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

No. MU/RO/Admin/2021/345

Dated : 17/2/2021

### OFFICE ORDER

### Green, Environment & Energy Auditing Committee

Green Audit, Environment Audit & Energy Audit can be defined as systematic identification, quantification, recording, reporting, and analysis of components of environmental diversity and energy usage as well. Its aim is to analyze environmental practices implemented by the University which will impact the eco-friendly ambiance

Green Audit aims to get a direction as to how to improve the condition of the environment and there are various factors that have determined the growth of carrying out Green Audit.

The 'Energy audit' aims, to establish the pattern of energy use and identifies the areas where energy can be saved or where energy can be used judiciously.

S. No.	Name	Designation	Committee Role
1	Dr. Satish Prakash Sharma	Professor, Department of Agriculture	Co-Ordinator
2	Dr. Vijay Kumar Yadav	Asst. Professor, Department of Agriculture	Auditor
3	Dr. Satish Kumar Ameta	Asst. Professor, Department of Life Science	Auditor
4	Mr. Deepak Kumar Joshi	Asst. Professor, Department of Electrical Engg.	Auditor
5	Dr. Mohd. Ashid	Asst. Professor, Department of Chemistry	Member
6	Ms. Nirma Kumari sharma	Asst. Professor, Department of Electrical Engg.	Member
7	Mr. Suraj Kumhar	Asst. Professor, Department of Electrical Engg	Member
8	Mr. H. Widhani,	OSD	Member
9	Mr. Nitish Kumar Jha,	Non-Teaching Staff	Member
10	Mr. Bhagwan Suman	Non Teaching Staff	Member

An Audit Committee is constituted with the following officials:

Regestrar

Mewar University Gangrar, (Chit'srgarh)

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
- 9. Record File

# MEWAR UNIVERSITY, GANGRAR INTERNAL ENERGY AUDIT REPORT

# Academic Session- 2020-21



Date of Audit: - 23/02/2021 - 24/02/2021

# Mewar University, Gangrar

24/2/21



### 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 30<sup>th</sup> 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) dated15<sup>th</sup> 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)]

Gangrar, (C

### MewarGirls 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]

### MewarGirls 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.

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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

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1.2 About Campus: -

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

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1170.08         1062.08         1062.1         1193.08         1253.27         1126.29           11979.9         1979.9         0         0         2126.84         2093.74         2093.74           1337.03         0         0         0         1590.91         1590.91         0           1337.03         0         0         1590.91         1590.91         2093.74         2093.74           1337.03         0         0         0         1590.91         1590.91         0           1337.11         1382.11         1382.11         1382.11         1382.11         1601.64         1572.82         1572.82           1189.78         1189.78         1189.8         1501.64         1572.82         1572.82         1572.82           1189.78         1189.78         1189.8         709.19         697.35         697.35         697.35           602.71         620.65         620.65         709.19         697.35         697.35         1341.62         1           640.52         665.78         650.58         799.64         739.64         739.64         739.64         739.64         739.64         739.64         739.64         739.64         739.64         739.64         739.64 </td <td>ADMINISTRATIVE AND ACADEMIC BLOCK</td> <td></td> <td>8890.84</td> <td>8519.33</td> <td>8675.24</td> <td>8675.24</td> <th></th> <td>8966.05</td> <td>9050.97</td> <td>9206.74</td> <td>9206.74</td>	ADMINISTRATIVE AND ACADEMIC BLOCK		8890.84	8519.33	8675.24	8675.24		8966.05	9050.97	9206.74	9206.74
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1382.11         1382.11         1382.11         1382.1         1601.64         1572.82         1572.82         1572.82           1189.78         1189.78         1189.78         1189.8         1359.6         1341.62         1341.62         1341.62           602.71         620.65         620.65         709.19         697.35         697.35         697.35           640.52         665.78         665.78         749.38         739.64         739.64         739.64	MEWAR HOSPITAL		1337.03	1337.03	0	0		1590.91	1590.91	0	0
1189.78         1189.78         1189.78         1189.8         1359.6         1341.62         1341.62           .602.71         620.65         620.65         709.19         697.35         697.35           .640.52         665.78         665.78         749.38         739.64         739.64	BHAMASHAH HOSTEL		1382.11	1382.11	1382.11	1382.1		1601.64	1572.82	1572.82	1572.82
602.71         620.65         620.65         709.19         697.35         697.35           640.52         665.78         749.38         739.64         739.64         739.64	SANGA HOSTEL		1189.78	1189.78	1189.78	1189.8		1359.6	1341.62	1341.62	1341.62
640.52         665.78         749.38         739.64         739.64	KUMBHA HOSTEL		602.71	602.71	620.65	620.65		709.19	697.35	697.35	697.35
	PRATAP HOSTEL	11-	640.52	640.52	665.78	665.78	1	749.38	739.64	739.64	739.64



