

**ENERGY, ENVIRONMENT & GREEN AUDIT**

**REPORT**

**PART-C: GREEN AUDIT  
REPORT**

**WATER UTILIZATION,  
CONSERVATION &  
WATER MANAGEMENT**





1.3: Source of Water, Storage and Distribution:

Table-11 shows the source of water, location of storage along with their application.

**Table-11: Source of Water, Location of Storage and Application**

Type of Water	Source	Application
Bore Water (Interconnected)	• Bore-1; East Side -260ft	• Input to the RO plant
	• Bore-2; A-Block Back-160ft	• Cooking Utensil Cleaning,
	• Bore-3; B-Block Front-200ft	• Bathing & Cloth Washing
Rain Water (8Nos) + One Pond	<ul style="list-style-type: none"> <li>• Collected from i) buildings run off and ii) road run-offs</li> <li>• Each building has one RWH</li> </ul>	• Used to increase the ground water level
		• Small pond is also available to Collect the rain water
Treated Water using RO Plant (2 Nos) from Bore and Well Water		• RO Water: Drinking and Cooking
		• Grey Water: Gardening & Toilet Cleaning (Good Imitative)
• Raw water tank capacity and Location	• Hostel-10,000L (Cement)	• 20,000Litres
	• Hostel-10,000L (HPDE)	
	• A-Block -10,000L (Cement)	• 10,000Litres
	• B-Block-10,000L (Cement)	• 10,000Litres



- All are tanks are cleaned monthly once (Good practice).
- Water filling is now in manual operation.

### 1.3: Treated Water for Drinking Application:

- The college management is keen on providing uninterrupted, safe and healthy drinking water to all; throughout the year.
- The over head tanks storing the drinking water are cleaned at regular interval sand the water management team has been maintaining a cleaning schedule
- The specifications of RO Plant and distribution of potable water to the entire campus is given inTable-12.

**Table-12: Specifications of RO Plant and Potable Water Distribution System**

S. No.	Parameters	Description
1.	Total no. of RO Plant	• 02 No's (Total 1,000L PH)
2.	Source of raw water	• Bore Water
3.	% of RO & grey water out put	• 60 % RO water: 40% grey water
4.	Usage of grey water	• Used for Toilet Cleaning (Good Initiative)
5.	Cleaning schedule of filter	• Once in three months (Replaced every year)
6.	Cleaning schedule of membrane	• Yearly twice
7.	Functioning of RO Plant	• Manual operation
8.	Quality of RO water	• Internally tested (50 TDS)
9.	RO water storage	• Stored in the HPDE tank sand distributed
10.	RO water tank capacity & location	• A Block – 1000 Litre & Hostel – 1000 Liter

### 1.3: Water Savings in Foreign Toilets:

The list of availability of Indian & Foreign style toilets are presented in the below Table-13.

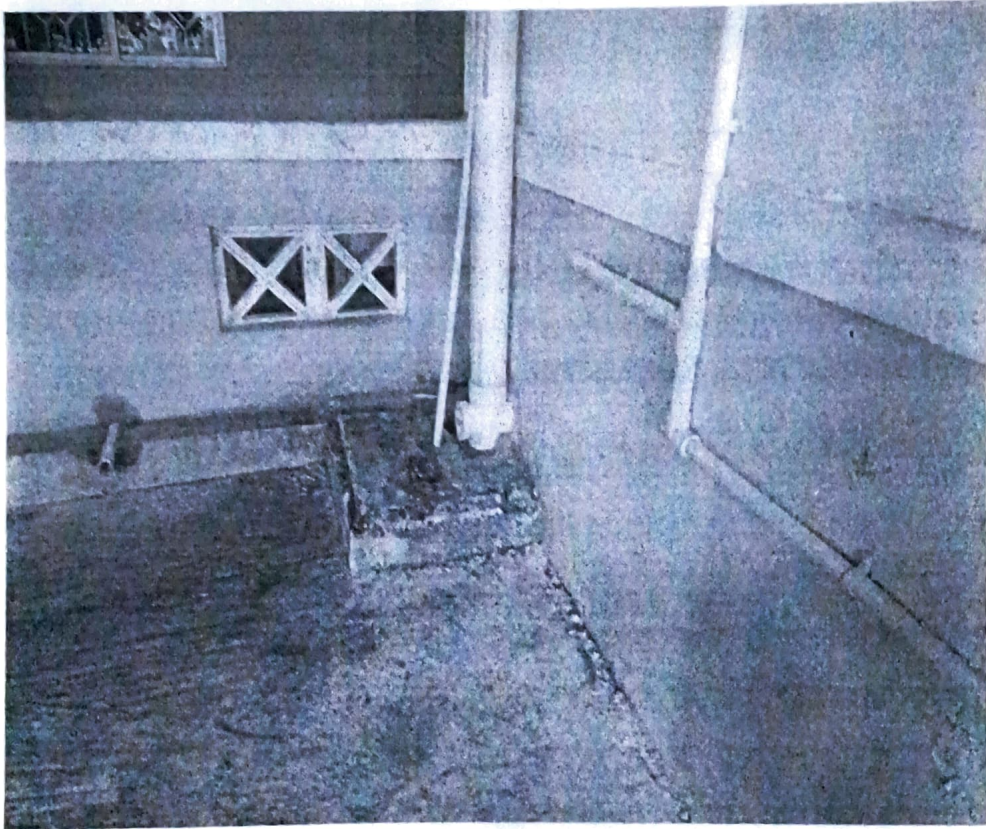
**Table-13: List of Indian & Foreign Style Toilets**

