

# Report

On

## Green, Energy & Environment Audit

For

**Mody University of Science & Technology**  
Lakshmanagarh 332 311

Prepared

By

**Senergy Consultants Pvt Ltd**  
Mumbai

**November 2020**

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# I Introduction

Green, Energy & Environment Audit was undertaken at Mody University of Science & Technology (Lakshmarharh, Sikar 332 311) during the month of November 2020.

The organization is very keen to promote green culture wherever possible, as a commitment towards better environment and conservation of energy. A lot of efforts have already been put up to bring down the carbon footprint. To further optimize consumption and identify saving opportunities, M/s Senergy Consultants was assigned to carry out Green & Environment Audit of the premises.

This Audit Report presents the analysis of the data collected, observations made at the facility and is governed by the objectives, scope of work, methodology etc. discussed in the ensuing paragraphs.

## **Team:**

The team members of the audit study.

- Mr Ravindra Datar
- Mr Dharmendra Kumar Upadhyay

## **Acknowledgment:**

We wish to express our gratitude towards Dr Uma Bhardwaj for having given us the opportunity for conducting the study and the support provided during the study.

We are also thankful to Mr Ashok Ranwa for extending the necessary help and co-operation from their side.

## II

# Executive Summary

The premises were evaluated against the various criteria laid down by the National Assessment and Accreditation Council (NAAC). The major observations are.

### Renewable Energy

- The college is planning to install Roof-top Solar Photovoltaic System for self-use; which may be expediated.
- Solar hot water system has been installed to meet major part of hot water requirements.
- The college has already installed biogas plant from plate waste and organic waste. The gas augments the cooking requirements in the canteens.

### Green Campus Initiative

- The movement of vehicle inside the campus is restricted with vehicles of Special Dignitaries and VIP Guests are allowed to enter the campus.
- There are pedestrian friendly pathways for in-campus movement
- There is restriction on the usage of plastic, which may be extended to completely ban plastic usage inside the campus.
- The campus is surrounded with a lot of greenery, trees, and proper landscaping.
- The bicycles are allowed for in campus movement as required.

### Environment & Energy Initiative

- The tree plantation is a regular activities and recently 50 neem trees were planted in Jeevan Jheel as a part of Monsoon plantation Drive.

### Air Quality & Ventilation

- The classrooms and other area are well ventilated to ensure proper air quality.
- The fans are appropriately installed to ensure proper air circulation
- The indoor as well as outdoor plants have also been provided to improve the environment.

### Lighting System

- The usage of natural light is optimized through well designed structure and windows.
- Almost all the lamps are replaced with LED, the remaining are being progressively replaced.
- The switching of the lamps is done manually, which may be carried out with sensor-based automation; especially for common area and washrooms.

### Water Quality & Conservation

- The water is supplied by the Tube well, which is a common practice in and around Lakshmanagarh.
- Water purifiers & coolers are provided at convenient locations and on each floor.
- The rainwater harvesting system has been installed.
- The distribution network and piping are more or less satisfactory and adequate.

### Waste Management

- The effluent water is treated in the Sewage Treatment plant; while the treated water is used for gardening.
- The organic waste is segregated and disposed of through Composite pit / Biogas plant. The manure is used in for gardening / inhouse plants.
- The electronic gadgets / waste is either donated if useful or handed over to appropriate waste collectors.
- The hazardous solid waste is disposed through Incinerator machine.
- The other solid waste is appropriately disposed of.

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**Air Conditioning System**

- The Air Conditioners are operated as required with manual control. The operation is minimal consequently automation may not be economical.
- The room temperature is maintained at 24 to 25 °C, which is well within the recommended values.
- The Air Conditioners are serviced regularly and properly maintained.
- Most of the Air Conditioners units are energy efficient with star rating of 3 and above.

**Infrastructure usage**

- Ramps are provided on the ground floor to address the needs of differently abled persons.
- The special toilets are available on the ground floor to address the needs of differently abled persons.
- The on-campus movement is distributed with multiple entrances as well as staircases.
- There are adequate fire extinguishers located at key areas. The college has initiated appropriate measures to meet the safety requirement.
- The draining system for washrooms is efficient and effective.
- No seepages were observed in the building premises.

