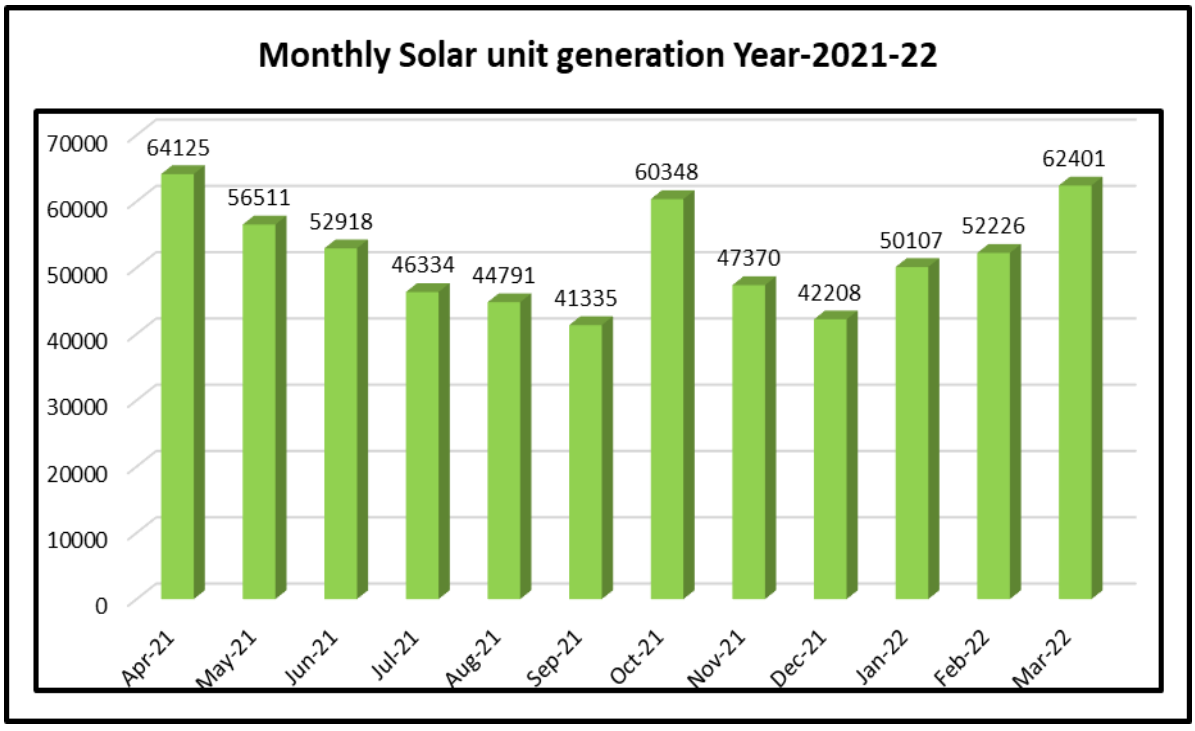


Figure 2.8:- Monthly Solar unit generation Year-2021-22

CHAPTER- 3
ELECTRICITY BILL ANALYSIS

3.0 Electricity Bill Analysis: -

Electricity bills for the last four years were analyzed. Detailed unit consumption, Solar unit generation, and % of renewable energy sources.

Table 3.0 :- Electricity bill analysis last 04 Year

Sr. no	Year	Unit consumption (Residentail)	Unit Consumption (University)	Total unit Consumption by AVVNL	Total Solar Unit Generation	Total Unit consumption (AVVNL + Solar)	Renewable Energy Share %
1	2018-19	3,81,399	2,55,912	6,37,311	4,15,350	10,52,661	39.46
2	2019-20	4,81,500	2,03,160	6,84,660	6,09,209	12,93,869	47.08
3	2020-21	3,36,507	2,30,656	5,67,163	6,29,936	11,97,099	52.62
4	2021-22	1,76,178	4,56,460	6,32,638	6,32,850	12,65,488	50.01
	Total	**13,75,584**	**11,46,188**	**25,21,772**	**22,87,345**	**48,09,117**	

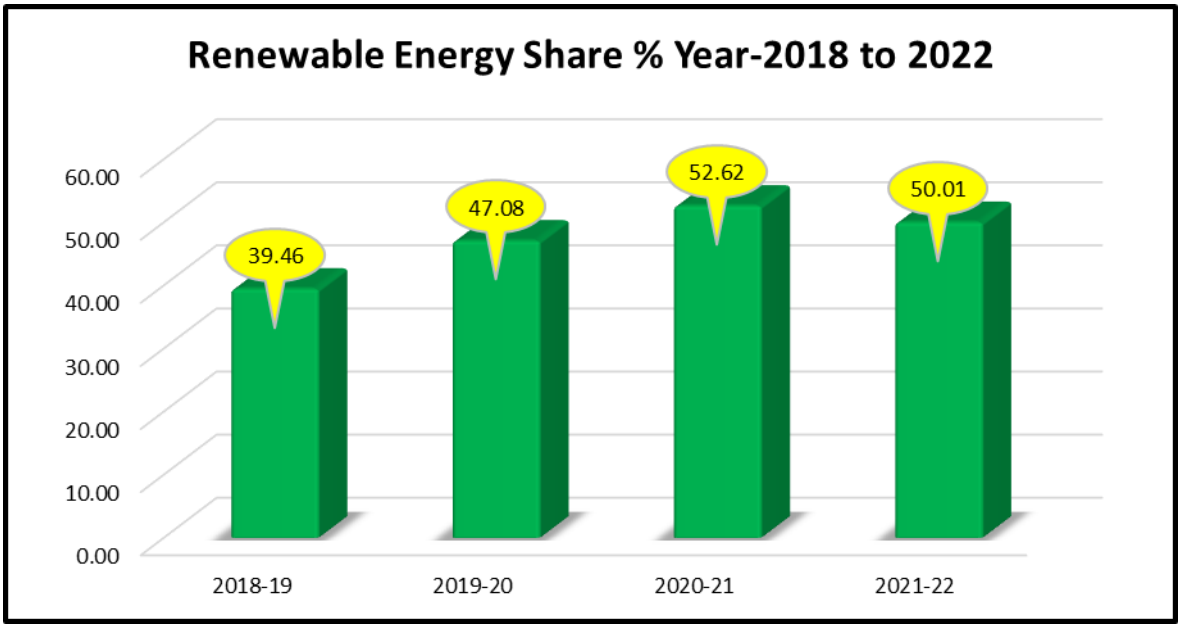


Figure 3.0:- Renewable energy share % Year-2018 to 2022

3.1 Monthly electrical energy consumption 2021-22:- (University Feeder)

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

Table 3.1 Energy consumption and billing amount (the year 2021-22)

Sr.No.	Month & Year	Unit Consumption (kWh)	Energy Charge (Rs/-)	Energy Charges (Rs./KWh)
1	Apr-21	11,012	98,342 /-	8.93
2	May-21	10,810	96,533/-	8.93
3	Jun-21	17,244	1,54,161/-	8.94
4	Jul-21	8,352	74,666/-	8.94
5	Aug-21	2,764	24,523/-	8.87
6	Sep-21	16,328	1,45,921/-	8.94
7	Oct-21	13,284	1,18,677/-	8.93
8	Nov-21	34,156	3,05,404/-	8.94
9	Dec-21	16,392	1,46,566/-	8.94
10	Jan-22	16,164	1,44,453/-	8.94
11	Feb-22	15,296	1,36,684/-	8.94
12	Mar-22	14,376	1,28,450/-	8.94
	Total	**1,76,178**	**15,74,380**/-	**8.93**

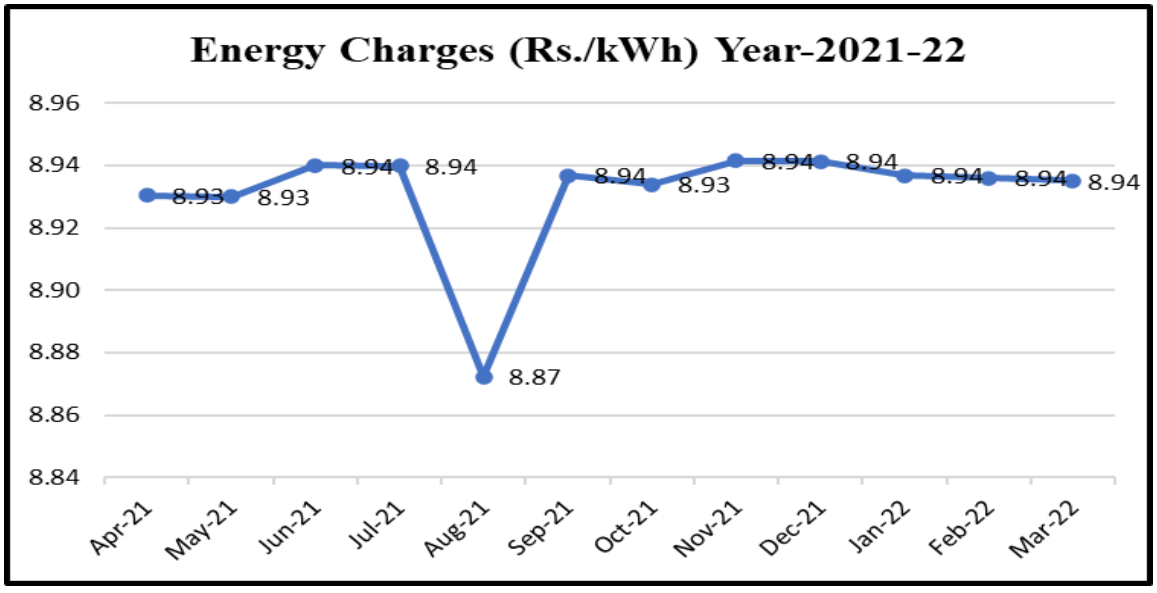


Figure 3.1:- Graphical presentation of actual per-unit charges for the year 2021-22

Observation:

It was found that total energy consumption in the last 12 months was 1,76,178 units. The average annual energy charge is Rs 8.93 /kWh.

3.2 Monthly demand analysis (2021-22) 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 2021-22

Sr.No.	Month & Year	Contrect Demand (kVA)	Billing Demand (kVA)	Maximum Demand (kVA)
1	Apr-21	300	225	63
2	May-21	300	225	64
3	Jun-21	300	225	84
4	Jul-21	300	225	109
5	Aug-21	300	225	114
6	Sep-21	300	225	120
7	Oct-21	300	225	92
8	Nov-21	300	225	92
9	Dec-21	300	225	82
10	Jan-22	300	225	73
11	Feb-22	300	225	70
12	Mar-22	300	225	72
Minimum Demand				**63**
Maximum Demand				**120**
Average Demand				**87**

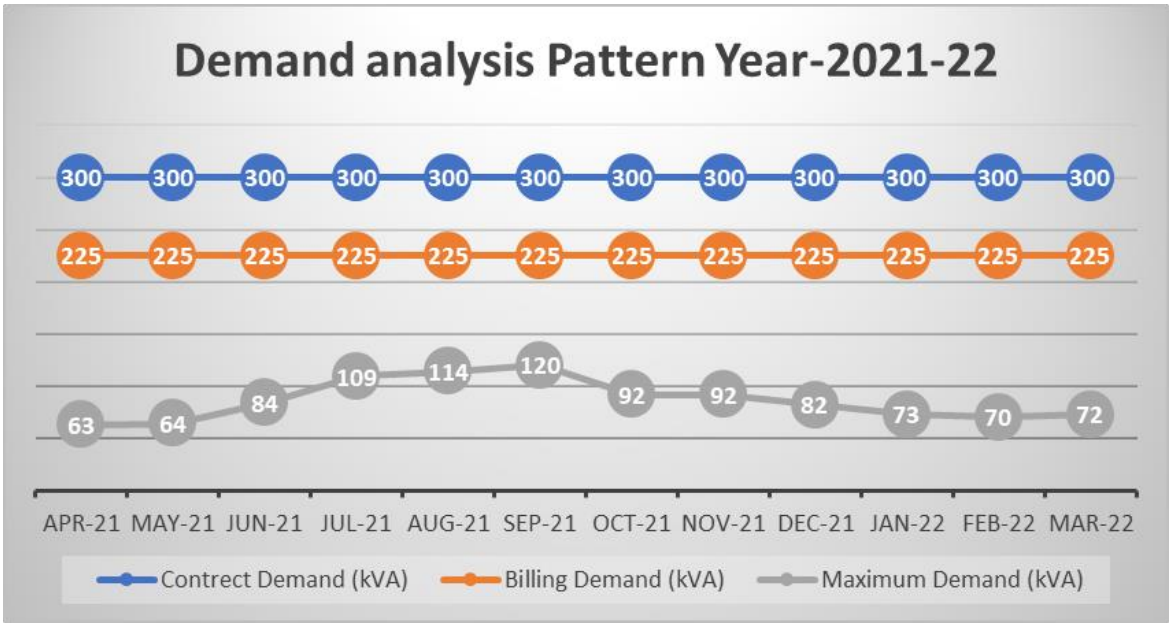


Figure 3.2:- Graphical presentation of demand consumption in the university year 2021-22

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 120 kVA in the Month of Sep-2021 and a minimum of 63 kVA in Apr- 2021.

3.3 Monthly Power factor analysis Year-2021-22 (University Feeder)

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

Table 3.3:- Power factor of the university year 2021-22

Sr.No.	Month & Year	Power Factor
1	Apr-21	0.863
2	May-21	0.832
3	Jun-21	0.854
4	Jul-21	0.876
5	Aug-21	0.822
6	Sep-21	0.822
7	Oct-21	0.822
8	Nov-21	0.897
9	Dec-21	0.887
10	Jan-22	0.885
11	Feb-22	0.877
12	Mar-22	0.907
		Average = 0.862

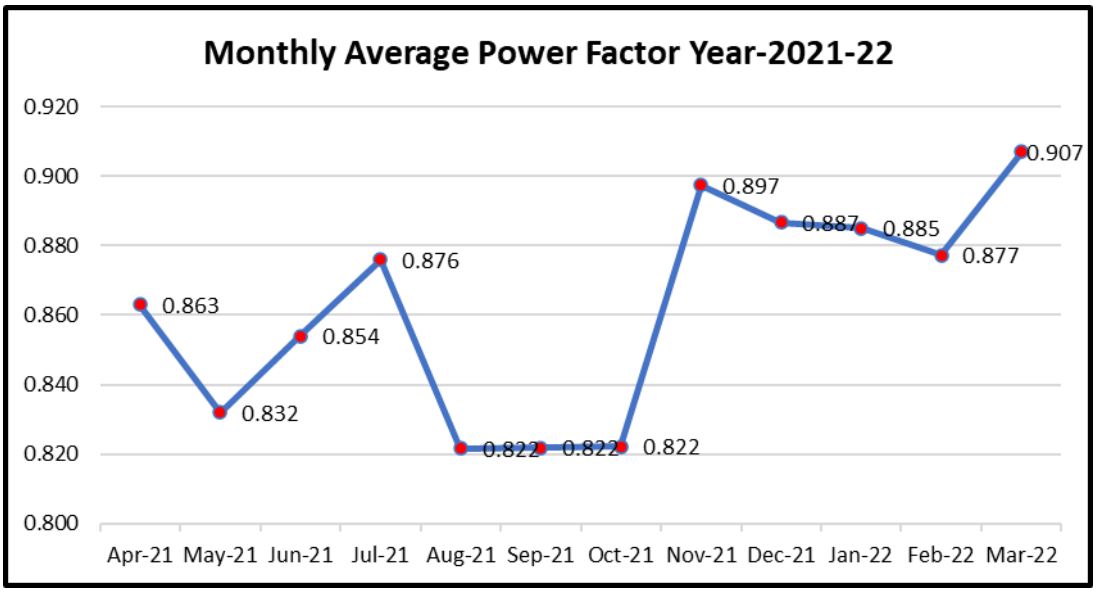


Figure 3.3 Graphical presentation of average power factor year 2021-22

Observation:

The average power factor was 0.862 for the year 2021-22. It is recommended to maintain power factor unity.