S. No.	Location	No. of Toilets	
		Indian	Western
1.	A Block	10	1
2.	B Block	10	1
6.	Auditorium Back Side	5	1
<b>Total =</b>		<b>725</b>	<b>03</b>

- In general the flush tank capacity may be 8 to 10 Liters (depends on make and model). Water savings also leads to power saving it saves the operating duration of the water pumps directly.

**1.3 : Rain Water Harvesting (RWH) – from Building Roof Area & Run-off Area:**

- The audit team appreciates the effects taken by the management of Sri Raaja Raajan College of Engineering & Technology for harvesting the rain water almost in all buildings.
- The roof area is so arranged to collect the rainwater and then passed through proper piping system, and then bring back to the RWH pits which are located close to each pits
- The building run off are collected through each pits mostly located in each buildings. Common area and road run-off are properly collected and routed to nearby water body.



**Fig.4: Rain Water Harvesting (RWH) system & Water Body implemented in the College-**



**ENERGY, ENVIRONMENT & GREEN AUDIT  
REPORT**

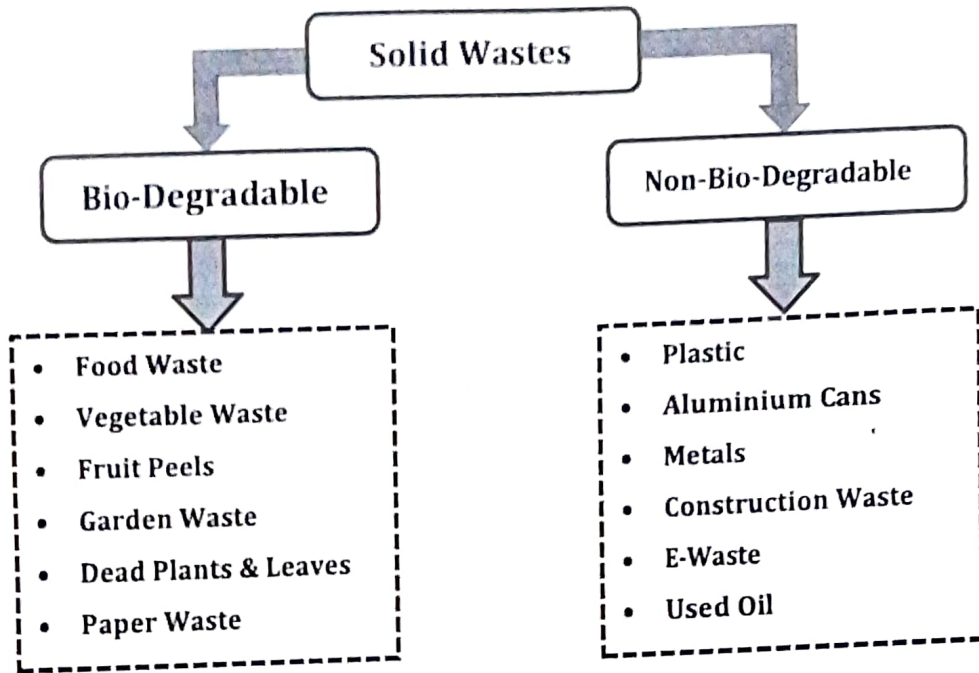
**PART-C: GREEN AUDIT  
REPORT**

**2. WASTE HANDLING & MANAGEMENT**



1.3: Solid Waste Management System:

Different types of wastes generated inside the college premises are represented in the block diagram given below.



1.3: Process of Solid Waste Management:

The college management practiced some methods to treat the waste generated and Table-14 shows the process of treating the solid waste generated inside the college campus.