**Green IT culture**

- The Energy efficient computers and laptops have been procured.
- The electronic communication is encouraged to minimize usage of papers.
- Most of the papers are reused for doubled sided printing to further minimize usage of paper.

## III Electrical System

### Gadget List

The details are as below:

#### Lamps:

Almost all the lamps are replaced with LED, the details are as below.

Description		Total	Operation	
			Hr/D	D/M
LED	7 W	3793	10	25
	15 W	500	10	25
	40 W	1684	10	25
RO	60 W	113	10	25

#### Computers:

Almost all the computers are with energy efficient LCD / LED monitors.

#### Fans:

All the fans are of standard rating and efficiency, the details are as below.

Description	Rating	Quantity
	W	No
Ceiling Fans	60	1700

#### Air Conditioning Units:

The Air Conditioning Units are with star rating of 3 and above, which are intrinsically operate at high energy efficiency, the details are as below.

Location	Type	Capacity	Quantity
Air Conditioner	Split AC	1.5 Ton	800
Air Conditioner	Split AC	2 Ton	400

#### Observations & Suggestions:

- Almost all the lamps are replaced with LED, the remaining are being replaced expediently.
- The fans may be progressively replaced with energy efficient BLDC fans, especially during replacements and new purchases.
- Most of the Air Conditioners units are energy efficient with star rating of 3 and above.
- The Air Conditioners are operated as required with manual control. The operation is minimal consequently automation may not be economical.

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- The rooms are well ventilated and provided with fans at appropriate location for proper air circulation.
- The temperature is maintained at 24 to 25 °C for air conditioning spaces, which is within the recommended values.
- The gadgets are services properly and maintained in good condition.

**Electricity Bill:**

Consumer Name: Modi University of Science & Technology		Consumer No. 0591/0003						
Tariff Category: 2011 XA		AJMER VIDYUT VITRAN NIGAM LTD						
Meter No.: 688572		Contract Demand: 2500 KVA						
Description	Unit	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Average
Energy Consumption	KWH	141210	153630	171420	197010	152160	138900	159055
	KVAH	145830	156730	177270	202200	156120	143580	163622
Recorded Demand	KVA	363.6	412.2	508.8	479.1	502.8	375.6	440
Billed Demand	KVA	1883	1883	1883	1883	1883	1883	1883
Power Factor		0.968	0.979	0.967	0.974	0.974	0.967	0.972
PF Incentive / Penalty	Rs	-11247.4	-25332	-12895.07	-24409	-18852.6	-10448.8	-17197
Demand Charges	Rs	508275	508275	508275	508275	508275	508275	508275
Bill	Rs	2003608	2025830	2206363	2461034	2044885	1902969	2107448
Cost	Rs/KWH	14.19	13.19	12.87	12.49	13.44	13.70	13.25

**Observations & Suggestions:**

- The average cost of the power is around Rs 13.25/- per kWh, which is on the higher side due to very high billed demand. However, the actual demand as well as consumption is lower due lockdown restrictions. This is expected to be within the normal range, once the restrictions are lifted and activities are normalized.
- The actual demand is considerably lower than the billed demand, leading to very high demand charges. However, the actual demand may be lower due lockdown restrictions. This actual demand may be checked during normal operation and possibility of reducing the contract demand to bring down the bill demand near actual demand may be assessed. This will help in reducing the demand charges and optimize cost of power.
- The power factor was also observed to be on the lower side which may be improved to avoid penalty also get incentive. The values may be maintained above 0.995 to achieve maximum incentive and optimize power cost.

**Power Factor Improvement:**

The higher power factor entails substantial incentive and reduces maximum demand; while penalty is slapped if the power factor drops below 0.90. The amount is payable on the energy charges as per the details below.