3.4 Monthly electrical energy consumption 2021-22 at (Residency Feeder)

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

Table 3.4 Energy consumption and billing amount year 2021-22

Sr.No.	Month & Year	Unit Consumption (kW)	Energy Charge (Rs/-)	Energy Charges (Rs./KWh)
1	Apr-21	32,388	2,57,030 /-	7.94
2	May-21	39,894	3,16,359/-	7.93
3	Jun-21	53,000	4,20,820/-	7.94
4	Jul-21	20,388	1,61,629/-	7.93
5	Aug-21	24,368	1,93,271/-	7.93
6	Sep-21	19,940	1,58,068/-	7.93
7	Oct-21	27,818	2,20,582/-	7.93
8	Nov-21	32,048	2,54,162/-	7.93
9	Dec-21	36,908	2,93,117/-	7.94
10	Jan-22	63,920	5,07,709/-	7.94
11	Feb-22	66,392	5,27,361/-	7.94
12	Mar-22	39,396	3,12,743/-	7.94
	Total	4,56,460	36,22,851/-	7.94

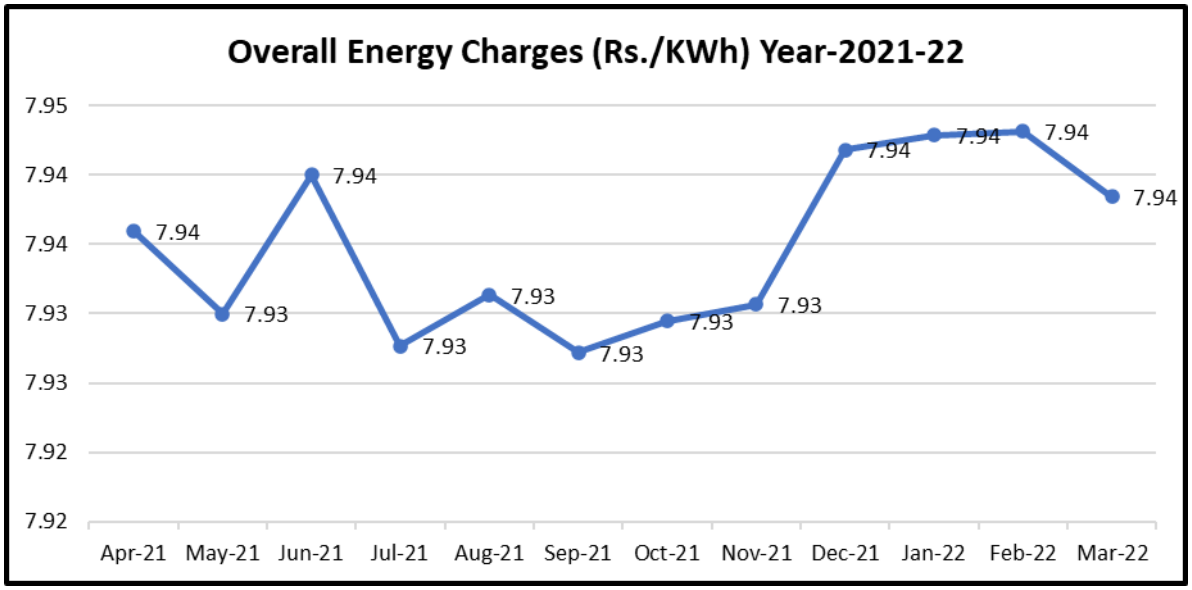


Figure 3.4:- Graphical presentation of actual per-unit charges for years 2021-22

Observation:

It was found that total energy consumption in the last 12 months was 1,76,178/- units. The average annual energy charge is Rs 8.93 kWh.

3.5 Monthly Demand analysis (2021-22) 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 year 2021-22

Sr.No.	Month & Year	Contrect Demand (kVA)	Billing Demand (kVA)	Maximum Demand (KVA)
1	Apr-21	300	225	136
2	May-21	300	225	96
3	Jun-21	300	225	102
4	Jul-21	300	225	79
5	Aug-21	300	225	92
6	Sep-21	300	225	71
7	Oct-21	300	225	79
8	Nov-21	300	225	106
9	Dec-21	300	225	137
10	Jan-22	300	225	195
11	Feb-22	300	225	200
12	Mar-22	300	225	140
Minimum Demand				**71**
Maximum Demand				**200**
Average Demand				**122**

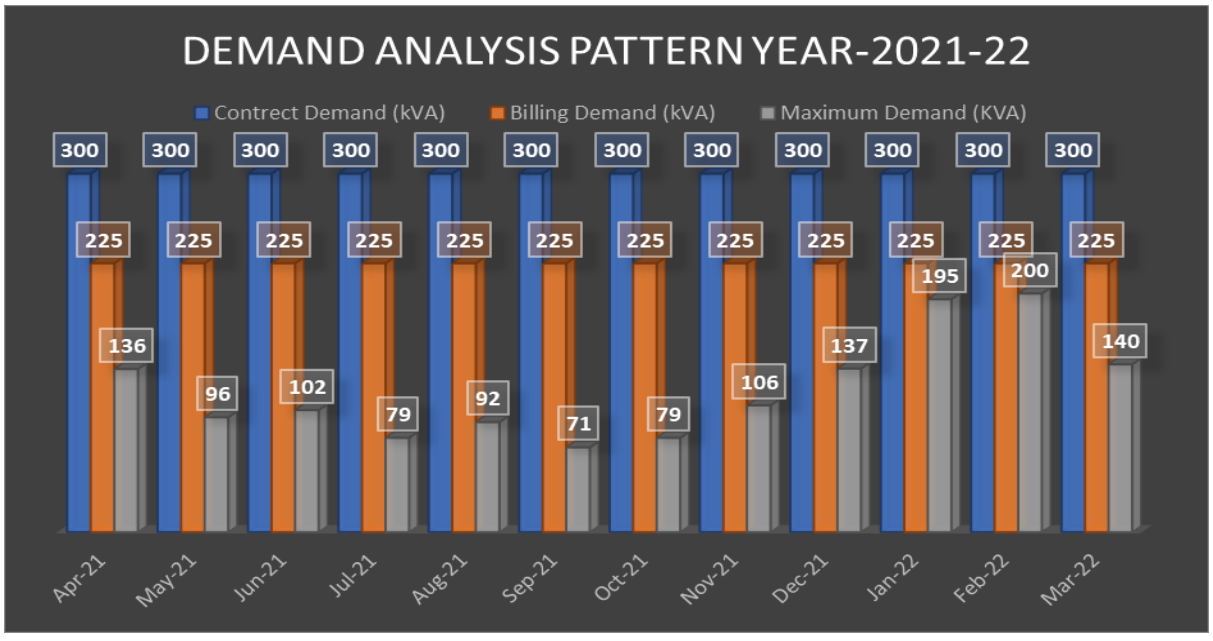


Figure 3.5:- Graphical presentation of demand consumption year 2021-22

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 20 kVA in the Month of Feb-2022 and a minimum of 71 kVA in Sep-2021.

3.6 Monthly Power factor analysis Year-2021-22 (Residency Feeder)

The monthly power factor is given in the following table.

Table 3.6 Power factor for the year 2021-22

Sr.No.	Month & Year	Power Factor	PF Penalty (Rs/-)	PF Incentive (Rs/-)
1	Apr-21	0.989	0.00	7,197
2	May-21	0.973	0.00	6,527
3	Jun-21	0.982	0.00	8,726
4	Jul-21	0.985	0.00	3,879
5	Aug-21	0.986	0.00	4,832
6	Sep-21	0.977	0.00	2,529
7	Oct-21	0.988	0.00	5,958
8	Nov-21	0.988	0.00	6,862
9	Dec-21	0.979	0.00	5,569
10	Jan-22	0.976	0.00	8,123
11	Feb-22	0.981	0.00	10,547
12	Mar-22	0.979	0.00	5,942
		Average = 0.981		**Total = 76,691**

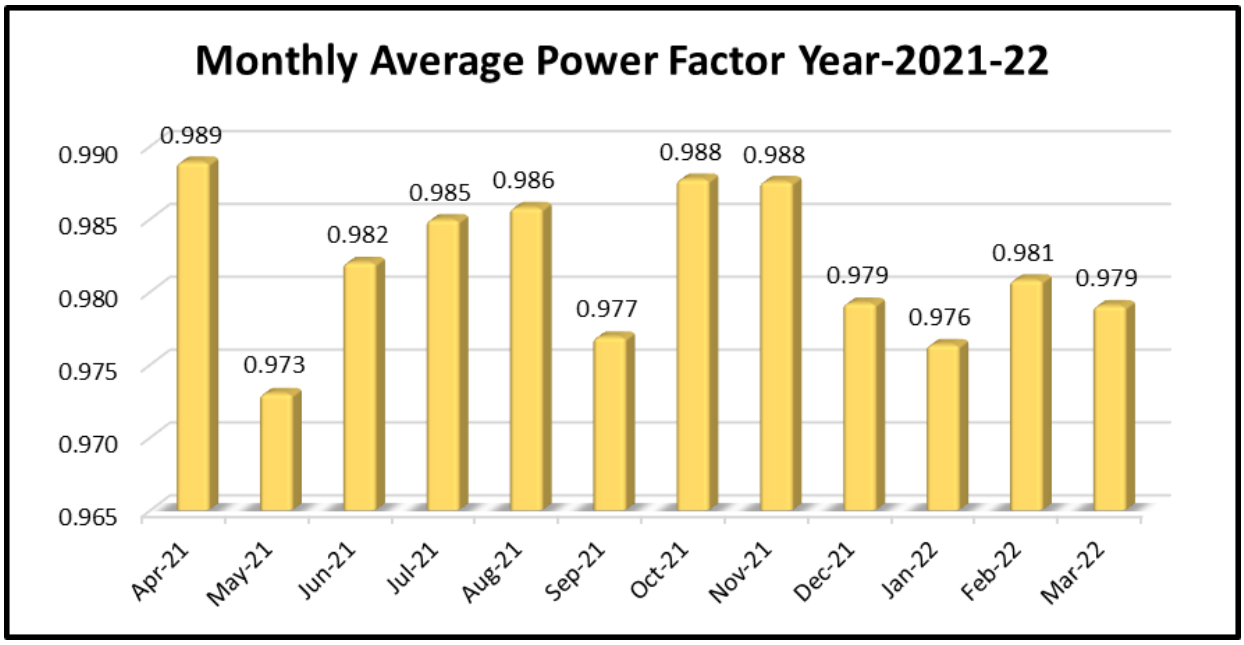


Figure 3.6 Graphical presentation of average power factor year 2021-22

Observation:

The average power factor for the year 2021-22 was 0.981. University has taken an incentive of Rs. 76,691 /- in the year 2021-22. **It's Appreciable.**

3.7 ON Site power measurement in Mewar University:-

Table 3.7 Operating load measurement on various buildings.

Sr. No	Building / Section	Voltage	Currient	P.F	Total Kw
1	MBA Building	395	61.22	0.912	38.20
2	Engineering Block	398	63.30	0.901	39.32
3	Admin Building Penal-01 (Near Draiver room G.F)	412	91.23	0.981	63.86
4	Admin Building Penal-02 (Near Temple Side)	402	24.10	0.913	15.32
5	Residency Feeder	423	176.81	0.97	125.65
6	Guest House	412	5.23	0.942	3.52
7	Meera Girls Hostel	414	4.32	0.965	2.99
8	Panna Girls Hostel	408	9.12	0.963	6.21
9	Mess	412	4.20	0.956	2.87
10	Sanga Hostel	410	58.00	0.978	40.28
11	International Hostel	413	42.21	0.976	29.47
12	Kumbha Hostel	412	7.30	0.965	5.03
13	Pratap Hostel	406	13.20	0.976	9.06
14	STP plant	412	30.00	0.965	20.66
15	B-Block	408	8.00	0.943	5.33
	Total Operating Load At 16/05/2022				407.75

Photograph of On-Site Power measurement:-

Figure 3.7:- On-site power measurement Dated 16/05/2022

Table 3.8:-Total Connected load share % on equipments

Sr. NO	Equipments	Rated Power (Watt)	Quntity (Nos)	Total Power (Watt)	Load Share (%)
1	Tubelight (28 W)	28	1134	31752	8.49
2	Tubelight (36 W)	36	98	3528	0.94
3	Celling Fan (60 W)	60	2702	162120	43.36
4	LED tubelight (20 W)	20	1306	26120	6.99
5	CFL (18 W)	18	506	9108	2.44
6	AC	1500	49	73500	19.66
7	PC	85	414	35190	9.41
8	Printer	250	54	13500	3.61
9	Exhaust	180	68	12240	3.27
10	Round Light	18	44	792	0.21
11	High Mast	1500	4	6000	1.60
Total Connected load (KW)				**373.850**	**100.00**

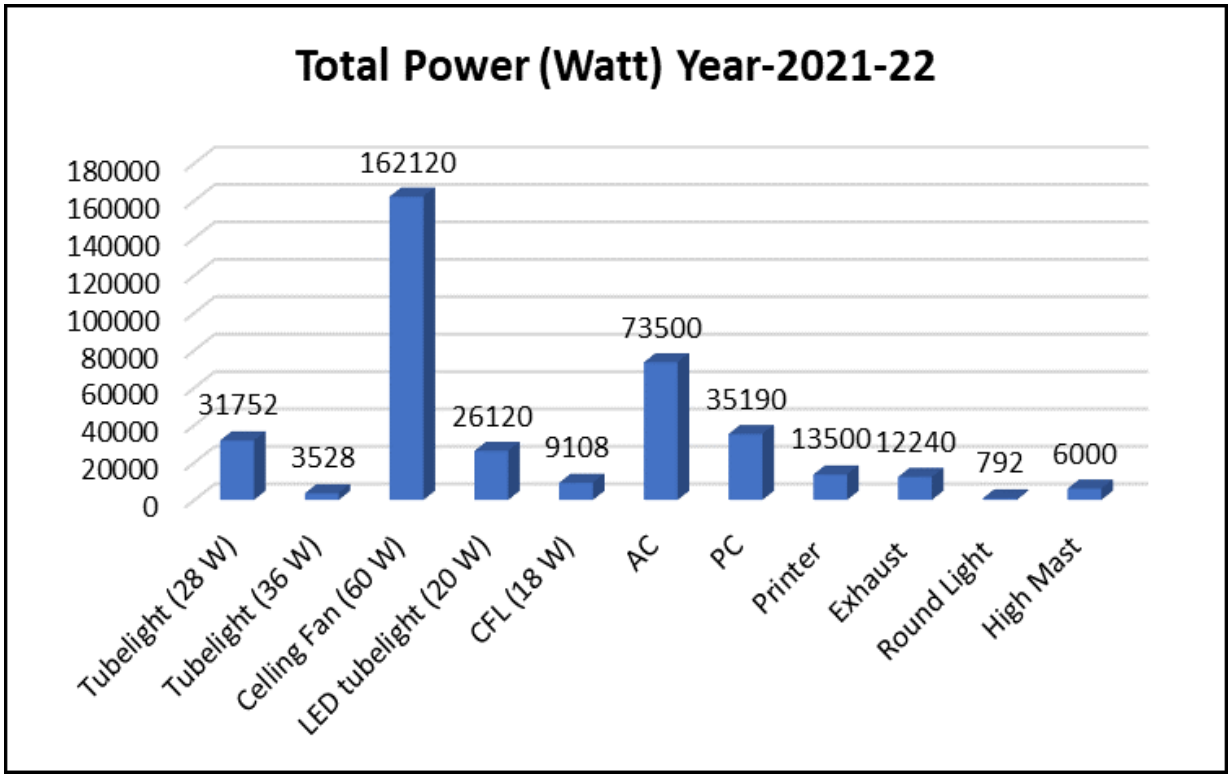
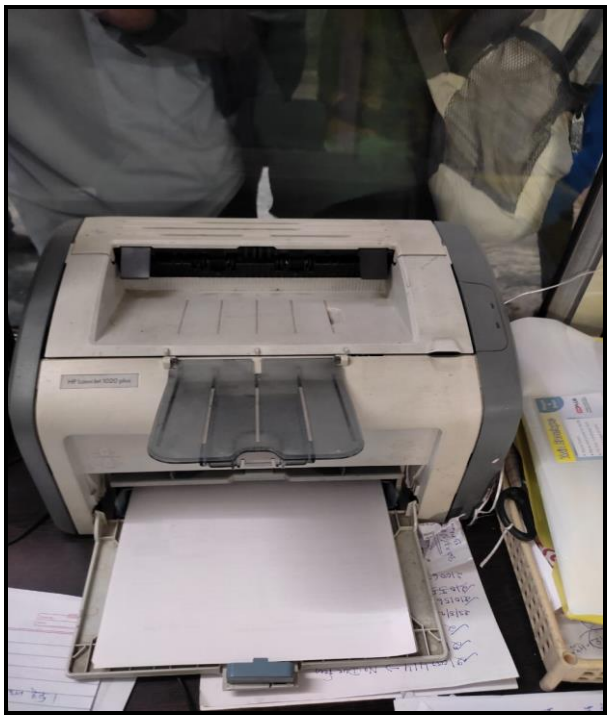


