Vrindavan Landscape & Ecological Solutions

UTTAR BHARATIYA SANGH'S

MAHENDRA PRATAP SHARADA PRASAD SINGH

COLLEGE OF COMMERCE AND SCIENCE

2022-23

ENERGY AUDIT 2022-23

Vrindavan Landscape &

Ecological Solutions

ENERGY AUDIT REPORT

2022-23

UTTAR BHARTIYA SANGH'S

MAHENDRA PRATAP SHARADA PRASAD SINGH

COLLEGE OF COMMERCE AND SCIENCE

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1. INTRODUCTION

Improving energy efficiency is the most cost-effective way to reduce energy-related emissions, improve economic competitiveness and increase energy security.

Energy audit

An assessment of the energy needs and efficiency of a building or buildings used to find the inefficiencies, done through an inspection survey and an analysis of the energy use, to identify improvements that need to be made to increase energy efficiency. This is often the first step in identifying opportunities to reduce energy expenses and carbon footprint.

College Energy Management System (CEMS)

Making a framework of practical procedures and processes (monitoring, control) for buildings or organisations to achieve best practices relating to energy efficiency, use and consumption, through the setting and delivery of energy targets. The energy management process starts with an energy audit to find opportunities to improve efficiency, then putting It into action with a number of strategies and then tracking the progress of the made changes. The CEMS is usually aligned with ISO 50001, providing a means of validating a best practice approach and recognising an organisation's commitment to energy performance management and improvement.

2. OBJECTIVES

The Energy Audit was defined to meet the following objectives:

- Conduct a simple Walk-Through audit or observation of the energy consumption of electrical appliances within the college building.
- Review and analyze energy usage history to create a baseline for which savings can be measured in the audited building.
- Determine what can be done to reduce energy consumption throughout the college buildings and what options are available for system improvements.
- Identify and evaluate measures that could improve the environmental performance of the buildings and provide recommendations.

3. INTERPRETATION OF COLLEGE ENERGY MANAGEMENT SYSTEM (CEMS)

1.Energy Conservation means steps taken to reduce and to use as much energy as necessary through changing energy consumption behavior, e.g. Switching off lights when not in use.

Energy Efficiency means using less energy to provide the same service/output, e.g. Replacing inefficient light bulbs with efficient ones.

Faulty means an equipment not working or made correctly; having defects.

Potential savings means the actual reduction in operating expenses from the improved energy efficiency generated by an energy conservation or efficiency activity.

Retrofitting means upgrading an existing system to improve energy efficiency.

Tariff means the amount of money charge by the supplier (utility) per kWh for the use of electrical energy.

Vampire Load means the way power is consumed by electronic and electrical appliances while they are switched off or in standby mode (consuming electricity at a cost but not doing any work).

4. DESCRIPTION OF BUILDING

College has huge campus and one sixth floor building plus terrace is located in Mumbai near teacher s colony.

College building architecture plan made in such way that the more day light (natural light) simply comes in corridor and class rooms.

The college building has Sith floor with two stare case and two lifts. Each floor has washrooms and wash basin. The college have water filter system at each floor.

The college class rooms are specious and natural source of lights with specious corridors.

5. ENERGY AUDIT: METHODOLOGY

Energy Audit is the key to a systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with its use, and serves to identify all the energy streams in a facility. It quantifies energy usage according to its discrete functions. College campus energy audit is an effective tool in defining and pursuing comprehensive energy management programmed. As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption".

6. FINDINGS

6.1.1 VAMPIRE LOADS FINDINGS:

- **Electronics appliances (computer, printer, etc.) are still ON even though they areturned off.**
- **Appliances on STANBY MODE are draining power even though they are not doing any use full task.**
- **Faulty light fittings which are left without bulb and faulty bulb which is intactare also vampire loads.**

6.1.2 . Lighting:

- **Lighting is the most common load which is used in all the rooms and outdoors. Here are some of the aspects and faults that were discovered:**
- **It has been observed there are a lot of unnecessary lights in one single room**
- **Too many lights are assigned to 1 switch.**

6.1.3 FAULTY LIGHTS:

- **Ballast of faulty light will draw power when the lights are ON even though it is not working.**

Many *lights are assigned to 1 switch*

Unnecessary lights

6.1.4 4.AIR CONDITIONERS:

- **Brand & model not consistent throughout the building which is expensive for maintenance.**

- **Officers leaving the door open when entering and exiting the room where the air conditioneris located.**
- **air conditioning contributes to about 62% of the overall power consumption of the buildings.**

6.1.5 5.OFFICE EQUIPMENT:

- **Most of the office equipment are usually left without turning them off after working hours and are using electricity as Vampire loads.**
- **- Electronics appliances (computer, printer, etc.) are still ON when connected to power point even though they are turned off.**

Electronics appliances (computer, printer, etc.) are still ON

7. SUMMARY OF RECOMMENDATIONS

Below are some recommendations based on general observations carried out throughout the college building.