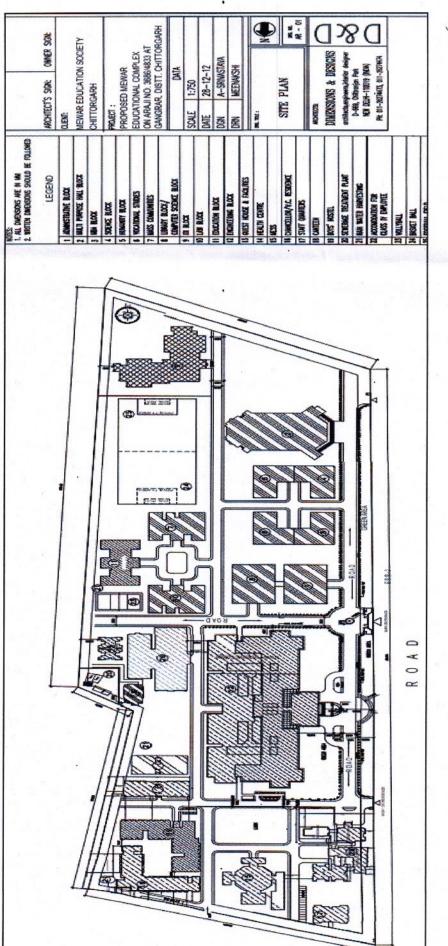
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			FAR	FAR AREA			BUILT	BUILT AREA		
S.NO	BLOCK	GROUND FLOOR ARÊA IN SQ.MT	FIRST FLOOR AREA IN SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT	GROUND FLOOR AREA IN SQ.MT	FIRST FLOOR SQ.MT	SECOND FLOOR AREA IN SQ.MT	THIRD FLOOR AREA IN SQ.MT	
6	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	
<u> </u>	tapply the			- Company - Comp	Hund Harris				Canturat, China results	History

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**1.3 MEWAR UNIVERSITY LAYOUT OF VARIOUS BUILDINGS** 







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Layout map of Mewar University

### **2.1 INTRODUCTION**

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprint.

In board sense, Energy Efficiency means economizing on the use of without adversely affecting economic growth and development. It include improving the efficiency of energy extraction, Transmission and Distribution and increasing the productivity of energy use.

### 2.2 Energy Audit

As per the energy Conservation Act, 2001, Energy Audit is define as "the verification, Monitoring and analysis of use of energy including submission of technical report containing recommendation for improving energy efficiency with cost benefit analysis and an action plan to reduce energy Consumption".

There are three phase of Energy Audit

- 1. Pre Audit Phase
- 2. Audit Phase
- 3. Post Audit phase

Above phase include following Stages

1. Data Collection:- In preliminary data Collection phase, exhaustive data collection was perform using different tools such as observation, survey communicating with responsible person and measurement.