**Table-14: Process of Waste Management**

S. No.	Waste Type	Waste Treatment
<b>Bio-Degradable Waste Management</b>		
1.	Food and Vegetable Waste	Collected and dumped in a yard (used as manure)
2.	Garden Wastes and Plant Leaves	Daily collected and dumped in a yard



3.	Paper Waste	Collected and stored in a separate place
		Sold to third party for recycling
4.	Napkin Pads	Collected, dumped in a yard; set fire and destroyed
<b>Non-Bio- Degradable Waste Management</b>		
5.	Plastics	Banned in the college campus (Welcome step).The chemical / salt storage plastic containers are disposed to third party.
6.	Metals	Construction metals or metals from any other sources are stored in a separate place.
		Used for sale to third party for recycling
7.	Transport Oil + Tyres	Stored in a separate place and used for sale to third Party.
8.	Transport Vehicle and Computer Batteries	Procuring new batteries with buyback offer (old battery replacement)
9.	Used edible oil	Almost zero waste. Mostly used for internal cooking And frying.
10.	E- Waste Management	Used for sale to third party for recycling





**Fig. 5: Solid Waste Management (Collection, Segregation, Storage & Safe Disposal)**



*[Handwritten Signature]*

**PRINCIPAL**

Sri Raja Ragan College of Engg. & Tech.  
 Amaravathipuram, Kankkudi - 630 301  
 Sivagangai Dist. Tamil Nadu





# **ENERGY, ENVIRONMENT & GREEN AUDIT REPORT**

## **PART-C: GREEN AUDIT REPORT**

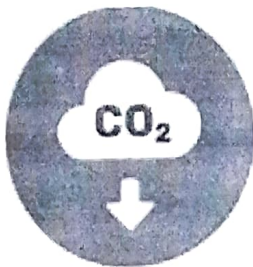
### **2. ASSESSMENT ON MATURE TREES & BIO-DIVERSITY**





### 2.1: Campus Greenery:

The college is completely covered with mature trees grown for more than 10 years. The total number of mature trees available in the college campus is 510 with 42 varieties of trees. Apart from the mature trees; preserving the ecology; the entire college campus is planted with various flowering shrubs and bushes.

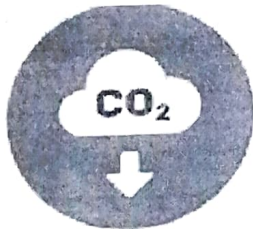


Total No. of Mature Trees available in the college campus is 510 which contributes for reduction of 20.4 Tons of CO<sub>2</sub> emission/ Annum

#### Energy calculation

2–Calorific value of biogas is about 4,780kcal/m<sup>3</sup> (i.e., 20 MJ/m<sup>3</sup>)

3–Calorific value of LPG is 12,500 kcal/kg



Annual savings of LPG is around 2,325kg which reduces 7.5 Tons of CO<sub>2</sub> Emission / Annum.



## 2.2: Recommendations for Indoor Plants as Natural Air Purifier:

- Indoor plants not only do plants look good while bringing life to our living space, they also help purify the air, according to a NASA study that explains that even a small plant inside the work space can help remove at least three household toxins (think benzene, formaldehyde, and trichloroethylene, which are carcinogenic chemicals commonly found in stagnant indoor environments).

## 2.1 : Bio – Diversity in the Campus:

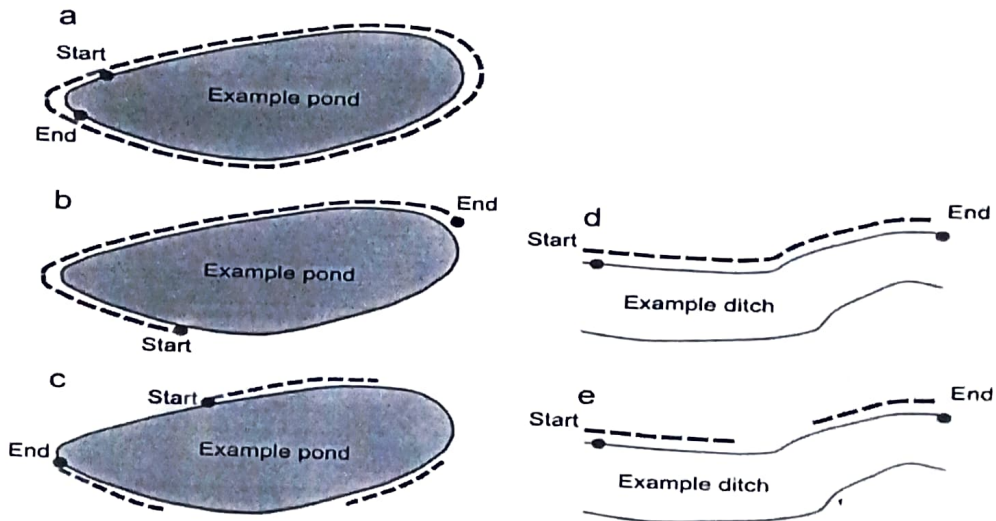
- Biodiversity is all the different kinds of life you'll find in one area — the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world.
- Each of these species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life.
- Biodiversity supports everything in nature that we need to survive: food, clean water and shelter.
- Sri Raaja Raajan College of Engineering & Technology campus is blessed with more varieties of resident birds (species always living inside the campus) and amphibians (Amphibians are small vertebrates that need water, or a moist environment, to survive).