The recommendations are categorized with **A** being the most urgent where immediate actions are needed to be executed (first or second week of receiving this report). **B** can be 1 to 2 months after receiving this report, while **C** will depend on the availability of funds.

Recommendations		
Category A	**Category B**	**Category C**
Apply energy conservation measures. Isolate or unplug vampire loads from power when not in use (i.e. re-chargeable equipment, computer and any other electronic devices with standby modes).	Establish Energy Efficiency and Conservation steering committee to take lead with EE&C initiatives and management within the college buildings.	Where applicable, replace all Double Frame light fittings (double tube) with single frame (single tube) throughout the building. Also remove unnecessary lights or reduce the number of lights per location.
Remove faulty light holders and bulbs or remove live wire from socket inside the light holder.	Renovate or improve the lighting control, i.e. add more switches to existing rooms/spaces where only one switch controls more than 10 lights, especially the lights in the conference/meeting room.	Replace all lights with energy efficient light bulbs, i.e. LED bulbs and tube.
Remove any faulty appliances located in the building.	Use fans in places where possible (especially in unsealed room, indoor corridor, conference room, etc.).	The conservation and efficiency mechanisms are tools for reducing the energy consumption.
solate or unplug faulty air conditioners if found within the building (working but no cold air coming out) and, OR service the air conditioner units quarterly.	Remove air conditioner if the room is very poorly sealed (i.e. if the room has no seals on the door and frequently open at times).	Replace old existing out-door air conditioner units with efficient ones (if funding is available).

8. ENERGY SAVING ACTION PLAN BY COLLEGE:

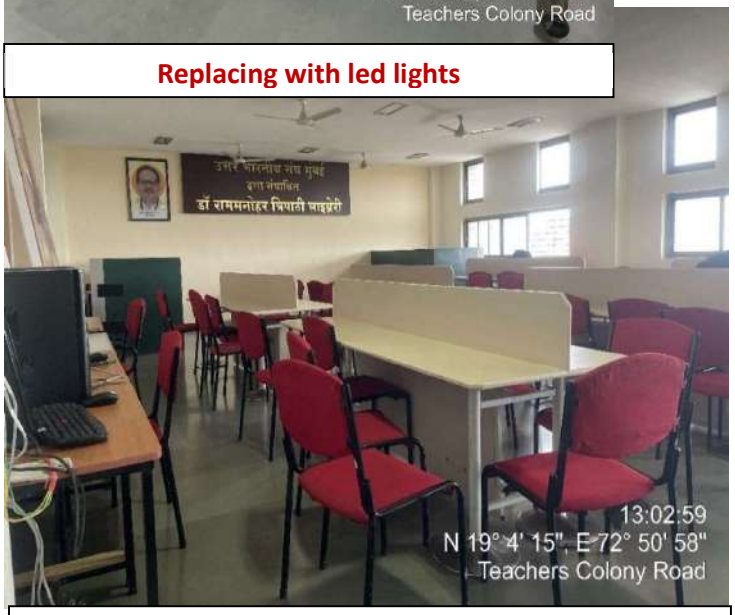
8.1.1 REDUCING VAMPIRE LOADS:

- **Turned OFF lights when not in used.**
- **Reduced the number of lights per switch, to better manage lighting.**
- **Reduced the number of lights per room.**

8.1.2 Lighting:

- **Disconnected the live wire connected to the faulty light bulb (s) to avoid leakage of energy.**

Replacing with led lights



Lights of when not in use

8.1.3 SOURCE OF NATURAL LIGHT:

College building architecture plan made in such way that the more day light (natural light) simply comes in corridor and class rooms.