Figure 3.8:- Equipment loading Share % year-2021-22

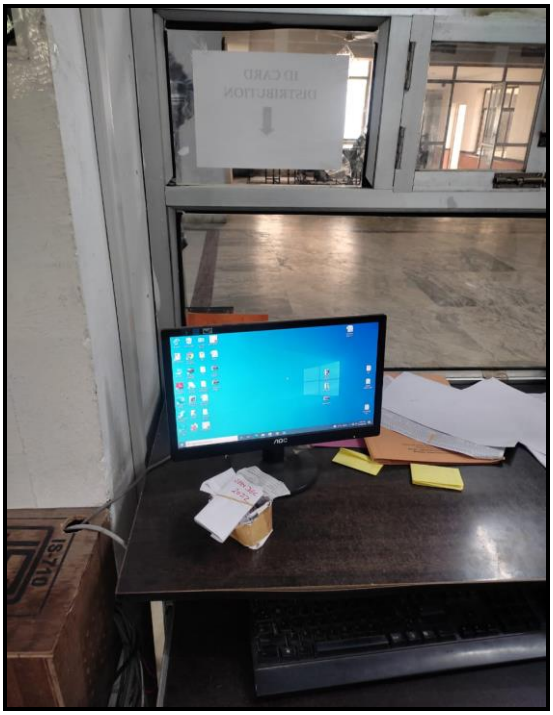
3.9 Some Photographs of Electrical Equipment's

CFL (PL type)

Efficient light (LED Downlighter)



Printer



Computer System

Figure 3.9:- Electrical Equipment in Mewar university

Some Photographs of Energy slogans

CHAPTER- 4
ENERGY CONSERVATION MEASURES

Case Study No. -01

Replacement of conventional 36 Watt to energy-efficient LED tube light 20 Watt in phase manner:-

Sr. No	Items	Parameters	Units
1	Power Consumption by T-12 LED (08 to 10 watt Blast power)	36 + 10 = 46	W
2	No of T-8	98	Nos.
3	Working Hrs/Day	8	Hrs/Day
4	Working Days/Year	250	Days/Year
5	Energy Efficient T-5 (LED)	20	W
6	Expected Energy Saving	5096	kWh/Year
7	Load Factor@90% Assume	0.90	NA
8	Overall Per Unit Charges	8.93	Rs./kWh
9	Expected Money Saving	44,997	Rs./Year
10	Cost of T-5	200	Rs./ Pices
11	Investment on New Light Purchasing	19600	Rs.
12	Maintenance Investment	5,000	Rs.
13	Total Investment	24600	Rs
14	Simple Pay Back Period	0.54	Year

Total Calculated Monetary Saving Potential in lighting = Rs 44,997 /-

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

Case Study No. -02

Replacement of conventional 18 Watt to energy-efficient Downliter 09 Watt in Phase manner

Sr. No	Items	Parameters	Units
1	Power Consumption by CFL (18 Watt)	18	W
2	No of CFL	506	Nos.
3	Working Hrs/Day	8	Hrs/Day
4	Working Days/Year	250	Days/Year
5	Energy Efficient downlighter (09 Watt)	09	W
6	Expected Energy Saving	9108	kWh/Year
7	Load Factor@90% Assume	0.90	NA
8	Overall Per Unit Charges	8.93	Rs./kWh
9	Expected Money Saving	81,334	Rs./Year
10	Cost of Downlighter (01 Nos)	150	Rs./ Pices
11	Investment on New Light Purchasing	75,900	Rs.
12	Maintenance Investment	5,000	Rs.
13	Total Investment	80,900	Rs
14	Simple Pay Back Period	01	Year

Total Calculated Monetary Saving Potential in lighting = Rs 81,334 /-

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

Case Study No. 3

Replacement of 60W conventional ceiling fan by 28W BLDC Energy Efficient ceiling fan in Phase manner

Sr. No	Items	Parameters	Units
1	Power Consumption by 60W	60	W
2	No of Fan	2702	No,s
3	Working Hrs/Day	8	Hrs/Day
4	Working Days/Year	250	Days/Year
5	Energy Efficient 28W	28	W
6	Expected Energy Saving	1,72,928	kWh/Year
7	Load Factor	0.9	NA
8	Per Unit Charges	8.93	Rs./kWh
9	Expected Money Saving	15,44,247	Rs./Year
10	Cost of New Celling Fan	2500	Rs./ Pices
11	Investment on New Fan Purchasing	67,55,000	Rs.
12	Maintenance Investment	1,00,000	Rs.
13	Total Investment	68,55,000	Rs.
14	Simple Pay Back Period	4.43	Year

Total Calculated Monetary Saving Potential in Celling Fan = Rs 15,44,247/-

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

Annexure-01

Green Campus policy & Initiative

Mewar University
Knowledge to Wisdom

MEWAR UNIVERSITY

GANGRAR, CHITTORGARH

RAJASTHAN

GREEN CAMPUS POLICY & INITIATIVE

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Gangrar, Chittorgarh

Continues……..

GREEN CAMPUS INITIATIVES INCLUDE

The institutional initiatives for greening the campus are as follows:

- **Restricted entry of automobiles**
- **Ban on use of Plastic**

RESPONSE:

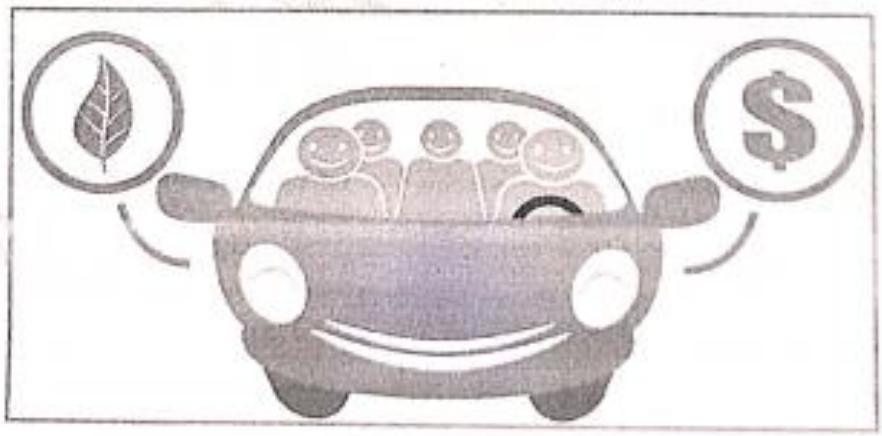
Mewar University has always followed a green agenda and has shown remarkable awareness of maintaining an eco-friendly campus. On visiting the Campus, one can experience the appealing and well-designed buildings, beautiful lawns, spacious sports grounds, and lush green environment favorable for the teaching-learning process.

INSTITUTIONAL INITIATIVES:

RESTRICTED ENTRY OF AUTOMOBILES

The university operates a fleet of 3 buses covering each corner of Chittorgarh, Bhilwara, and its nearby areas to facilitate the students and staff. The institute encourages the staff and students to use the university conveyance instead of their vehicles for safety, security, fuel conservation, and to reduce environmental pollution.

The University buses are periodically checked for pollution by the authorized agency. University has a vehicle parking area available outside the main entrance of the campus for the guests, visitors, faculties, students, and any other vehicles. The vehicles should possess pollution check stickers. Only bicycles are allowed inside the campus. Random checks are made to check the validation and periodicity of this certificate. For two-wheelers or four-wheelers, security measures are compulsory. Stakeholders are also encouraged to adopt carpooling to reduce the toxic emissions in the air.



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Mewar University

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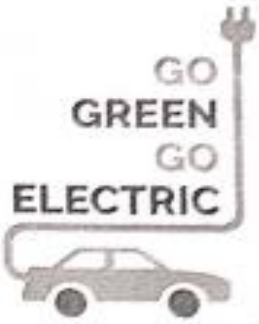


USE OF BICYCLES

The students staying on the university campus are using bicycles to move within the campus as well as to travel the nearby areas outside the campus. Students and staff coming from nearby villages also prefer bicycles as a mode of transport for attending the University. It is environmentally friendly and helps to decrease pollution.

BAN ON USE OF PLASTIC

Mewar University is making an untiring effort to "Reduce Plastic Pollution" by minimizing plastic footprint and by way of refuse, reduction, reuse, and recycling. Hence, the subsequent initiatives are taken by all the stakeholders to spread awareness of environmental conservation:

1. To refuse and reduce plastic products in daily use, and pledge to a plastic-free environment within the campus.

Registrar
Mewar University

Continues …….

2. Ban single-use plastic water bottles, takeaway cups, lunch wrapped in disposable plastic packaging, plastic bags, disposables food service cups, plates, and containers fabricated from polystyrene foam, plastic straws, etc, within the university premises and canteens.
3. Encourage the use of biodegradable and other kinds of compostable utensils in situ of plastic and shall bring a fork, knife, and spoon from home.
4. Encourage the use of durable, foldable, and cheap reusable bags that may be carried around in a car, pocket, or purse.
5. Discourage plastic bottles and instead use glass, steel, or clay bottles in offices.
6. Welcome innovative ideas to cut back plastic footprints.
7. Mobilize students of schools/ colleges/ polytechnic/ITIs and other offices across the country in a cleanliness drive.

Single-use plastic items like plastic bottles, bags, spoons, straws, and cups are banned completely and awareness is made among staff and students through orientation and display boards within the premises. To limit the utilization of plastic, measures are taken to switch plastic teacups and glasses with steel glasses within the canteen. The staff and students are informed to use steel or copper water bottles rather than plastic bottles.

Registrar
Mewar Univer ity
Gangrar, (Chi rgarh

END OF THE REPORT

THANKS

Empirical Exergy Private Limited

Registered Office: 18-E, Sudama Nagar, Indore -452009
Office (Indore): Flat No. 201, Om Apartment, 214 Indrapuri, Indore (M.P.),
Contact: +91-731-4948831, Mobile: +91-78693-27256, 88713-68108
www.eeplgroups.com, email:-eempirical18@gmail.com
CIN No: U74999MP2018PTC045751

Ref No: EEPL/2022-23/ENVI/003 **Date: - 20-05-2022**

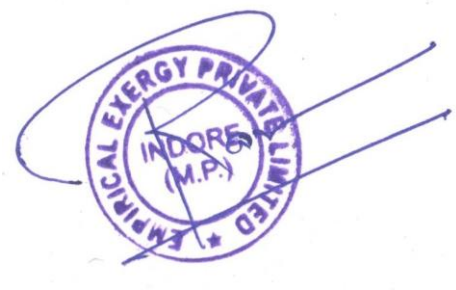
ENVIRONMENTAL AUDIT CERTIFICATE

This is certified that Empirical Exergy Private Limited (EEPL) Indore M.P. has conducted an Environmental audit at **Mewar University, Chittorgarh (Rajasthan)** for the academic year 2021-22, and the audit report has been submitted.

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

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

For- **Empirical Exergy Private Limited**



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)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

ENVIRONMENT AUDIT REPORT

CONSULTATION REPORT

MEWAR UNIVERSITY

Gangrar Chittorgarh (Rajasthan)

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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Bhawarkuan,Indore – 452 001 (M. P.), India
0731-4948831, 7869327256
Email ID:eempirical18@gmail.com
www.eeplgroups.com

(2021-22)

CONTENT

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 environmental 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 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)
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Certified Water Auditor (NPC, Govt of India)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

ENERGY IS LIFE
BEE
CONSERVE IT

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

Green Monitoring Committee.

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

No. MU/RO/Admin/2022/1450 Dated : 4/5/2022

OFFICE ORDER

Reconstitution of Green, Environment & Energy Auditing Committee

Green Audit, Environment Audit & Energy Audit Committee is reconstituted to conduct the necessary audit in due course. Members of the Audit Committee are mentioned below:

S. No.	Name	Designation	Committee Role
1	Dr. Y. Sudershan	Professor & Dean, Department of Agriculture	Co-Ordinator
2	Mr. Rakesh Kumar Singadiya	Director, Empirical Exergy Pvt. Ltd.	External Auditor
3	Dr. Neelu Jain	Associate 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 Engg.	Internal Auditor
6	Dr. Mohd. Ashid	Asst. Professor, Department of Chemistry	Member
7	Ms. Nirma Kumari Sharma	Asst. Professor, Department of Electrical Engg.	Member
8	Mr. Suraj Kumhar	Asst. Professor, Department of Electrical Engg	Member
9	Mr. H. Widhani	OSD	Member
10	Mr. Narendra Kumar Ved	Non-Teaching Staff	Member
11	Ms. Sanchita Karnik	Non-Teaching Staff	Member

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:
1. PS to Hon'ble Chairperson for Kind information.
2. PS to President/Pro President for kind information.
3. Deans/Directors/CoE for Information.
4. All HoDs for information.
5. Concerned Committee Members
6. Coordinator, IQAC Cell.
7. Admission/Accounts/Examination/Stores/IT Support/Library/
8. Wardens/Maint.I-C/Receptionist

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 saftey Engineer]
- **Mr. Aakash Kumawat** [Site Engineer]
- **Mr. Ajay Nahra,** [Sr. Accountant & admin]

EXECUTIVE SUMMARY

The executive summary of the environmental audit report furnished in this section briefly gives the identified water conservation measures, that can be implemented in a phased manner to conserve water and increase the productivity of the university.

SUSTAINABLE INITIATIVE TAKEN BY UNIVERSITY: -

- **WASTEWATER TREATMENT PLANT: -**

  University has installed a sewage treatment plant (STP) for wastewater generated in various activities on the university campus. The output of the plant is 14.5 m^3/hr University has utilized treated water for gardening purposes. **It's Appreciable.**

RECOMMENDATION

WATER MONITORING SYSTEM

- University has planned the installation of water flow meters to quantify the real-time water consumption of the university**.**

DRIP WATER IRRIGATION SYSTEM FOR GARDENING.

- University has a water sprinkler system in the lawn area. **It is Appreciable.** It is recommended to use of drip water irrigation system for gardening can save 10 to 20 % of fresh water.

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) dated15th October 2018. The University is also NAAC accredited.

Mewar University has never affiliated with any institution, nor has the University ever set up any study center 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)]

- **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.