Consumers under this schedule shall maintain an Average Power Factor of not less than 0.90 (90%). In case the Average Power Factor falls below 0.90 (90%), a surcharge @ 1% of Energy Charges for every 0.01 (1%) fall in average power factor below 0.90 (90%), shall be charged.

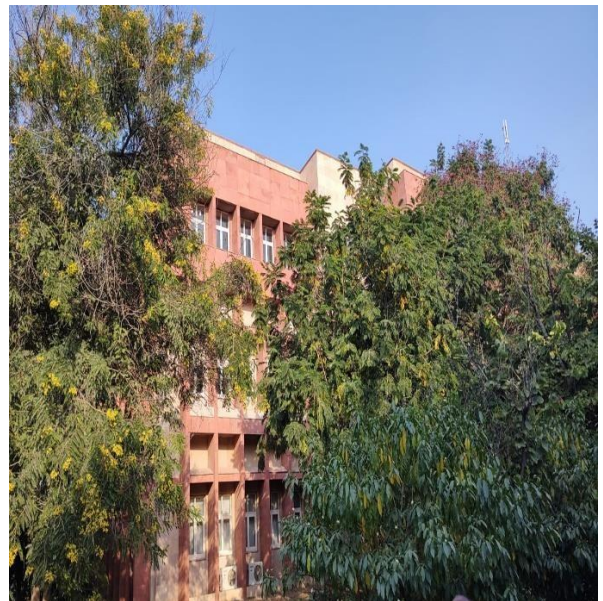
Also an incentive of 0.5% of Energy Charges shall be provided for each 0.01 (1%) improvement above 0.95 (95%) till 0.97 (97%). If the average power factor is above 0.97 (97%), an incentive of 1% of energy charges shall be provided for each 0.01 (1%) improvement above 0.97 (97%).

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## IV Environmental System

### Ventilation & Air Quality:

- The air ventilation is adequate.
- Several indoor & outdoor plants have been installed to improve air quality.
- It has been a general practice to switch off the fans & lights in an unoccupied area.



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# V Water Management

## **Consumption Pattern:**

The water supplied by the Tube well is used for drinking and other requirements.



## **Water Purifiers:**

The water purifiers are installed on each floor.



## **Water Distribution System:**

The distribution network and piping are more or less satisfactory and adequate.

## **Rainwater Harvesting:**

The rainwater is used for recharging of borewell water. This borewell water is used for cleaning, flushing and gardening purposes.

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## VI Waste Generation & Management

### Solid Waste:

- The organic is segregated in the college premises and disposed fed to the composting pit.
- The other solid waste is segregated, while hazardous waste is incinerated, the rest is disposed of appropriately.
- Each Floor is provided is with segregated dustbin for Recyclable waste and Non-Recyclable Waste
- The electronic gadgets with residual life are donated while the electronic waste is properly segregated and handed over to appropriate scrap collector.



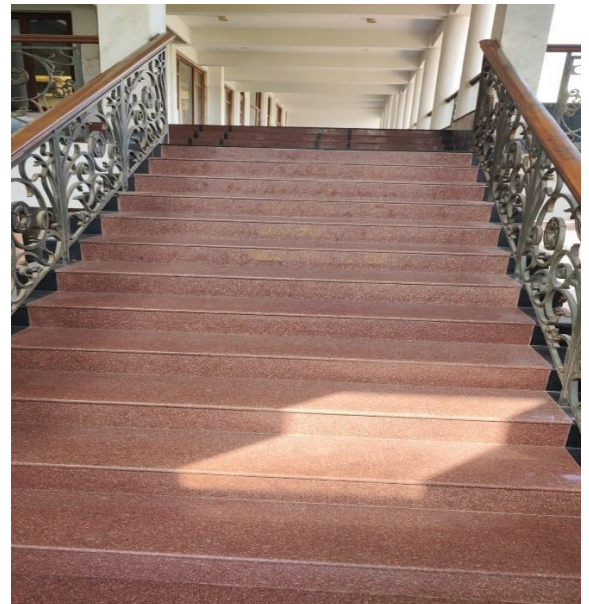
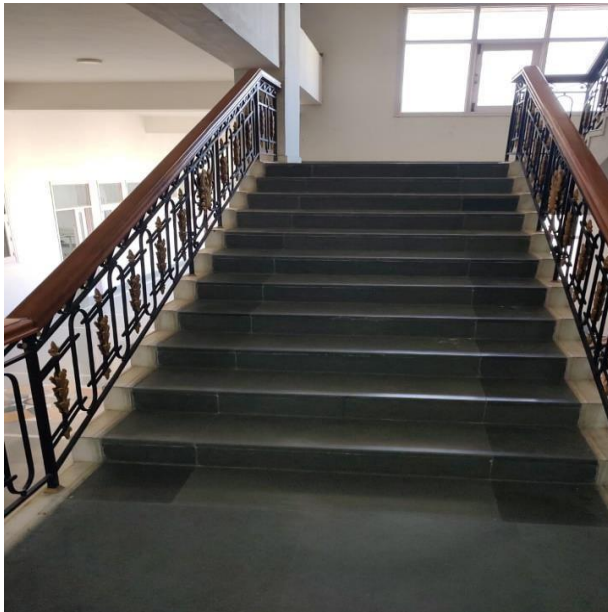
### Sewage & Wastewater:

- The sewage treatment plant is installed to treat the waste water.
- Treated water is used for gardening purposes only.

## VII Infrastructure & Safety

### Movement on-campus (Distributed / non-distributed leading to crowds)

- The premises are provided with multiple staircases with necessary entrances to ensure quick and effective movement in normal as well as emergency conditions.
- The movement of vehicle inside the campus is restricted with vehicles of Special Dignitaries and VIP Guests are allowed to enter the campus.
- There are pedestrian friendly pathways for in-campus movement
- There is restriction on the usage of plastic, which may be extended to completely ban plastic usage inside the campus.
- The bicycles are allowed for in campus movement as required.



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**Parking space:**

- There is adequate parking space for vehicles/four wheelers. However, almost all the students and many of the faculty members avail public transport system which is very convenient.

**Firefighting & fire escape system:**

- There are efficient fire extinguishers in the premises, which are checked / refilled as per the stipulated frequency.
- The premise is provided with multiple staircases with requisite entrances to ensure quick and effective movement in emergency conditions.
- Water sprinkler system is provided on 7<sup>th</sup> floor as per latest government guidelines.



**Draining system:**

- The drains from the washrooms and other areas are properly collected and disposed.

**Seepage in the building:**

- The premise was visually inspected for seepages. No seepages were observed in any of the places.

## VIII Green Culture

- The LED / LCD monitors & Laptops has been procured, which are energy efficient.
- These monitors are not only energy efficient but also generate minimal heat and cut down on air conditioning load.
- The electronic communication is encouraged to minimize usage of papers.
- Most of the papers are reused for doubled sided printing to further minimize usage of paper.

The following steps may be initiated to further enhance efficiency of the systems.

1. An efficient power management system may be incorporated to
  - a. Switch off the display if not in use.
  - b. Put the computer in Sleep mode / switching off the machines, if not used for prolonged period.
2. Optimize brightness of the screen.
3. Discourage use of screen savers, which has similar power consumption.

### **Paper-less communication:**

The major internal as well as external communication is through electronic medium.

### **Re-using one sided paper for printing:**

It was observed that two side printing / printing on the back side of used paper in more than 80% of the cases.

### **Rainwater Harvesting:**

The underground tank has been made to collect the rainwater. The rainwater is used for recharging of borewell water. This borewell water is used for cleaning, flushing and gardening purposes.

## IX Renewable Energy

### Solar Photovoltaic:

The college is planning to install Roof-top Solar Photovoltaic System for self-use; which may be expediated. The economics and payback period shall be attractive, considering higher power cost and good plant load factor. The possibility of going through ESCO or BOOT (build, own, operate, transfer) may also be considered.

### Solar Thermal:

The organization has installed rooftop solar water heater system on the terrace.



### Biogas Plant:

The organization has installed biogas plant for cooking as the quantity of plate waste is substantial.



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