Natural light is one of the key ways of saving energy. Daylighting minimizes the amount of artificial light and reduces electricity and HVAC (heating, ventilation, and air conditioning) costs. Electrical lighting produces a lot of heat, whereas natural lighting generates hardly any heat if it is properly controlled. Making use of natural light can save up to 75 percent of the energy used for lighting buildings and reduce cooling costs

A. Source of natural light

Source of natural light

8.1.4 AIR CONDITIONERS:

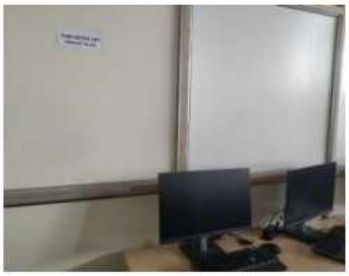
- **Using same brand throughout (cheap for maintenance cost)**
- **The air conditioners serviced quarterly.**
- **Using sealed glass windows and sealed glass doors.**
- **Always door closed when entering/exiting an air-conditioned room (putting a notice on the front and back of the door as a reminder).**
- **Keeping and maintaining the temperature at 23 ℃ during summer and occasionally used in winder.**
- **<u>Switch OFF when not in used.</u>**
- **Using electric fan whenever possible.**
- **Using outside breeze when possible, should the air conditioner be turned off completely to minimize the cost of electricity.**
- **Installation of correct sizing of air conditioner in the rooms.**
- **All installed air conditioners servicing twice or three times a year.**

8.1.5 OFFICE EQUIPMENT:

(Computers, printers and network accessories)

- **all office equipment such as printers, computers i.e. PC, monitor, etc. turned off on the power point.**
- **- Avoiding putting equipment on 'STANDBY MODE'**

(III) Unplugging electronic devices

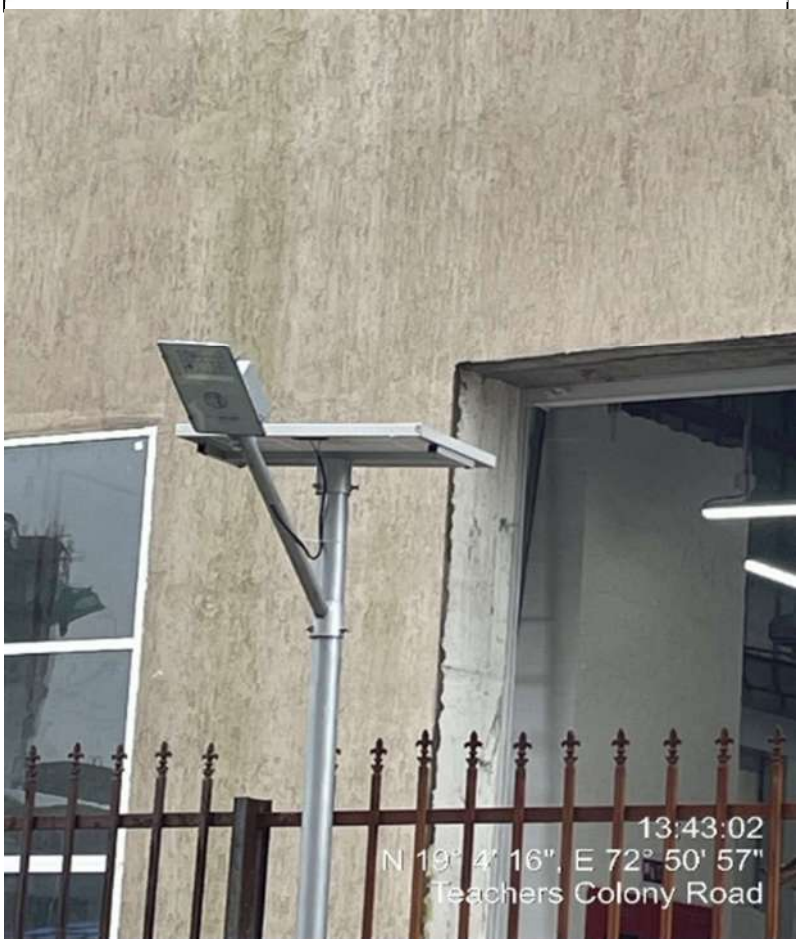


8.1.6 SOLAR LIGHTS:

Solar lights are a clean and green energy source that do not produce any harmful emissions or pollutants. This makes them an environmentally friendly option that can help reduce carbon emissions and improve air quality.

College Utilizing solar LED lighting systems for a street, parking and pathways. This will reduce cost and the impact on the environment.