- **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 future prospects through career counseling 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

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

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

Mewar university from Google map

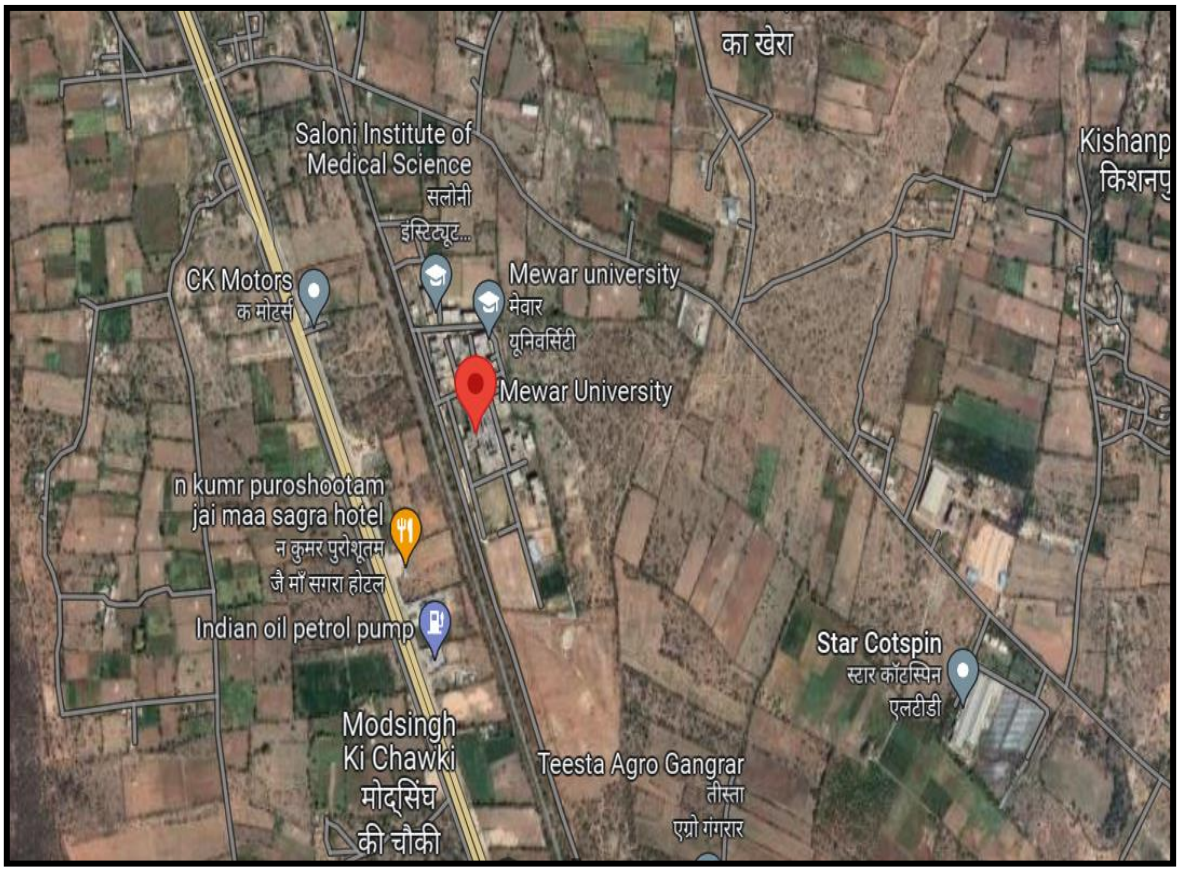
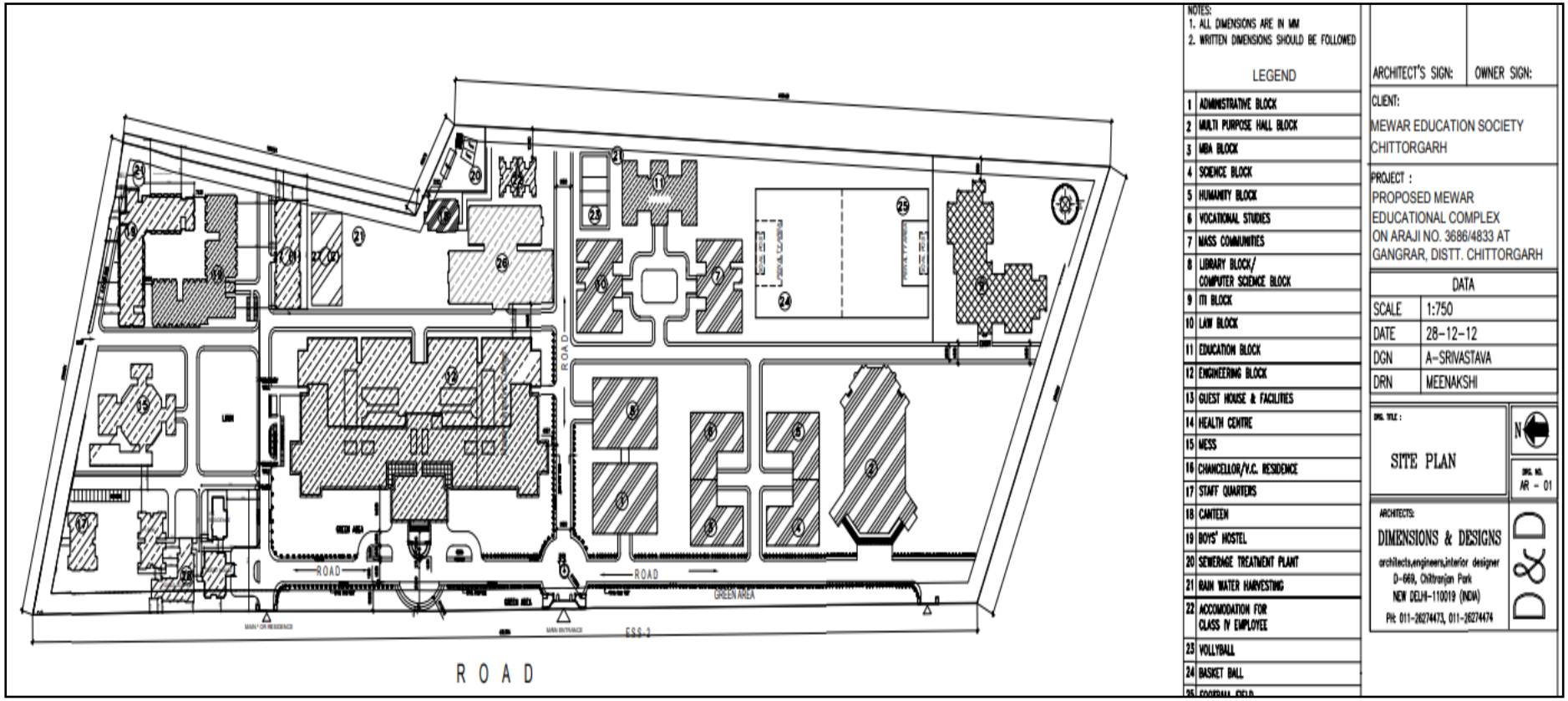


Figure 1.1: - Satellite Image of Mewar university from Google map

1.3 MEWAR UNIVERSITY LAYOUT OF VARIOUS BUILDINGS

Layout map of Mewar University



1.4 Environment Auditing

Environment audits can be a highly valuable tool for an institute in a wide range of ways to improve their energy, environment, and economic performance. while reducing wastages and operating costs. Environment audits provide a basis for calculating the economic benefits of water conservation projects by establishing the current rates of water use and their associated cost.

1.5 Objectives of Environment audit

The general objective of the environmental audit is to conduct a water audit and preparation of baseline report on water conservation measures to mitigate consumption and improve quality and sustainable practices.

The specific objectives are:

- To monitor freshwater consumption in the university and water conservation practices.
- To assess the quantity of water, usage, the quantity of wastewater generation, and their reduction within the university.

1.6 Target Areas of Environment audit

This indicator addresses water sources, water consumption, irrigation, stormwater, appliances, and fixtures aquifer depletion, and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

1.7 Methodology followed for conducting Environment audit

Step 1: Walkthrough survey

- Understanding of existing water sourcing, storage, and distribution facility.
- Assessing the water demand and water consumption areas/processes.
- Preparation of detailed water circuit diagram.

Step 2: Secondary Data Collection

- Analyze historic water use and wastewater generation
- Field measurements for estimating current water use
- Metered & unmetered supplies.
- Understanding of "base" flow and usage trends at the site
- Past water bills
- Wastewater treatment scheme & costs etc.

Step 3: Site Environment Audit Planning (based on on-site operations and practices)

- Preparation of water flow diagram to quantify water use at various locations
- Wastewater flow measurement and sampling plan

Step 4: Conduction of Detailed Environment Audit & Measurements

- Conduction of field measurements to quantify water/wastewater streams
- Power measurement of pumps/motors
- Preparation of water balance diagram
- Establishing water consumption pattern
- Detection of potential leaks & water losses in the system
- Assessment of productive and unproductive usage of water
- Determine key opportunities for water consumption reduction, reuse & recycle.

Step 5: Preparation of Environment Audit Report

- Documentation of collected & analyzed water balancing and measurement details
- Projects and procedures to maximize water savings and minimize water losses.
- Opportunities for water conservation based on reducing/recycling/ reuse and recharge options

CHAPTER- 2
WATER CONSUMPTION AND WASTEWATER SOURCES

2.1 Details of Source of Fresh Water and Use Areas:

The main source of freshwater is Borewell for the university. The freshwater is mainly used for drinking, housekeeping, gardening, domestic activity, and new construction project. Details of the pumps are given in the table.

Table:2.1 Details of Freshwater sources.

Sr. No.	Fresh Water Sources	Location	Motor Power (HP)	Remark
1	Open Well	The back side of the Sanga hostel	10	For Freshwater Supply
2	Borewell-01	Near Open Well	5	For Freshwater Supply
3	Borewell-02	The back side of the Mess	3	For Freshwater Supply
4	Borewell-03	Near Temple	7.5	For Freshwater Supply
5	Borewell-04	Near STP Plant	5	For Freshwater Supply
6	Borewell-05	Near MBA building	3	For Freshwater Supply
7	Transfer Pump-01	UG Tank Near Mess	5	Transfer Pump
8	Transfer Pump-02	UG Tank Near Khajuri	5	Transfer Pump
9	Transfer Pump-03	UG Tank Near Khajuri	5	Transfer Pump
10	Transfer Pump-04	UG Tank near MBA Tank	7.5	Transfer Pump
11	Transfer Pump-05	STP outlet	5	Transfer Pump

2.2 Water Flow Measurement and Power measurement: -

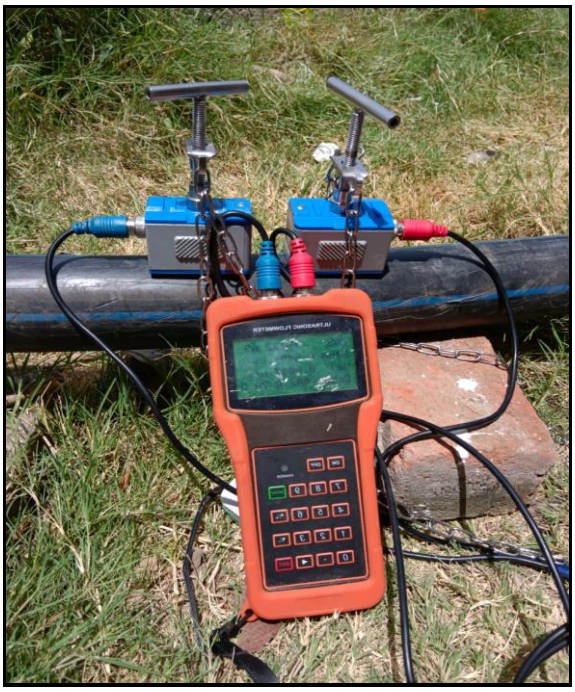
Table 2.2: - Flow and power measurement of borewells.

Sr. No.	Fresh Water Sources	Location	Motor Power (HP)	Voltage	Current	Power Factor	Power Consumption (kW)	Measured Water Flow (m3/hr)	Working (Hr./day)
1	Open Well	Back side of Sanga hostel	10	407	14.3	0.78	7.9	9.6	20
2	Borewell-01	Near Open Well	5	405	11.3	0.82	6.5	5.7	20
3	Borewell-02	Back side of Mess	3	402	5.3	0.84	3.1	2.5	20
4	Borewell-03	Near Temple	7.5	Under Maintenance					
5	Borewell-04	Near STP Plant	5	399	4.5	0.79	2.5	2.1	20
6	Borewell-05	Near MBA building	3	397	5.1	0.86	3.0	1.5	20
7	Transfer Pump	UG Tank Near Mess	5	402	10.1	0.86	6.0	5.6	20
8	Transfer Pump -01	UG Tank Near Khajuri	5	403	11.1	0.83	6.4	10	20
9	Transfer Pump -02	UG Tank Near Khajuri	5	401	9.4	0.78	5.1	4.4	20
10	Transfer Pump	UG Tank near MBA Tank	7.5	398	9.6	0.85	5.6	8.5	20
11	Transfer Pump	STP outlet	5	398	7.6	0.86	4.5	14.5	12

Observation: - It was measured that the average freshwater consumption of the university from open well and borewell is 15.7 M^3/Hr.

2.3 Water Accounting & Metering system:

It was observed that there is a requirement for water flow meters on borewells to quantify per day groundwater extraction from different sources.



ultrasonic flow Meter installation at university tank

Water measurement by bucket method.

Measurement at STP outlet

Figure: - 2.1 Water flow measurement on the university campus.

2.4 Water Storage Capacity in University Campus: -

There are different types of tanks available in the university for water storage like Underground RCC tanks, Overhead RCC tanks, PVC tanks, etc.

Table 2.3: - Water Storage tank in university campus

Sr. No	Location	Type of Tank	Unit Capacity (Liter)	Quantity	Total Capacity (Liter)	Total Capacity (Kilo Liter)
1	Administrative and Academic Block, Annapurna Mess and Education Block	Underground (RCC tank)	1,00,000	4	4,00,000	400
2	Administrative and Academic Block	Overhead tank (RCC)	40,000	2	80,000	80
3	Guest House	Overhead tank (RCC)	30,000	1	30,000	30
4	Workshop	Overhead tank (RCC)	50,000	1	50,000	50
5	MBA Building	Overhead tank (RCC)	30,000	1	30,000	30
6	Panna Girls hostel	Overhead tank (RCC)	15,000	1	15,000	15
7	Annapurna Mess	Overhead tank (RCC)	30, 000	1	30,000	30
8	2 BHK residency	Overhead tank (RCC)	15,000	1	15,000	15
9	1 BHK Residency	Overhead tank (RCC)	30,000	2	60,000	60
10	1 BHK Residency (B- Block)	Overhead tank (RCC)	30,000	4	1.20.000	120
11	Kumba Hostel	Overhead tank (RCC)	20,000	2	40,000	40
12	Pratap Hostel	Overhead tank (RCC)	20,000	2	40,000	40
13	Sanga Hostel	Overhead tank (RCC)	30,000	2	60,000	60
14	Bhabha Sah (International Hostel)	Overhead tank (RCC)	40,000	2	80,000	80
15	Meera Girls Hostel	Overhead tank (RCC)	20,000	1	20,000	20
	Total Water Storage Capacity of Mewar university: -				1, 70,000	1,070

2.5 Photographs of water storage tanks.

Fresh Water Storage tank

RO Treated water storage tanks

Fig:- 2.2 Water Storage Tank and capacity of University Campus

2.6 Water use areas on University Campus: -

Water is preliminary used for drinking, domestic, gardening, and clinical activity. The audit team visited various departments and buildings to determine appliances. The details of the washroom, toilet, and taps are given on the table

Table: 2.4 Details of washroom and Uses Taps in various areas

Admin block						
Sr.No.	**Location**	**Urinals**	**Hand wash**	**Toilets**	**Taps**	**Drinking Taps**
1	Basement	14	23	23	46	22
2	First floor	13	26	28	56	
3	Second floor	18	25	33	66	
4	Third floor	22	27	37	74	
M.B.A. Block						
Sr.No.	**Location**	**Urinals**	**Hand wash**	**Toilets**	**Taps**	**Drinking Taps**
1	Ground floor	5	8	6	12	4
2	First floor	5	8	6	12	4
3	Second floor	5	8	6	12	4
4	Third floor	5	8	6	12	4
Engineering Block						
Sr.No.	**Location**	**Urinals**	**Hand wash**	**Toilets**	**Taps**	**Drinking Taps**
1	Ground floor	4	4	6	12	4
2	First floor	5	4	5	10	4
3	Second floor	3	4	6	12	4

Sr. No.	Location	Urinals	Hand wash	Toilet	Bathroom	Taps	Drinking Taps
1	Bhamashah International Hostel	0	114	114	0	228	4
2	Sanga Boys Hostel	16	28	32	32	64	16
3	Kumbha Boys Hostel	16	24	32	32	64	16
4	Pratap Boys Hostel	24	48	48	48	96	8
5	Panna Dhai Girls Hostel	0	12	32	32	64	16
6	SC Meera Girls Hostel	0	12	24	24	48	8

2.7 Details of RO in University Campus.

Table 2.5: - Details of RO on the campus.

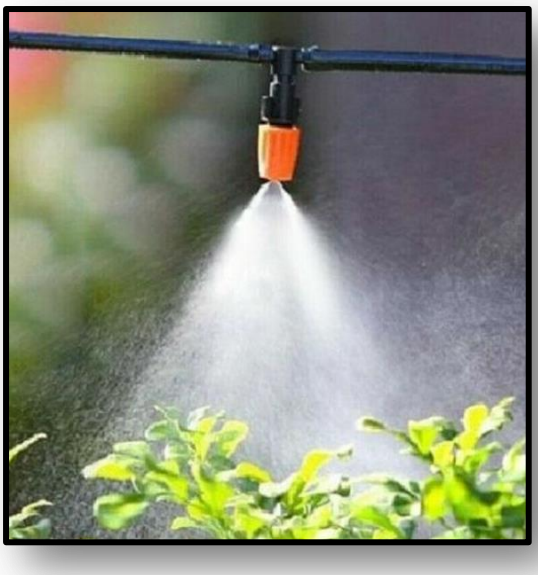
Sr. no	Location	Capacity (Litre)	Quantity
1	Main Building	500	1
2	Veg Mess	500	1
3	Kumbha Hostel	100	1
4	Pratap Hostel	100	1
5	Sanga Hostel	100	1
6	Panna Hostel	100	1
7	Guest house	50	1
8	Meera Hostel	100	1
9	1 BHK (B- Block)	50	1
10	MBA Building	100	1
11	BhamaShah International Hostel	50	1

2.8 Fresh Water uses for Gardening:

University has installed a water sprinkler system for the lawn area in front of the main university admin block **Its appreciable.**

Figure:-Water Sprinkler system in university lawn

Observation: - There is good potential for water-saving by adopting the "Automatic Watering 360 adjustable misting nozzle irrigation Drippers system" for other areas of the university.