Following Steps were taken for data collection:

- > The Team went to each Department, Centers, Library, Canteen etc.
- Data about the general information was collected by observation and interview.
- The power consumption of appliances was recorded by taking an average value in some cases.
- Data Analysis: Detailed Analysis of data collected included: calculation of energy Consumption, Analysis of latest electricity bill of the campus, understanding the tariff plan provided by the Rajasthan State electricity Board. Data related to water usages were also analysed using appropriate methodology.
- 3. Recommendation on the basis of results of data analysis and observation, Some Steps for reducing power and water Consumption were recommended. Proper treatments for waste were also suggested. Use of fossil fuels has to be reduced for the sake of community health.

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The above target area particular to the college was evaluated through questionnaires were distributed. The format of these is given below.

### 2.3 Pre Audit Phase

Survey Form for Data Collection

- 1. List ways that you use energy in our university (Electricity, LPG, Petrol, Diesel& others)
- 2. Electricity Bill Amount for the Last Year (2021-22)
- 3. Amount Paid for LPG Cylinders for Last one Year (During the Session 2021-22)
- 4. Weight of Fire wood used per Month & Amount of money Spent? Also Mention the Amount spent for Petrol/Diesel/others For Generators?
- 5. Are there any energy saving methods employed in our university. If yes, please specify. If no suggest some.
- 6. How much money does our university spend on energy Such as electricity, gas, firewood etc. in a month
- 7. How many CFL Bulbs has our university installed? Mention use (Hours Used/Day for how many day in a month)
- Energy used by each bulb per month? (For Example-60 Watts Bulb\*4 Hours\* number of Bulbs = kwh)
- 9. How many LED Bulbs has our university installed? Mention use (Hours Used/Day for how many day in a month)
- 10. Energy used by each bulb per month (kwh)?
- 11. How many Incandescent (Tungsten Bulb) has our university installed? Mention use (Hours Used/Day for how many day in a month)
- 12. Energy used by each bulb per month (kwh)?
- 13. How many Fan has our university installed? Mention use (Hours Used/Day for how many day in a month)
- 14. Energy used by each Fan per month (kwh)?
- 15. How many Air Conditioners has our university installed? Mention use (Hours Used/Day for how many day in a month)
- 16. Energy used by each Air Conditioners per month (kwh)?

### 2.4 OBJECTIVE OF ENERGY AUDIT

The overall objective of the assignment is to quantify energy saving in existing system and achieve reduction in energy consumption pattern.

Hence the detail objectives are as under,

- > To carry out the energy consumption
- > To evaluate the performance of the equipment
- > To find out the energy saving opportunities
- To quantify the total energy savings
- To find out the ways to achieve energy efficiency

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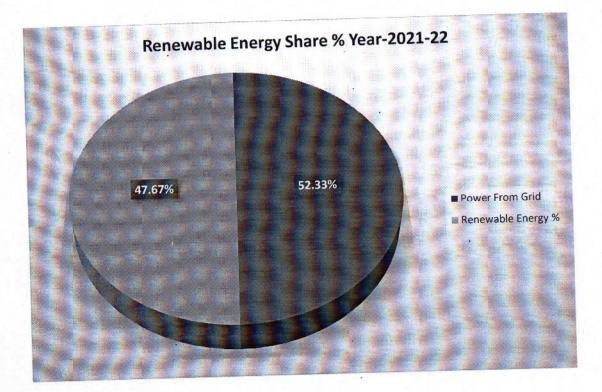
Gangrar, (Chittorgarh)

## 2.5 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 campusis about 12,03,812 KWHunits (Grid + Solar) period from April - 2020 to March- 2021.

Mewar University has a 480 KWp solar photovoltaic rooftop grid-connected system installed on almost all buildings. Total Solar generation is **6,29,936 KWH**units &Grid generation is **5,73,876** KWHfrom April-2020 to March- 2021



2.6 Total Connected Load & Total Consumption of Energy during the year (2020-21)

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Engineering Block	1st Floor	17	80	67	4	1	2	2	0	0				- 127,-54		-		
	2nd Floor	17	85	73	7	2	2	9	0	0						0		10
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ement+Agriculture + CSE+CA)	2nd Floor	58	212	399	12	18	15	42	0	36								
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	4th floor	8	0	40	0	0	0	67	0	0						0		
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								National Mess	International Mess	Guest House	Shops	Godwan& Main Gate Rooms