Solar street light



8.1.7 RAIN WATER HARVESTING PROJECT:

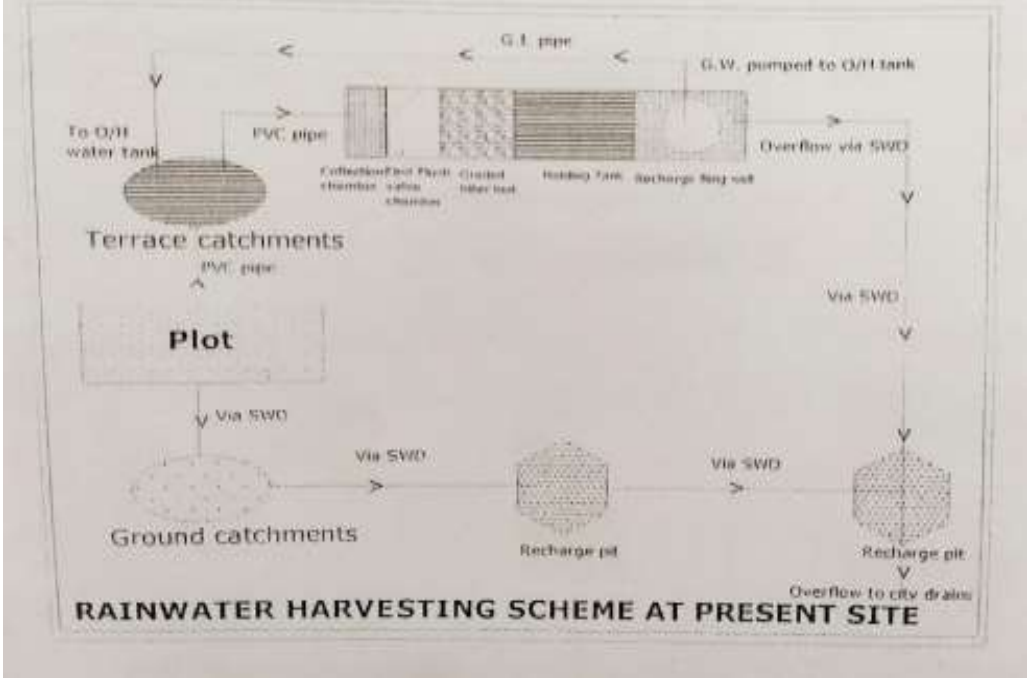
Water scarcity is one of the growing concerns of the present times, the only solution for which is water conservation. Water conservation is implemented on different levels in the college from rain water harvesting, tree plantation to maintain the underground water levels to recycling the water for gardening purposes and many more. Rainwater harvesting is a conservation process used for many drives and for the future needs.

The college has set-up the rain harvesting unit in different niches within the college campus. The rainwater that flows off in the college areas are collected and stored to recharge the groundwater level. Harvested rain water is filtered through several layers of mesh or strainer fixed across the inlet to the storage system and is cleaned on a regular basis. The rain water set-up units satiate the requirements of water for the entire college.

	
Water Management System on campus	**Water Management System on campus**

Rain Water Harvesting Units

Rain Water harvesting Plan



Rain Water harvesting Certificate

DR. AMAR JOSHI. M.Sc. Ph.D.(IIT Bombay)
GEOLOGIST
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204, BOOPKALA, WEST AVENUE, SANTACRUZ (W), MUMBAI 400054
HYDROGEOLOGY * ENGINEERING GEOLOGY * ENVIRONMENTAL GEOLOGY *RAINWATER HARVESTING
E mail: amarjoshi@iitbombay.org, amarjoshi@geologist.com, rainrecharge@gmail.com

Date- 04/05/2019

TO WHOM SO EVER IT MAY CONCERN

Name & Addresses of Owner : Uttar Bharatiya Sangh, plot no.629/1243,Near Teachers Colony-F Block,Bkc,Bandra-East, Mumbai-400 051.

Name & Addresses of Licensed surveyor Architect : Ar.Parijat Misra
305,'A'Wing,Sangam Building,
Sv.Road,Santacruz(W).
Mumbai-400 054.

This is to Certify that the Rain Water Harvesting Tank is Constructed as per the design and drawing issued by me.

The work at site is executed Satisfactorily. The Rain Water Harvesting Tank meets the specified standards as per the Govt Notification in vogue.