Adjustable Misting Nozzle Irrigation Drippers

Drip water irrigation system

Fig: 2.4 Technology for Drip Water Irrigation for plant

2.9 Waste Water Generation sources: -

At present wastewater is generated from various departments, canteen, mess, hostels like washrooms, handwash, and washing of medical equipment in Pharmacy department and RO rejected water treated in STP plants. After that treated water university to be reused in gardening.

Table: - 2.6 Wastewater generation area on the university campus

Sr. No	Key Water Usage Section	Type of water used (raw, treated, etc.)	Water Consuming activities
1	Admin Block	Fresh Water	Drinking and other uses
2	Hostels	Fresh Water	Drinking, Food cooking, other Uses
3	Institution Buildings	Fresh Water	Drinking and other uses
4	Canteens /Mess	Fresh Water	Food cooking, drinking
5	Residential	Fresh Water	Drinking, domestic and other activities
6	Guest House	Fresh Water	Drinking and other uses

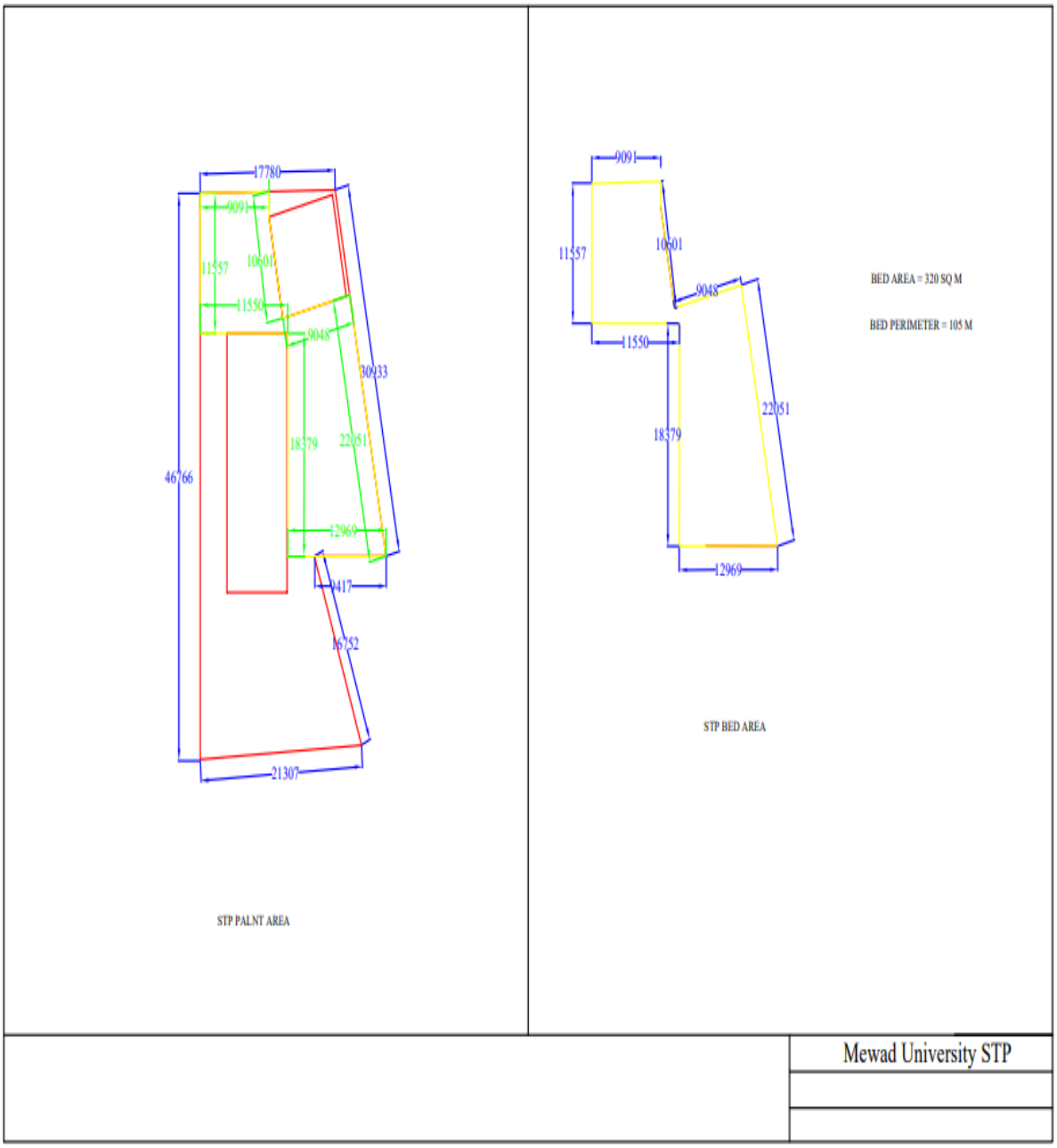
- Some photographs of wastewater generation sources are given

Figure:- 2.5 Waste Water Generation sources

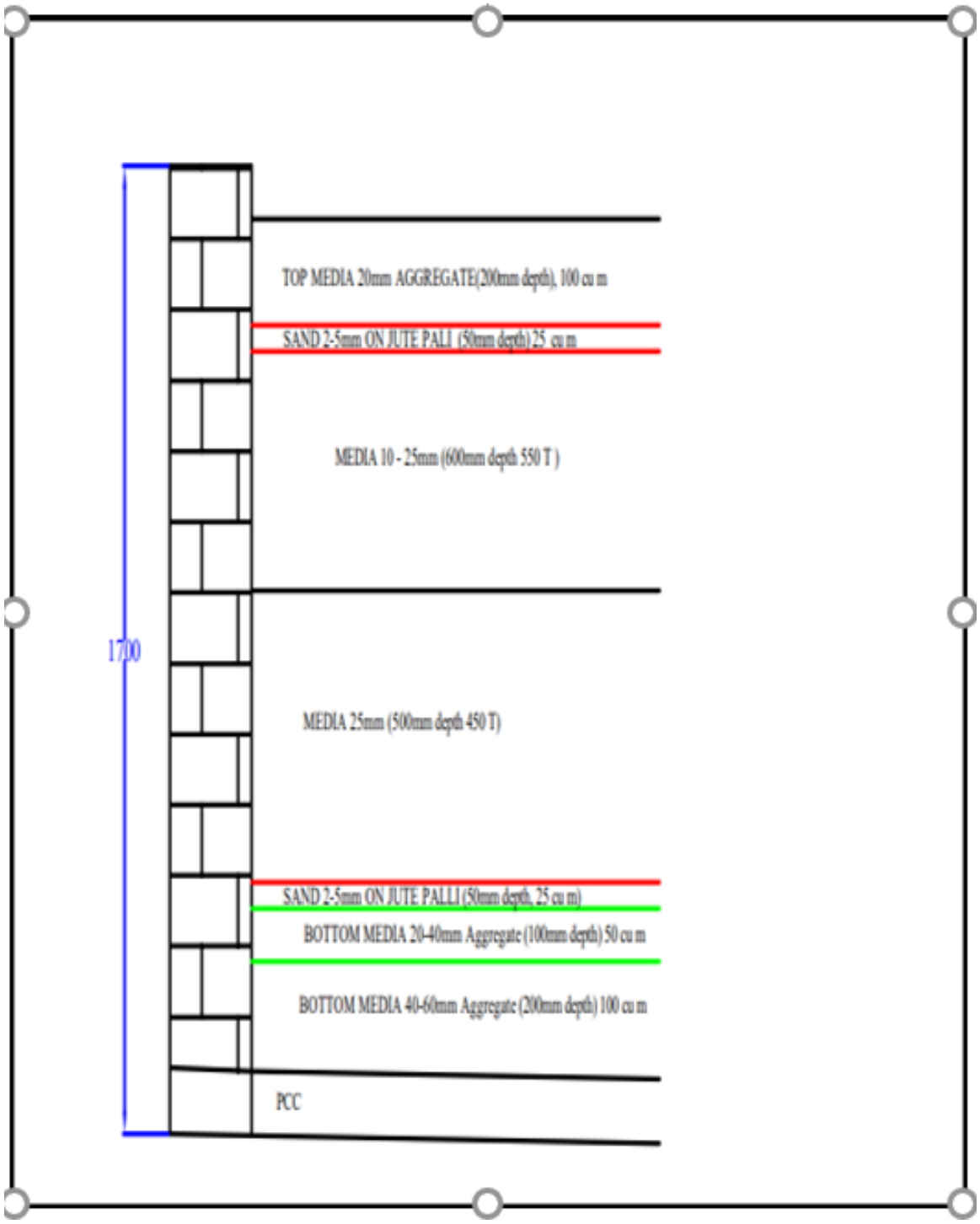
2.10 Waste Water Treatment Plant: -

University has installed an STP plant for wastewater treatment. After the water treatment is utilized for the gardening purpose.

The layout of the STP plant: -



Design of Biological treatment system for STP



Observation: - All wastewater treated in the STP plant and treated water are used for gardening purposes. **It's Appreciable.**

CHAPTER- 3
RAINWATER HARVESTING SYSTEM

3.1. Rainwater Harvesting systems

Rainwater harvesting is a technique to capture the rainwater when it precipitates, store that water for direct use or charge the groundwater and use it later.

There are typically four components in a rainwater harvesting system:

- Roof Catchment.
- Collection.
- Transport.
- Infiltration or storage tank and use.

If rainwater is not harvested and channelized it runoffs quickly and flows out through storm-water drains. For storm-water management, the recharge pits, percolation pits, and porous trenches are constructed to allow stormwater to infiltrate inside the soil.

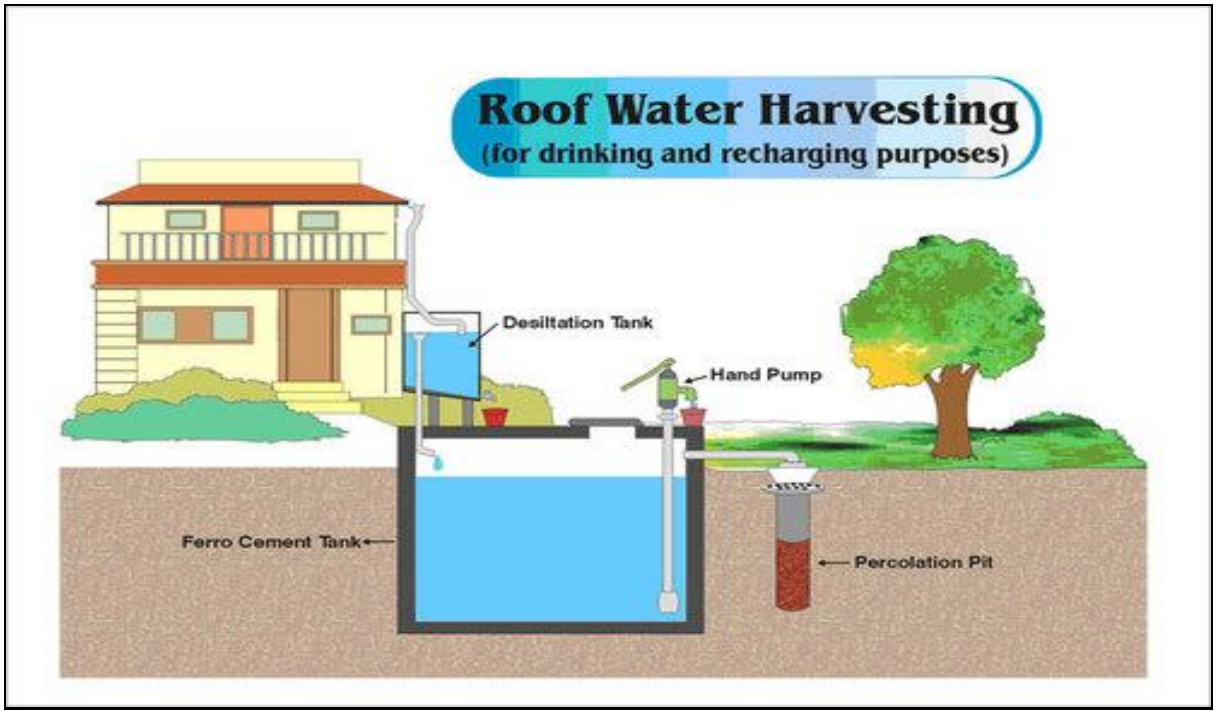


Figure: - 3.1 Components of a rooftop rainwater harvesting system

3.2 Rainwater harvesting system in Mewar University:

University has rainwater harvesting systems on campus.

Figure 3.2:- Rain Water Harvesting System on the university campus

3.3 Rainwater Harvesting Potential of the College

The university has a total built-up area is approx. 1500 **m^2.** The average annual rainfall of 1.064 m and runoff coefficient of 0.88 is considered for commercial building. Accordingly, to the above figures and consideration, the estimated rainwater harvesting potential for the college is about 1404.48 **m^3/year**. The following Mathematical Equation is used for the calculation.

RWH Potential = Rainfall (m) x Area of catchment (m^2) x Runoff coefficient

END OF THE REPORT

THANKS

Empirical Exergy Private Limited

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Contact: +91-731-4948831, Mobile: +91-78693-27256, 88713-68108
www.eeplgroups.com, email:-eempirical18@gmail.com
CIN No: U74999MP2018PTC045751

Ref No: EEPL/2022-23/GREEN/004 **Date: - 20-05-2022**

GREEN AUDIT CERTIFICATE

This is certified that Empirical Exergy Private Limited (EEPL) Indore M.P. has conducted a green audit at **Mewar University, Chittorgarh (Rajasthan)** for the academic year 2021-22, and the audit report has been submitted.

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

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

For- **Empirical Exergy Private Limited**

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)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

GREEN AUDIT REPORT

CONSULTATION REPORT

MEWAR UNIVERSITY

Gangrar Chittorgarh (Rajasthan)

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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(2021-22)

CONTENTS2

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 the green 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 study.

Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
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(BEE, Ministry of Power, Govt. of India)
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Member of ISHRAE [58150]

ENERGY IS LIFE
BEE
CONSERVE IT

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

Green Monitoring Committee.

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

No. MU/RO/Admin/2022/1450 Dated : 4/5/2022

OFFICE ORDER

Reconstitution of Green, Environment & Energy Auditing Committee

Green Audit, Environment Audit & Energy Audit Committee is reconstituted to conduct the necessary audit in due course. Members of the Audit Committee are mentioned below:

S. No.	Name	Designation	Committee Role
1	Dr. Y. Sudershan	Professor & Dean, Department of Agriculture	Co-Ordinator
2	Mr. Rakesh Kumar Singadiya	Director, Empirical Exergy Pvt. Ltd.	External Auditor
3	Dr. Neelu Jain	Associate 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 Engg.	Internal Auditor
6	Dr. Mohd. Ashid	Asst. Professor, Department of Chemistry	Member
7	Ms. Nirma Kumari Sharma	Asst. Professor, Department of Electrical Engg.	Member
8	Mr. Suraj Kumhar	Asst. Professor, Department of Electrical Engg	Member
9	Mr. H. Widhani	OSD	Member
10	Mr. Narendra Kumar Ved	Non-Teaching Staff	Member
11	Ms. Sanchita Karnik	Non-Teaching Staff	Member

Registrar
Mewar University
Gangrar, (Chittorgarh)

Copy to:
1. PS to Hon'ble Chairperson for Kind information.
2. PS to President/Pro President for kind information.
3. Deans/Directors/CoE for Information.
4. All HoDs for information.
5. Concerned Committee Members
6. Coordinator, IQAC Cell.
7. Admission/Accounts/Examination/Stores/IT Support/Library/
8. Wardens/Maint.I-C/Receptionist

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 saftey Engineer]
- **Mr. Aakash Kumawat** [Site Engineer]
- **Mr. Ajay Nahra,** [Sr. Accountant & admin]

EXECUTIVE SUMMARY

Green Initiative Taken by University

- **CAMPAIGN OF PLANTATION AND GREEN CAMPUS:**

  University has around **1685** trees on campus. It's a good initiative taken by management for a green campus under the campaign of a plantation. **It's APPRECIABLE.**

- **480 KWp SOLAR PHOTOVOLTAIC ROOFTOP INSTALLATION:**
  - University has a 480 KWp solar photovoltaic rooftop grid-connected system installed on most of the buildings. Total unit generation from Sep-2018 to March- 2022 is **22,87,354** units. The solar unit generated for the year 2021-22 is 6,32,850 units. It is more than 50 % of the total unit consumption of the university campus.
  - **The total CO_2 reduction is 596.652-ton CO_2e** up from Sep-2018 to March- 2022 It is a big contribution toward CO_2 emission reduction. (Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip).