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Parking				[B] Total Energy Consumption (During 2020-21)	Total Energy Consumpation [A+B]

# 2.7 Electricity bill analysis of during the year 2020-21

Electricity bills forthe last four years were analyzed. Detailed unit consumption, Solar unit generation, and % of renewable energy sources. Table 2.1 :- Electricity bill analysis of 2020-21 Year

Renewable Energy Share %	47.67
. Total Unit consumption (AVVNL + Solar )	12,03,812
Total Solar Unit Generation	6,29,936
Total unit Consumption by AVVNL	5,73,876
Unit Consumption (University)	2,33,206
Unit consumption (Residentail)	3,40,670
Year	2020-21
Sr. no	3

Year	Mode of Power Generation	Power Consumption (In KWH) Per Unit Charge (In Rupess)	Per Unit Charge (In Rupess)	Cost (In Rupees)
2020-21	2020-21 Solar Generation	629936	4.50	2834712
2020-21	2020-21 Grid Generation	573876	10.30 (Approximate)	5910922
	E	Total Cost Analysis		8745634

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2.7 Details of LPG Cylinderduring
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Total Cost (In Rupees)	45600	1425000	000209	34200	2131800
Price of Each Cylinder (Average Price)			Rs.950		
No. of LPG Cylinder used (No. of Cylinder in a Month*12)	4*12=48	125*12=1500	55*12=660	3*12=36	2244
Place	Guest House	National Mess	International Mess	University	Total
Sr. no	1	2	3	5	

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### CHAPTER- 3 POWER SUPPLY SYSTEM

### 3.1 Transformer and substation

The power supply for the Mewaruniversity is from AVVNL with the help of 11 kV feeders. There are 3 electricity connections. One is a university feeder under Tariff 2620G11 KV Non-Industrial with sanctioned load of 425 kW. The second is a residency feeder undertariff 1011, 11 KV Non-Industrial with sanctioned load of 400 kW, and the third are bank feeder with 14 kW. There aretwostep-down transformershaving capacities are 630KVA and 500 KVA.Universityand residential respectively. The details are given in following table 2.1

Table: 3.1 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 3.1:- 11 kV Feeder and 630 kVA and 500 kVA

Gangrar, (Chitturgarh)

Sr.No.	Month & Year	Transformer Capacity (KVA)	Maximum Demand (kVA)	Transformer loading %
1	Apr-20	630	61	9.68254
2	May-20	630	63	10
3	Jun-20	630	82	13.01587
4	Jul-20	630	104	16.50794
5	Aug-20	630	109	17.30159
6	Sep-20	630	114	18.09524
7	Oct-20	630	88	13.96825
8	Nov-20	630	. 89	14.12698
9	Dec-20	630	. 84	13.33333
10	Jan-21	630	75	11.90476
11	Feb-21	630	73	11.5873
12	Mar-21	630	69	10.95238
	Average Transformer loading % Calculated Transformerloading on residency Feeder Loading % Year			13.37302

Table 3.2: Calculated Transformer loading on university feeder loading % Year (2020-21)

Sr No. Month & Voar Transformer Maximum Demand Transformer loading

Sr.No.	Month & Year	Transformer Capacity (KVA)	Maximum Demand (KVA)	Transformer loading
1	Apr-20	500	128	25.6
2	May-20	500	. 92	18.4
3	Jun-20	500	108	21.6
4	Jul-20	500	82	16.4
5	Aug-20	500	90	18
6	Sep-20	500	77	15.4
7	Oct-20	500	81	16.2
8	Nov-20	500	116	23.2
9	Dec-20	500	132	26.4
10	Jan-21	500	205	41

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	Average Transformer loading %			24.38333
12	Mar-23	500	142	28.4
11	Feb-22	500	210	42