Yours Faithfully

DR. AMAR N. JOSHI

DR. AMAR JOSHI

9. HISTORICAL DATA ANALYSIS

A. Energy Balance

Table shows the electricity consumption of college building for 1-year period. Raw data was not provided accordingly, hence an average estimated power consumption was calculated

Table Electricity bill (JANUARY 2022 – DECEMBER 2023)

Month	Power Consumption(kWh)/Month	Total Electricity Cost (Rs)
January	190 kWh	11180 Rs
February	256 kWh	15560 Rs
March	325 kWh	29420 Rs
April	251 kWh	27350 Rs
May	254 kWh	33720 Rs
June	339 kWh	21180 Rs
Jully	369 kWh	58010 Rs
August	288 kWh	36950 Rs
September	283 kWh	42190 Rs
October	318 kWh	38530 Rs
November	339 kWh	36170 Rs
December	385 kWh	40880 Rs
Total	**3597 kWh**	**391140 /Rs**

From Table 2, the average cost of the monthly consumption is calculated to be: **32500 Rs**

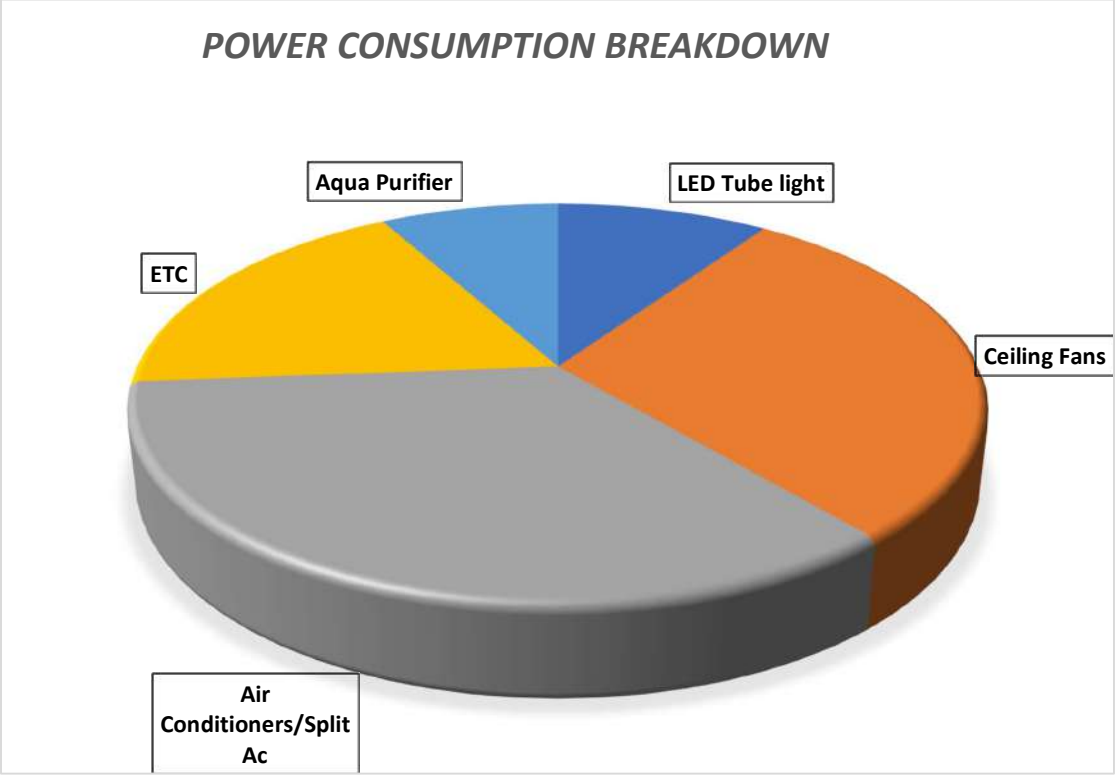
Thus, the cost of the yearly consumption is **391140 Rs**

10. INVENTORY DETAILS OF LIGHT UNITS

Sr. No	Gadgets	Total No	Watt
1	LED Tube light	178	20
2	Ceiling Fans	145	75Avg
3	Air Conditioners/Split Ac	07	1000Avg
4	Desktops	57	NA
5	Laptops	00	NA
6	Printers	04	NA
7	CCTV Cameras	70	NA
8	Aqua Purifier	04	750 Avg
9	Xerox Machine	03	NA

Details of AC			
Location	**Type**	**Capacity**	**No**
College Office Room	Split Ac	1Ton	01
Principal Cabin	Split Ac	1Ton	01
Management Office	Split Ac	1Ton	01
Computer Lab	Split Ac	2Ton	05