    Electricity purchased from the grid.

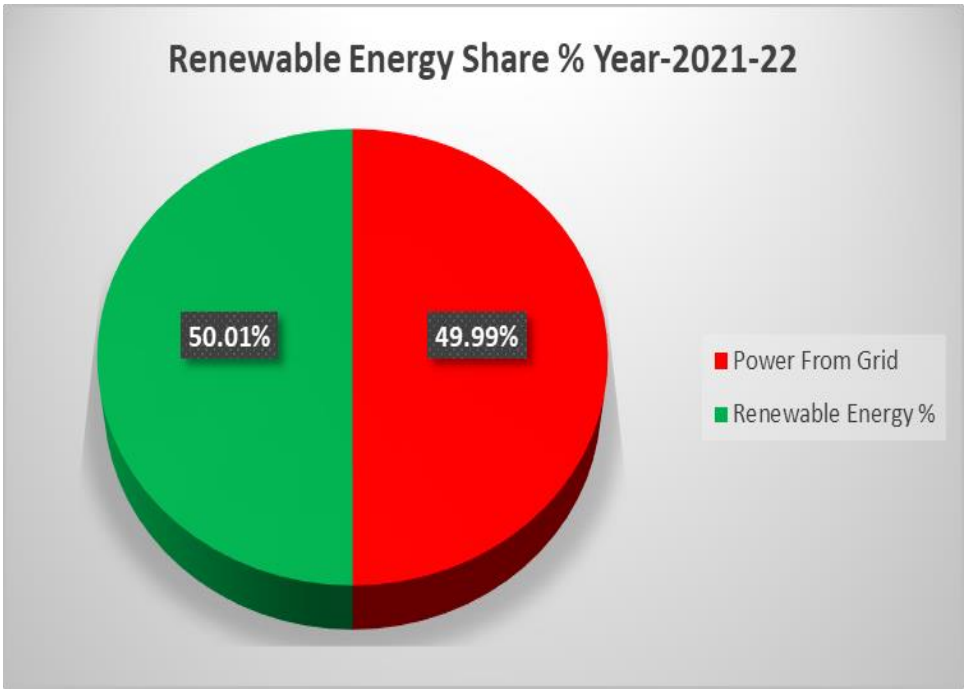


Figure 1.1: - Share of renewable energy sources

- **Vermicompost unit:** University has installed 05 no of vermicompost pit **It's appreciable**. All type of agricultural waste decomposes in the pit and prepare good quality environmentally-friendly manure is formed from the compost It is to be used for agricultural purposes on the university campus.

RECOMMENDATION: -

SOLID WASTE MANAGEMENT:

- The basic principle of good waste management practice is based on the concept of 3Rs, namely, reduce, recycle, and reuse. All the degradable and non-degradable waste materials are collected and processed in an environmentally friendly way on the University campus.
- **Biodegradable and non-biodegradable:** Waste materials are collected with help of different colored three dustbin systems on the campus.
- **Organic converter:** - There is good potential for the installation of an organic converter in the university for all types of kitchen and vegetable waste generated from the guesthouse, and the hostel's mess. Recommended organic converters with capacity are attached in **Quotation in annexure-01**

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) dated15th October 2018. The University is also NAAC accredited.

Mewar University has never affiliated with any institution, nor has the University ever set up any study center 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)]

- **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.

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 future prospects through career counseling 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

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	ENGINEERINGBLOCK	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

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

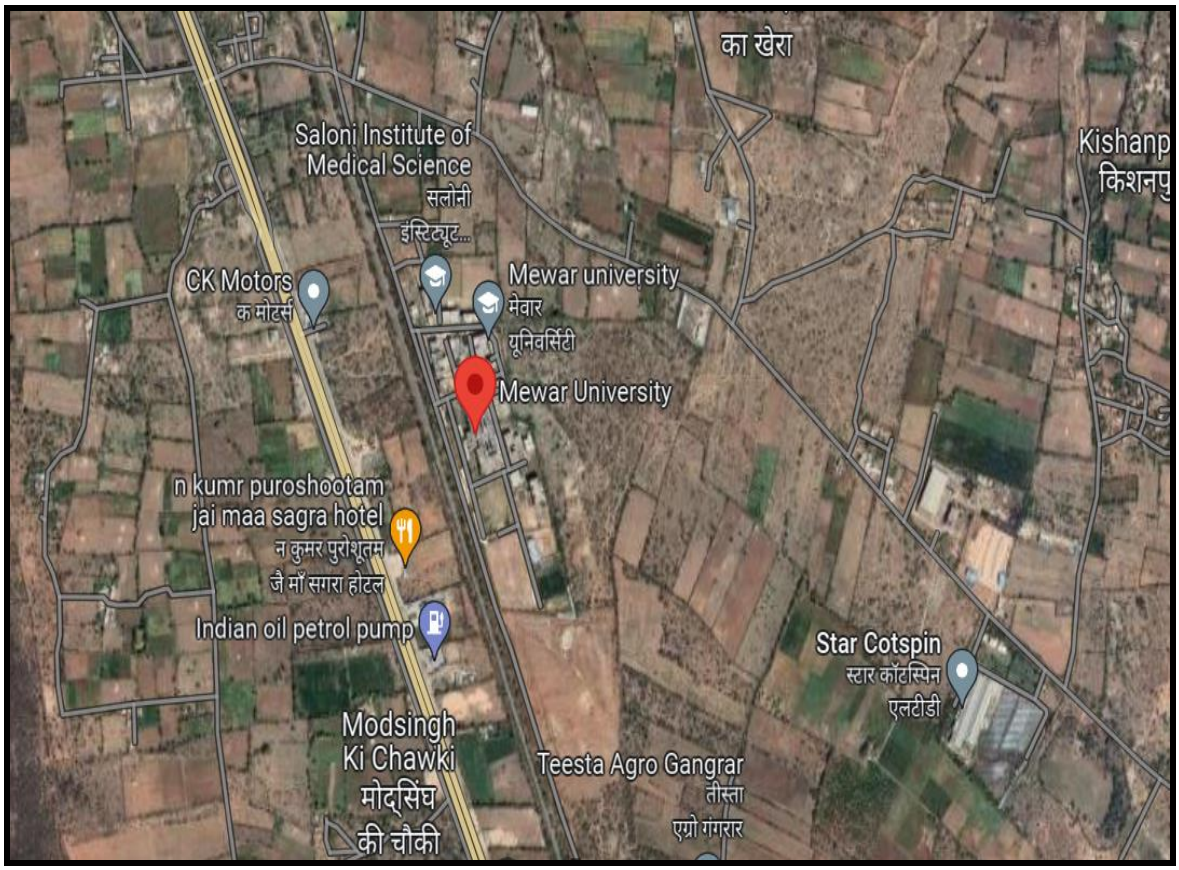
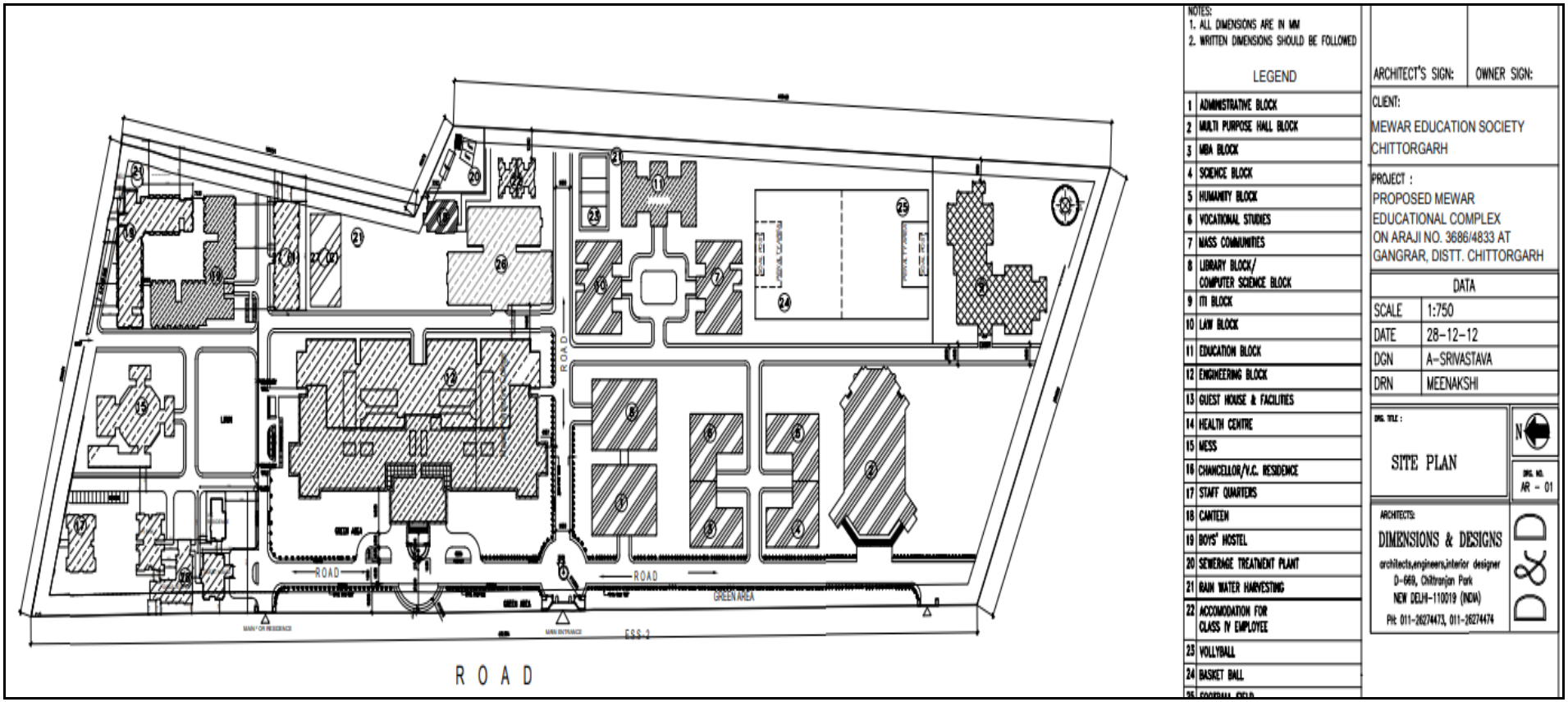


Figure 1.1: - Satellite Image of Mewar university from Google map

1.3 MEWAR UNIVERSITY LAYOUT OF VARIOUS BUILDINGS

Layout map of Mewar University



1.4 About Green Auditing

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge into the environment.

Green audit means to identify opportunities for sustainable development practices, enhance environmental quality, improve health, hygiene, and safety, reduce liabilities achieve values of virtue. A green audit also provides a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of **"Mewar University"** enables assessment of the lifestyle, action, and its impact on the environment. This green audit was mainly focused on greening indicators like utilization of green energy (solar energy) and optimum use of secondary energy sources (petrol and diesel) in the University campus, vegetation, carbon footprint of the campus, etc. Green auditing aims to help the institution to apply sustainable development practices and to set examples before the community and young learners.

1.5 Objectives of Green Auditing

The general objective of a green audit is to prepare a baseline report on "Green campus" and alternative energy sources (solar energy), measures to mitigate resource wastage, and improve sustainable practices.

The specific objectives are:

- To inculcate values of sustainable development practices through a green audit mechanism.
- Providing a database for corrective actions and plans.
- To identify the gap areas and suggest recommendations to improve the green campus status of the University.

CHAPTER- 2
GREEN CAMPUS & SUSTAINABLE DEVELOPMENT

2.1 Green Audit

In the survey, the focus has been given to the assessment of the present status of plants and trees on the university campus and efforts made by the university authorities for nature conservation. The campus is in the vicinity of approximately more than 1685 trees/medicinal herbs/ornamental plants. The detail is given below:

Figure .2.1 Green Campus

2.1 List of plants on the university campus.

1. **Common Timber Trees**

Sr. No	Common Name	Scientific Name	Family	Number of Trees
1.	Neem	Azadirachta indica	Meliaceae	87
2.	Kadamba	Neolamarckia kadamba	Rubiaceae	08
3.	Drum Stick	Moringa oleifera	Moringaceae	17
4.	Peepal	Ficus religiosa	Moraceae	06
5.	Desi Babul	Acacia nilotica	Fabaceae	29
6.	Siris	Albezia lebbeck	Fabaceae	31
7.	Shisham	Dalbergia sissoo	Fabaceae	20
8.	Arjun	Terminalia arjuna	Combretaceae	19
9.	Ashapala	Polyalthia longifolia	Annonaceae	41
10.	Rudrax	Elaeocarpus ganitrus	Elaeocarpaceae	05
11.	Royal Palms	Roystonea rigia	Arecaceae	10
12.	Vilayati Babul	Prosopis juliflora	Fabaceae	50
13.	Monkey Puzzled Tree	Araucaria heterophylla	Araucariaceae	16
14.	Indian Laburnum	Cassia fistula	Fabaceae	17
15.	Bel	Aegle marmelos	Rutaceae	15
16.	Geiger Tree	Cordia sebestena	Ehretiaceae	16
17.	Siamea Tree	Cassia siamea	Caesalpiniaceae	32
18.	Pagoda Tree	Plumeria rubra	Apocynaceae	35
Total				454

2. Common Ornamental plants

S.No.	Common Name	Scientific Name	Family	Number of Trees
1.	Kachnar	Bauhinia variegate	Fabaceae	132
2.	Devil Tree	Alstonia scholaris	Apocynaceae	62
3.	Gulmohar	Delonix regia	Fabaceae	43
4.	Silver Oak	Grevillea robusta	Proteaceae	04
5.	Ashapala	Polyalthia longifolia	Annonaceae	41
6.	Ashoka	Saraca asoca	Fabaceae	13
7.	Benjamina	Ficus benjamina	Moraceae	36
8.	Date Palms	Phoenix dactylifera	Arecaceae	15
Total				346

Anthocephalus Cadamba (Kadamb)

Bauhinia variegata (Kachnar)

3. Common Fruits Yielding Plants

S.No.	Common Name	Scientific Name	Family	Number of Trees
1.	Amla	Emblica officinalis	Euphorbiaceae	36
2.	Mango	Mangifera indica	Anacardiaceae	15
3.	Guava	Psidium gujava	Myrtaceae	16
4.	Mulberry	Morus alba	Moraceae	05
5.	Jamun	Syzygium cumini	Myrtaceae	07
6.	Jackfruit	Artocarpus heterophyllus	Moraceae	12
7.	Ber	Ziziphus mauritiana	Rhamnaceae	08
8.	Pears	Pyrus spp.	Rosaceae	07
Total				106

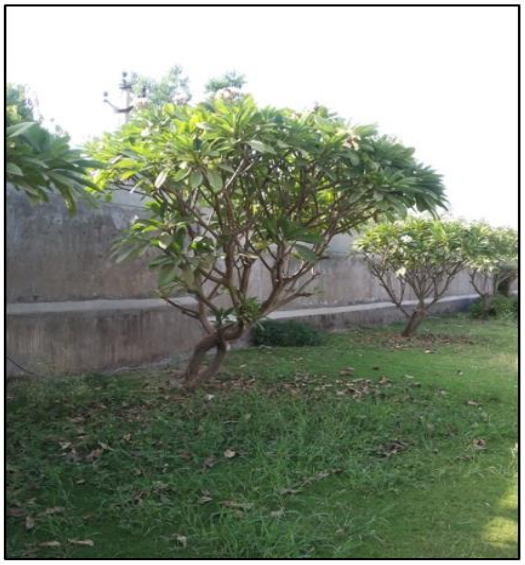
Delonix regia (Gulmohar)

Guazuma ulmifolia (Bhadraksh)