### 3.2 DG Set:-

There are 2DG sets on the university campus. Details of the DG Sets are given in the table. Table 3.4Technical 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

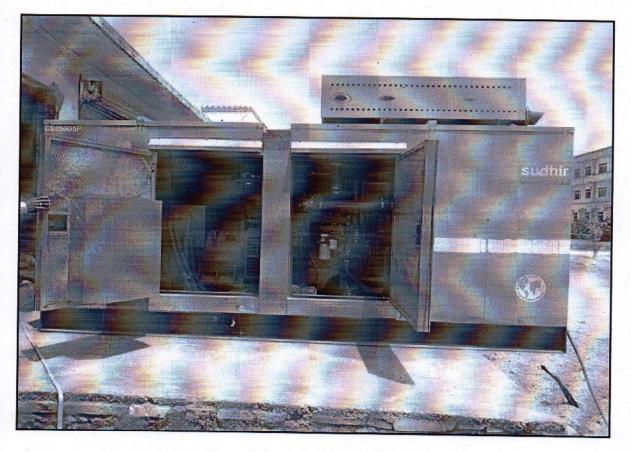


Figure 3.2:- DG set in Power House

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### 3.3 Capacitor Bank

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

Table: 3.5Details of Capacito	or bank
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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 3.3Capacitor bankon main penal

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

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### 3.4 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: - 3.6 Solar plant detailed

Sr. No	Description	Technical Specification		
1	Pla	nt Information		
1.1	Plant capacity	480 kWp		
1.2	Locations	<ol> <li>Administrative and Academic building</li> <li>Kumbha Hostel building.</li> <li>Pratap Hostel building.</li> <li>Sanga Hostel building.</li> <li>Mewar Hospital</li> <li>PannaDhai Girls Hostel .</li> <li>Meera Girls Hostel.</li> </ol>		
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	320Wp		
2.4	No of PV Panels	1478		
2.5	Total Capacity	480kWp		
3	Inve	rter 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	2	KSG-20 K	720
1	Academic building	4	KSG-50 K	730
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	PannaDhai Hostel	1	KSG-20 K	60
7	Meera Girls Hostel	1	KSG-30 K	90

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### 3.5 Solar Plant 480 KWp and Inverter System

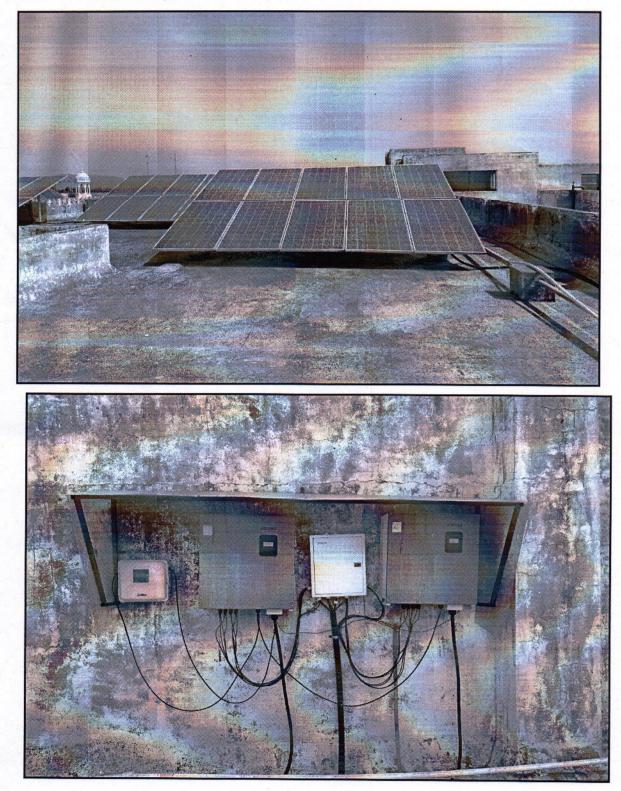


Figure 3.5 :- Solar Plant 480 KWp and Inverter System

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Environmental Promotional Activity beyond Campus