11. POWER CONSUMPTION DETAILS BREAKDOWN

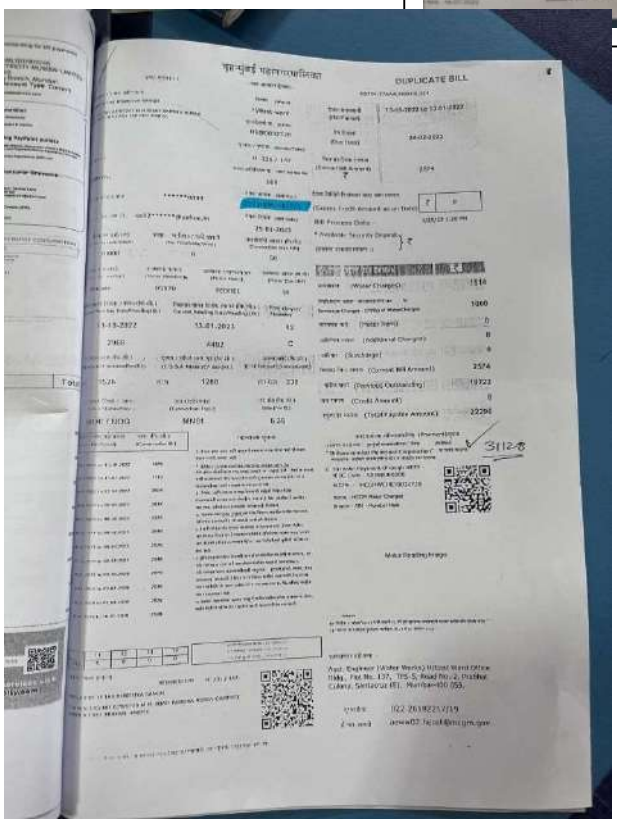


Analysis of the chart

- Air conditioning is responsible for high significant proportion of the total energy consumption followed by Fans.
- There is variation among the appliance due to their arrangement within the building, the hours in which they operate and the rate at which they consume electricity.
- There is variation among the appliance due to their arrangement within the building, the hours in whthey operate and the rate at which they consume electricity.

12. POWER CONSUMPTION DATA

Power consumption data for the campus building (2022/2023)



13. WATER MANAGEMENT:

To minimize cost of electricity on water system college implemented following action

- *Selecting the most efficient pump.*
- *Right-size the pump*
- *Maintain pumping systems effectively*
- *Use higher efficiency/proper pump seals*
- *Eliminate unnecessary uses*

most efficient pump

14. PHOTO PLATES:(Energy Management System)

Use of natural source of light

Water Conservation Awareness

(v) Changing user behavior





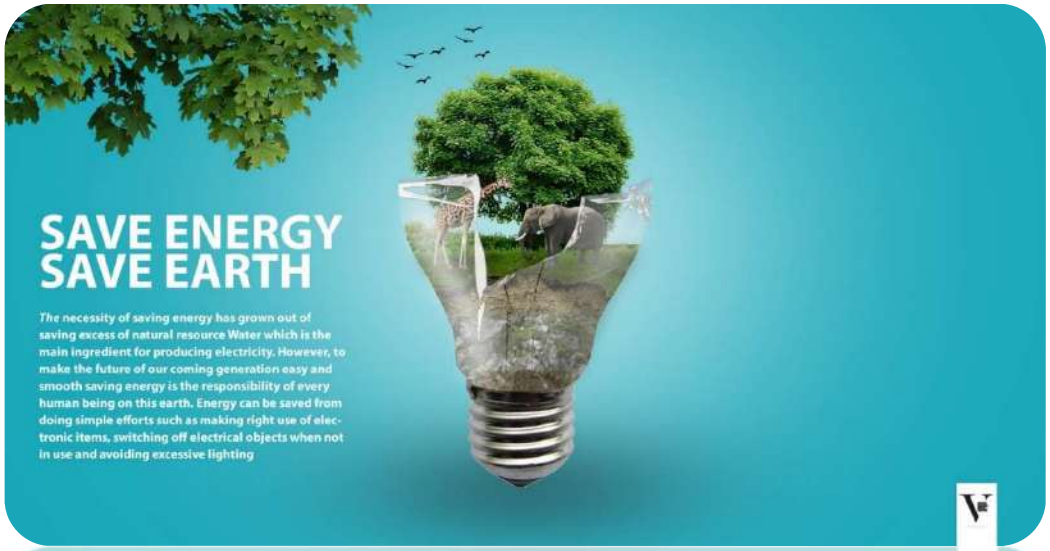


(1) Submercible water pump

7.1.2 (3.2) – Water storage Tank

Turning water tap off

Zero water leakage mission



Vrindavan Landscape & Ecological solutions.

भारत सरकार
Government of India
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
Ministry of Micro, Small and Medium Enterprises
UDYAM-MH-19-0065047