4. Common Shrubs & Plants

S.No.	Common Name	Scientific Name	Family	Number of Trees
1.	Lemon	Citrus lemon	Rutaceae	21
2.	White Champa	Plumeria alba	Apocynaceae	86
3.	Rose	Rosa indica	Rosaceae	95
4.	Duranta	Golden duranta	Verbenaceae	31
5.	Mehndi	Lawsonia inermis	Lythraceae	12
6.	Kaner	Nerium oleander	Apocyanaceae	21
7.	White Cedar	Thuja occisentalis	Cupressaceae	12
8.	China Rose	Hibiscus rosa-sinensis	Malvaceae	40
9.	Golden Durant	Duranta erecta	Verbenaceae	38
Total				356

Nyctanthes arbor-tristis (Harsinghar)



Plumaria rubra (Champa)

5. Common Medicinal Plants

S.No.	Common Name	Scientific Name	Family	Number of Trees
1.	Harsringar	Nyctanthes arbor-tristis	Oleaceae	21
2.	Patharchatta	Bryophyllum pinnatum	Crassulaceae	40
3.	Tulsi	Ocimum tenuiflorum	Lamiaceae	67
4.	Sarpaganda	Rauvolfia serpentina	Apocynaceae	62
5.	Lemon	Citrus limon (L.)	Rutaceae	34
6.	Ashwaganda	Withania somnifera	Solanaceae	23
7.	Beach Launaea	Launaea sarmentosa	Asteraceae	12
8.	Aloe Vera	Aloe barbadensis Mill.	Asphodelaceae	41
9.	Lemon Grass	Cymbopogon citratus	Poaceae	36
10.	Chaff-Flower	Achyranthes aspera	Amaranthaceae	14
11.	Ajwain	Trachyspermum ammi	Apiaceae	17
12.	Kalmegh	Andrographis paniculata	Acanthaceae	21
13.	Satawar	Asparagus racemosus	Liliaceae	16
14.	Giloey	Tinospora cordifolia	Menispermaceae	11
15.	Harad	Terminalia chebula	Combretaceae	8
Total				423

2.2 Tree plantation and Biodiversity on the campus: -

Fig.2.2 – Tree plantation and Biodiversity on the campus

University has **1685 trees** on the campus. This is a good initiative taken by management for a green campus under the campaign of the plantation. **It's APPRECIABLE.**

CHAPTER- 3
RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT

3.0 Grid Connected Solar Photovoltaic System (480 KWp)

There are 480 KWp solar photovoltaic rooftop grid-connected systems installed on most buildings. System details are given below:

Sr. No	Description	Technical Specification
1	Plant Information	
1.1	Plant capacity	480 KWp
1.2	Locations	1. Main University building. 2. Kumbha Hostel building. 3. Pratap Hostel building. 4. Sanga Hostel building. 5. Mess Buildinhg 6. Panna Dhai Girls Hostel . 7. Meera Girls Hostel.
1.3	Latitude & Longitude	23.3103 N & 77.3619 E
2	PV Panel Details	
2.1	Make	M/s. Goldi Green Technologies Pvt. Ltd
2.2	Panel Type	Poly-crystalline
2.3	Panel Wattage	320 Wp
2.4	No of PV Panels	1478
2.5	Total Capacity	480 kWp
3	Inverter Information	
3.1	Make	KSTAR
3.2	Model	1. KSG-50K = 04 2. KSG-20K = 06 3. KSG-15K = 01 4. KSG-20K =05
3.3	Capacity	480 Kw

Sr. No	Building Name	Total No of Inverter	Inverter Modal	No of Penal
1	University Main Building	2	KSG-20 K	730
		4	KSG-50 K	
2	Kumbha Hostel	2	KSG-20 K	110
3	Pratap Hostel	1	KSG-15 K	108
		1	KSG-20 K	
4	Sanga Hostel	2	KSG-30 K	190
5	Mess	2	KSG-30 K	190
6	Panna Dhai Hostel	1	KSG-20 K	60
7	Meera Girls Hostel	1	KSG-30 K	90

Photographs of Solar Plant:-

Figure 3.1:- Solar Plant 480 KWp and Inverter System

Total Solar unit generation :-

Table 3.2:- Total Solar Unit generation Year-2018 to 2022

Sr. No	Year	Unit
1	2018-19	4,15,350
2	2019-20	5,69,087
3	2020-21	6,29,936
4	2021-22	6,20,672
	Total	**22,35,045**

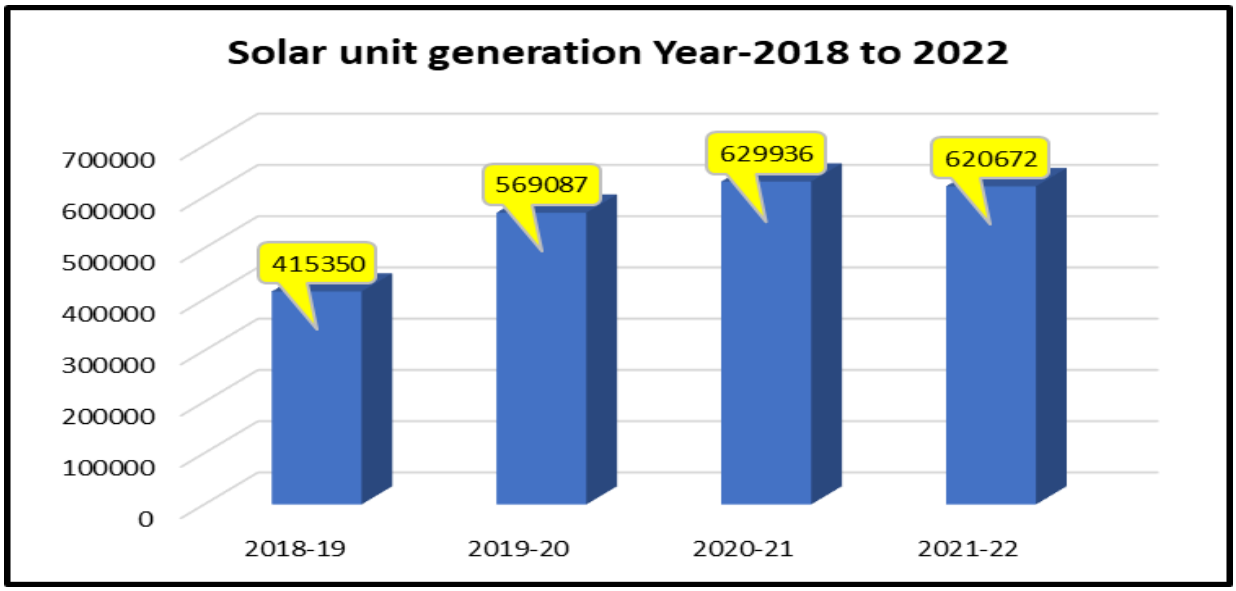


Figure: - 3.2 Graphical presentation of Solar unit generation

Observation: -

Total unit generation from the installation of the solar system up to march-2022 is 22,35,045 units.

Solar unit generation Year-2021-22:-

Table 3.3:- Monthly Solar unit generation Year-2022

Sr. No	Month & Year	Unit (kWh)	Amount (Rs/-)	per unit Charges (Rs/kWh)
1	Apr-21	64,125	2,88,563/-	4.50
2	May-21	56,511	2,54,300/-	4.50
3	Jun-21	52,918	2,38,131/-	4.50
4	Jul-21	46,334	2,08,501/-	4.50
5	Aug-21	44,791	2,01,560/-	4.50
6	Sep-21	41,335	1,86,008/-	4.50
7	Oct-21	60,348	2,71,568/-	4.50
8	Nov-21	47,370	2,13,165/-	4.50
9	Dec-21	42,208	1,89,936/-	4.50
10	Jan-22	50,107	2,25,479/-	4.50
11	Feb-22	52,226	2,35,015/-	4.50
12	Mar-22	62,401	2,80,802/-	4.50
	Total	**6,20,672**	**27,93,028/-**	**4.50**

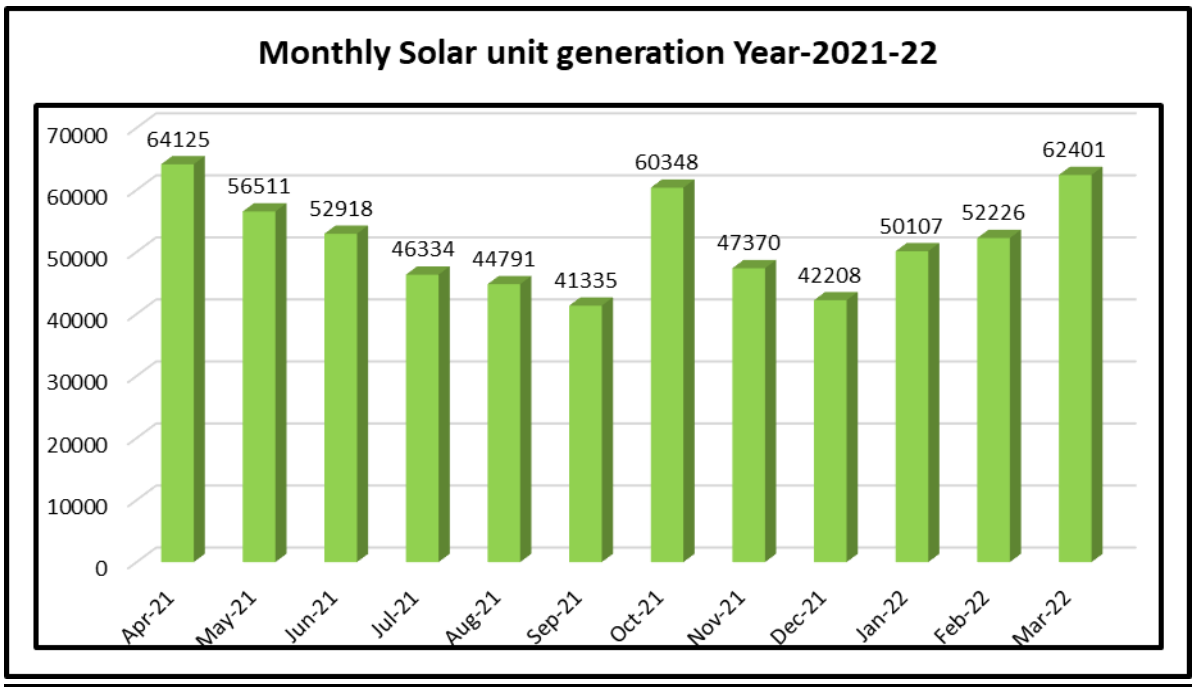


Figure 3.3:- Monthly Solar unit generation Year-2021-22

Observation: -

- **The total CO_2 reduction is 596.652 -tons of CO2e** Sep-2018 to March- 2022. It is a big contribution toward CO_2 emission reduction. (Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip). Electricity is purchased from the grid.

Chapter-04
Carbon Footprint

4.1 About Carbon footprint.

Climate change is one of the biggest challenges faced by the world, nations, governments, institutions, businesses, and mankind today.

Carbon footprint is a measure of the impact your activities have on the amount of carbon dioxide (CO_2) produced through the burning of fossil fuels and is expressed as a weight of CO_2 emissions produced in tonnes.

We focus on consumption in each of our five major categories: housing, travel, food, products, and services. In addition to these, we also estimate the share of national emissions over which we have little control, government purchases, and capital investment.

For simplicity and clarity, all our calculations follow one basic method. We multiply a user input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption, and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet, and spending behavior.

Although working out your inputs can take some investigation on your part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in your calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint…

4.2 Methodology and Scope

The carbon footprint gives a general overview of the Mewar University greenhouse gas emissions, converted into CO_2 -equivalents and it is based on reported data from internal and external systems. The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders. The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the "Greenhouse Gas Protocol Corporate Accounting and Reporting Standard" (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions -ISO 14064. This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the Mewar University Campus. This involves accounting for and reporting on, the GHG emissions from all those activities for which the company is directly responsible. The items quantified in this study are as classified under the ISO 14064 standards: The report calculates the greenhouse gas emissions from Mewar University. This includes electricity, as well as emissions associated with diesel consumption in the institute vehicle. The emission associated with air travel, waste generation, administration, and marketing-related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2, or 3 areas classified under the ISO 14064 standards.

4.3 Carbon emission from electricity

Direct emissions factors are widely published and show the number of emissions produced by power stations to produce an average kilowatt-hour within that grid region

Unlike other energy sources, the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use comes from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is a significant contributor to GHGs emissions from the unit. Electricity used onsite is the most direct, and typically the most significant, a contributor to a unit's carbon footprint. Thus, using an average fuel mix for generating electricity, the carbon dioxide intensity of electricity for the national grid is assumed to be 0.9613 KgCO2/Kwh

(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip). Electricity is purchased from the grid

Table:- 4.1 Electricity Purchased from the grid and Emissions from the electricity Import

Sr. no	Year	Total unit Consumption by AVVNL	Unit	Emission Factor kg CO^2e/kWh	Emission ton CO^2e/year
1	2017-18	9,24,726	kWh	0.9613	889
2	2018-19	6,37,311	kWh	0.9613	613
3	2019-20	6,84,660	kWh	0.9613	658
4	2020-21	5,67,163	kWh	0.9613	545
5	2021-22	6,32,638	kWh	0.9613	608
	Total	**34,46,498**		**Total**	**3313**

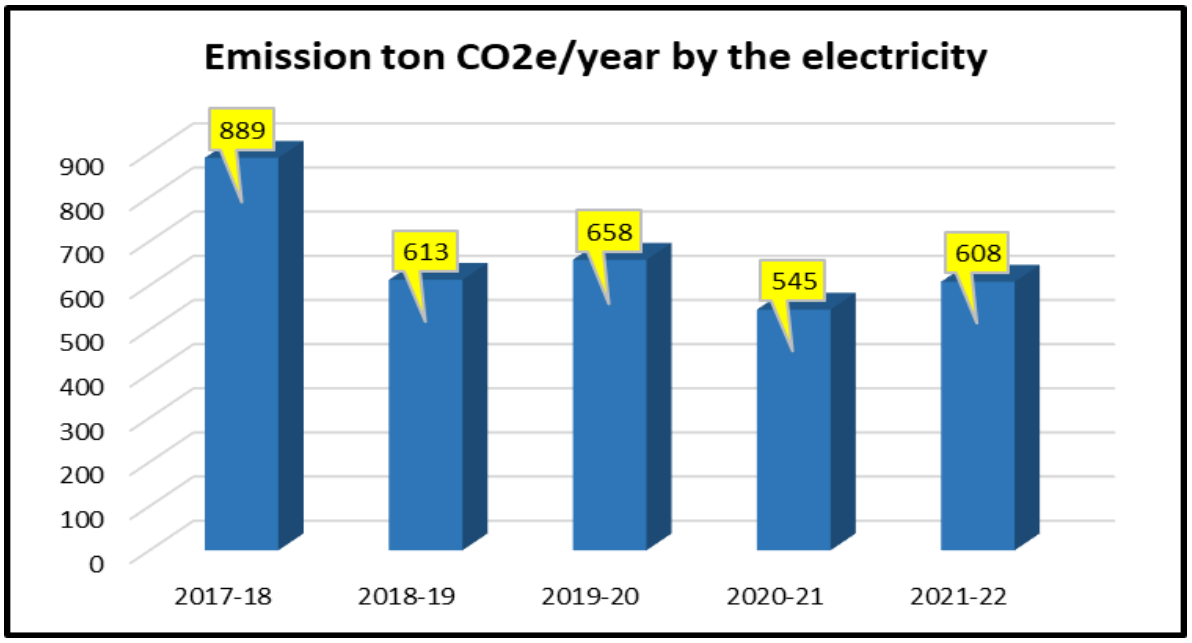


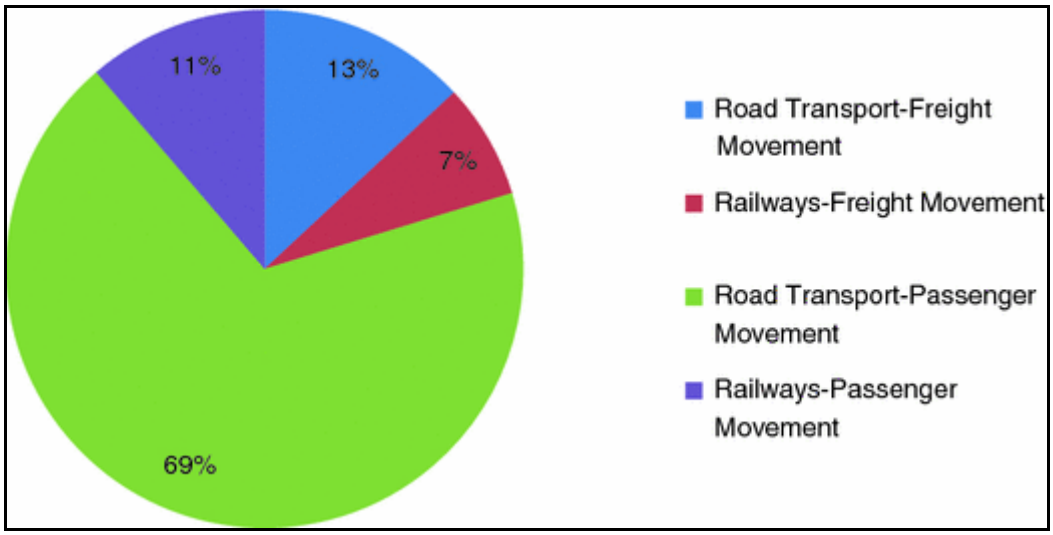
Figure 4.1:- Graphical Presentation of CO2 emission from electricity per year

Observation:-

Total CO_2 Emission by indirectly from electricity is 608 Ton CO_2 e/year in 2021-22.

4.4 Carbon emission from vehicles.

In India, it is the third most CO_2 emitting sector, and within the transport sector, road transport contributed more than 90% of total CO_2 emissions (IEA, 2020; Ministry of Environment Forest and Climate Change, 2018)



Transportation (29 percent of 2019 greenhouse gas emissions) – The transportation sector generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuels for our cars, trucks, ships, trains, and planes.

We have also considered the total GHGs emission done by transportation facilities available on the campus like Cars, ambulances, Buses, etc. We consider the different types of vehicles which are operated on petrol and diesel fuels

The energy team has analyzed the following vehicle movement for Campus.

Calculation of Carbon footprint analysis: -

As per discussion by the concerned department in the university and data provided by Management.

The following details are given in the table: -

Sr. No	Vehicle Type	Fuel type	Distance Traveling per day (KM)	Average Mileage (Per Liter)	Total Distance traveling per month (25 days)
1	University Bus -01	Diesel	65	15	1,625
2	University Bus -02	Diesel	65	15	1,625
3	University Bus -03	Diesel	80	15	2,000
4	Van-01	Petrol	75	18	1,875
5	Van-02	Petrol	75	18	1,875
6	Ambulance	Diesel	20	12	500
7	Swift Car	Diesel	40	17	1,000
8	Inova Car	Diesel	80	14	2,000
9	Loading Tempo	Diesel	100	15	2,500
Total Distance traveling in a month					**15,000**

- CO_2 Emissions from a gallon of gasoline: 8,887 grams CO_2/ gallon
- CO_2 Emissions from a gallon of diesel: 10,180 grams CO_2/ gallon

(1 US Gallon = 3.7854 liters)

- CO_2 Emissions from a Littre of gasoline: 2347.95 grams CO_2/ Liter.
- CO_2 Emissions from a Littre of diesel: 2689.56 grams CO_2/ liter.

$$\text{Total } CO_2 \text{ Emissions} = \frac{CO_2 \text{ Per liter}}{\text{Average Mileage (Km/Liter)}} \times \text{Distance (in km)}$$

$$\text{Total } CO_2 \text{ Emissions} = \frac{2689.59}{15.44} \times 600 = \mathbf{104517.71 \text{ gram or } 104.51 \text{ Kg/day}}$$

When Vehicle traveling in 320 Days in Year =

104.51 x 320 = 33445.6 Kg/year or **33.445 ton/year**

4.5 Carbon emission from DG sets: -

University has 02 no DG sets installed on the campus one is a university feeder and the second is for a residency feeder.

Table 4.5 :- Total diesel consumption in a year in the table: -

Sr.No	Month	Diesel (DG)
1	Apr-21	700
2	May-21	800
3	Jun-21	550
4	Jul-21	1,550
5	Aug-21	1,100
6	Sep-21	1,450
7	Oct-21	1,500
8	Nov-21	1,500
9	Dec-21	1,400
10	Jan-22	1,650
11	Feb-22	2,200
12	Mar-22	3,350
	Total	**17,750**

Every liter of diesel fuel contains 720 grams of pure carbon. In an average liquid hydrocarbon burning engine. It can be assumed that about 99 % of the fuel is Oxidized (It is assumed that somewhat less than 01 % will fail to fully oxidize and will be emitted as a particulate of unburned hydrocarbons instead of CO_2.

Calculation of Total CO_2 =

- CO_2 Emissions from a Littre of diesel: 2689.56 grams CO_2/ liter.
- Diesel consumption April-2021 to March-2022 = 17,750 Liter
- 17750 x 2689 = 47729750 gram. or **47.72 Ton/year**

4.6 Biomass Calculation and CO^2 Sequestration of the Trees: -

1. Estimation of above-ground biomass (AGB)

$$K= 34.4703 – 8.0671D + 0.6589 D^2$$

Where = K is above-ground biomass.
D is Breast height diameter in (cm)

1 Estimation of below ground biomass (BGD)

BGB = AGB x 0.15

2 Total Biomass (TB)

TB = AGB + BGB

3 Calculation of carbon dioxide Weight sequestered in the tree in Kg.

C = W x 0.50

4 Calculate the weight of CO_2 sequestered in the tree per year in Kg.

CO_2 = C x 3.666

Where: -

AGB = Above ground biomass.

D = Diameter of tree breast height.

BGB = Below Ground Biomass.

C = Carbon

TB = Total Biomass.

Biomass calculation of the tree

Common Name	Average Diameter CM (25 to 100)	AGB	BGB	Total	Carbon Storage	Amount of CO^2 Sequestered	No of Tree	Total Amount of CO^2 Sequestered (Kg)	Annually CO^2 Sequestered amount (Kg)
Neem	75	3248.258	487.24	3735.50	1867.748	6847.164	87	595703.30	8124.70
Kadamba	60	1994.490	299.17	2293.66	1146.832	4204.285	8	33634.28	458.73
Drum Stick	50	1328.370	199.26	1527.63	763.813	2800.138	17	47602.34	649.24
Peepal	50	1328.370	199.26	1527.63	763.813	2800.138	6	16800.83	229.14
Desi Babul	40	798.030	119.70	917.73	458.867	1682.207	29	48784.01	665.36
Siris	55	1644.458	246.67	1891.13	945.563	3466.434	31	107459.46	1465.62
Shisham	40	798.030	119.70	917.73	458.867	1682.207	20	33644.15	458.87
Arjun	65	2378.468	356.77	2735.24	1367.619	5013.691	19	95260.12	1299.24
Ashapala	30	403.470	60.52	463.99	231.995	850.495	41	34870.28	475.59
Rudrax	30	403.470	60.52	463.99	231.995	850.495	5	4252.47	58.00
Royal Palms	30	403.470	60.52	463.99	231.995	850.495	10	8504.95	116.00
Vilayati Babul	35	583.778	87.57	671.34	335.672	1230.574	50	61528.69	839.18
Monkey Puzzled Tree	45	1046.228	156.93	1203.16	601.581	2205.395	16	35286.32	481.26
Indian Laburnum	50	1328.370	199.26	1527.63	763.813	2800.138	17	47602.34	649.24
Bel	36	623.912	93.59	717.50	358.750	1315.176	15	19727.64	269.06
Geiger Tree	35	583.778	87.57	671.34	335.672	1230.574	16	19689.18	268.54
Siamea Tree	45	1046.228	156.93	1203.16	601.581	2205.395	32	70572.65	962.53
Pagoda Tree	60	1994.490	299.17	2293.66	1146.832	4204.285	35	147149.98	2006.96
Kachnar	45	1046.228	156.93	1203.16	601.581	2205.395	132	291112.17	3970.43
Devil Tree	40	798.030	119.70	917.73	458.867	1682.207	62	104296.85	1422.49

Gulmohar	30	403.470	60.52	463.99	231.995	850.495	43	36571.27	498.79
Silver Oak	65	2378.468	356.77	2735.24	1367.619	5013.691	4	20054.76	273.52
Ashapala	65	2378.468	356.77	2735.24	1367.619	5013.691	41	205561.31	2803.62
Ashoka	25	257.108	38.57	295.67	147.837	541.970	13	7045.61	96.09
Benjamina	35	583.778	87.57	671.34	335.672	1230.574	36	44300.66	604.21
Date Palms	36	623.912	93.59	717.50	358.750	1315.176	15	19727.64	269.06
Amla	30	403.470	60.52	463.99	231.995	850.495	36	30617.81	417.59
Mango	27	311.579	46.74	358.32	179.158	656.793	15	9851.90	134.37
Guava	28	340.852	51.13	391.98	195.990	718.498	16	11495.97	156.79
Mulberry	30	403.470	60.52	463.99	231.995	850.495	5	4252.47	58.00
Jamun	54	1578.524	236.78	1815.30	907.652	3327.451	7	23292.15	317.68
Jackfruit	35	583.778	87.57	671.34	335.672	1230.574	12	14766.89	201.40
Ber	37	665.405	99.81	765.22	382.608	1402.641	8	11221.13	153.04
Pears	45	1046.228	156.93	1203.16	601.581	2205.395	7	15437.77	210.55
Lemon	15	66.218	9.93	76.15	38.075	139.583	21	2931.25	39.98
White Champa	26	283.664	42.55	326.21	163.107	597.950	86	51423.73	701.36
Rose	75	3248.258	487.24	3735.50	1867.748	6847.164	95	650480.62	8871.80
Duranta	45	1046.228	156.93	1203.16	601.581	2205.395	31	68367.25	932.45
Mehndi	30	403.470	60.52	463.99	231.995	850.495	12	10205.94	139.20
Kaner	30	403.470	60.52	463.99	231.995	850.495	21	17860.39	243.60
White Cedar	25	257.108	38.57	295.67	147.837	541.970	12	6503.64	88.70
China Rose	46	1099.940	164.99	1264.93	632.466	2318.619	40	92744.77	1264.93
Golden Durant	54	1578.524	236.78	1815.30	907.652	3327.451	38	126443.12	1724.54
Harsringar	28	340.852	51.13	391.98	195.990	718.498	21	15088.46	205.79

Patharchatta	50	1328.370	199.26	1527.63	763.813	2800.138	40	112005.50	1527.63
Tulsi	36	623.912	93.59	717.50	358.750	1315.176	67	88116.80	1201.81
Sarpaganda	39	752.464	112.87	865.33	432.667	1586.156	62	98341.69	1341.27
Lemon	36	623.912	93.59	717.50	358.750	1315.176	34	44715.99	609.87
Ashwaganda	45	1046.228	156.93	1203.16	601.581	2205.395	23	50724.09	691.82
Beach Launaea	46	1099.940	164.99	1264.93	632.466	2318.619	12	27823.43	379.48
Aloe Vera	35	583.778	87.57	671.34	335.672	1230.574	41	50453.53	688.13
Lemon Grass	26	283.664	42.55	326.21	163.107	597.950	36	21526.21	293.59
Chaff-Flower	80	3734.070	560.11	4294.18	2147.090	7871.233	14	110197.26	1502.96
Ajwain	75	3248.258	487.24	3735.50	1867.748	6847.164	17	116401.79	1587.59
Kalmegh	36	623.912	93.59	717.50	358.750	1315.176	21	27618.70	376.69
Satawar	37	665.405	99.81	765.22	382.608	1402.641	16	22442.25	306.09
Giloey	57	1780.397	267.06	2047.46	1023.728	3752.988	11	41282.87	563.05
Harad	50	1328.370	199.26	1527.63	763.813	2800.138	8	22401.10	305.53
		62188.841	**9328.33**	**71517.17**	**35758.584**	**131090.968**	**1685**	**4153779.72**	**56652.75**

University has **1685 trees** on campus. This is a good initiative taken by management for a green campus under the campaign of the plantation.

It's APPRECIABLE.

There are total CO_2 sequestered of **56652 Kg /year or 56.652 Tons /Year.**

Calculation of CO_2 Emission of Mewar University: -

CO_2 Emission Neutralize by the Solar 2021-22: -

April -2021 to March -2022 = 6,20,672 Kwh

6,20,672 X 0.9613 = 5,96,652 Kg/year

5,96,652 / 1000 = 596.652 Ton/year

Total Carbon Footprint generated by the campus	=	Carbon footprint by electricity + Carbon footprint by vehicle + Carbon footprint by DG Sets. - Carbon Neutralize by the tree, - Carbon Neutralize by Solar

Total Carbon Foot print by campus: **608 + 47.71 + 33.44 -56.65 - 596.6 = 35.9 tons/year**

Recommendation: -

Required more plantation and installation of more solar panels to further reduce carbon emission share by the university.

4.7 Other Emissions Excluded

This study did not evaluate the carbon sequestration potential of existing plantation activities and emissions from the staff commuting, food supply, official flights, paper products, water supply, and waste disposal and recycling due to limited data availability. The current study identifies areas where data monitoring, recording, and archiving need to be developed for enlarging the scope of mapping of GHGs emissions in the future years. Accordingly, a set of tools and record-keeping procedures will be developed for improving the quality of data collection for the next year's carbon footprint studies.

CHAPTER- 5
WASTE MANAGEMENT

5.1 About Waste:

Human activities create waste, and it is the way these wastes are handled, stored, collected, and disposed of, which can pose risks to the environment and public health waste management is important for an eco-friendly campus. In universities, different types of waste are generated, and its collection and management are very challenging.

Solid waste can be divided into three categories: biodegradable, non-biodegradable and hazardous waste. A bio-degradable waste includes food waste, canteen waste, wastes from toilets, etc. Non-biodegradable wastes include what is usually thrown away in homes and schools such as plastic, tins and glass bottles, etc. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals, acids, and petrol.

Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated at the University. Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential to a sustainable University. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Table 5.1 Different types of waste generated on the University Campus.

Sr. No.	Types of Waste	Particulars
1	Solid wastes	Damaged furniture, paper waste, paper plates, food waste, etc
2	Plastic waste	Pen, Refill, Plastic water bottles and other plastic containers, wrappers, etc
3	E-Waste	Computers, electrical and electronic parts, etc
4	Glass waste	Broken glass wares from the labs etc
5	Chemical wastes	Laboratory waste etc
6	Bio-medical Waste	Sanitary Napkin etc

5.2 Waste Management Practices adopted by the University

University has implemented a **"Three dust bin"** waste collection system and has banned the use of plastic bags, **It's Appreciable**.

Figure: - 5.1 Three Dustbin Collection system on the university campus

Vermicompost pit

University Vegetable waste and other leaf liters were used to feed in the **"Vermicompost pit"** and the resulting vermin cast is used as manure in the garden. All kinds of waste generated from the various activities are collected.

Figure: - 5.1 Varmi Compost pit.

5.3 Waste Collection Points:

The audit team also visited various departments, Admin building, MBA building, Workshop building, and Mess, to find out waste generation areas and waste collection points for further improvement. Details are given in the table.

Table: 5.2 Detailed Waste collection Dust bin system

Administrative and Academic Block		
Sr.No.	**Location**	**Dustbin**
1	Basement	10
2	First floor	8
3	Second floor	8
4	Third floor	4
	Total	**30**
Education Block		
Sr.No.	**Location**	**Dustbin**
1	Ground floor	6
2	First floor	6
3	Second floor	8
4	Third floor	6
	Total	**26**
Engineering Block		
Sr.No.	**Location**	**Dustbin**
1	Ground floor	6
2	First floor	6
3	Second floor	8
	Total	**20**

Sr.No.	**Location**	**Dustbin**
1	Bhamashah International Hostel	16
2	Sanga Boys Hostel	12
3	Kumbha Boys Hostel	13
4	Pratap Boys Hostel	4
5	Panna Dhai Girls Hostel	8
6	SC Meera Girls Hostel	4
	Total	**57**

Observation:- Total dustbins is more than 200 in the university. **It's Appreciable.**

5.4 Organic Waste Generation in university

- The audit Team also visited in mess and guest house and discussion with the concerned officer the waste collection process. University has approx. 50 Kg per day waste generated. Department wise Generated organic waste is as follows: -

Recommended:- Install an Organic waste composting Machine in the university: -

An organic waste composting machine is an independent unit that facilitates the composting process and provides better compost. It takes waste as its input and provides manure as its output. Composting without an organic waste composting machine will take a considerable amount of time.

About Composting Process: -

Highly compact composting machine, which uses special microorganisms to break down and decompose all kinds of organic waste into compost within 24 hrs with a volume reduction of 85-90%. When organic waste is added to it, moisture is sensed by the humidity sensor, heater, mixing blades, and an exhaust system.

Recommendation: -

University has a good potential to install an organic converter. (Quotations are attached)