## 2.2 : Recommendations to maintain Bio-Diversity:

- **Bird Sighting and Survey:** Conduct a dedicated bird sighting and identify the list of birds both residing birds and migratory birds available in the college campus
- Prepare the list of birds with their local name, scientific name, their average life time, nesting facility created by the bird and photo of the bird. Show case the result to all the stake holder and inculcate a habit of friendly environment
- Discuss with the ornithologists and facilitate the environment with more birds coming to the campus and especially migratory birds.



- **Reptile & Amphibian survey:** Similar to bird survey; conduct a survey to list the amphibians available in the campus
- Amphibian and reptile surveys are often performed as part of the Green Audit process or terrestrial survey. These surveys are effective at detecting the presence of even the most elusive species.
- Since Sri Raaja Raajan College of Engineering & Technology campus has an excellent pond; it is highly recommend conducting the frog and toad survey around the pond and identifying the species.



**Fig.7: Diagram illustrating approaches to conduct the survey at a water body**



*[Handwritten Signature]*  
**PRINCIPAL**

Sri Raaja Raajan College of Engg. & Tech.,  
 Amaravathipudur, Kanyakudi - 630 001  
 Sivagangai Dist, Tamil Nadu



### 3. AUDIT SUMMARY & CONCLUSION





### SUMMARY OF THE AUDIT PROCESS:

In order to make the Sri Raaja Raajan College of Engineering & Technology campus 100 % energy efficient; Environmental sustainability and lush Greenery; the audit team recommends implementing the following measures:

#### I. Energy Conservation & Management – Electrical Energy:

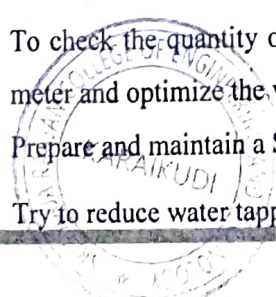
- In a phased manner, ceiling fans must be changed from conventional fans into BLDC fans. Also change FTL into LED with adequate illumination levels
- Implement Energy Management System (EMS) to accurately measure & monitor energy flow
- Prepare a policy plan to convert the distributed UPS layout into centralized UPS and save energy. This step also saves the maintenance time due to reduction in number of batteries
- Implement automatic street light controller to turn on and off based on different time in a day. Use astrological timer for better results and energy savings
- Diesel flow meter must be fitted with each DG and calculate the UPL accurately
- Prepare suitable formats for all energy consumption and regularly follow the records. At regular intervals conduct internal audits to assess the effectiveness of the practice. Make proper corrections; if it deviates from the standard operating procedure
- Regularly conduct i) Illumination study, ii) Thermal comfort study, iii) Flue gas study on DG, and Boiler, iv) Water quality assessment (for all types of water utilized) and v) Indoor and ambient air quality study

#### II. Energy Conservation & Management – Thermal Energy:

- Regularly clean the stove burners and ensure that the flame should be in light bluish color

#### III. Water Conservation & Management:

- Construct a suitable capacity of Sewage Treatment Plant (STP) for proper liquid waste management
- To check the quantity of water utilized by each buildings by connecting digital water flow meter and optimize the water usage
- Prepare and maintain a Single Line Diagram (SLD) for water distribution network
- Try to reduce water tapped from the ground water source since it is not environmental friendly



- Paste water and energy saving slogans at appropriate places
- Generate your own power and water for regular activities and move towards Net Zero Energy and Net Zero Water Building
- Retrofit aerator based water taps for good water savings. For hand washing applications, all the pipes must be fitted with aerators
- Captures almost 100 % rain water harvesting through i) Recharging pits and ii) Open well type storage pits
- Properly follow scientific method of handling chemicals/Acids/Salt sand safe disposal through 3<sup>rd</sup> party
- Water treatment log (for RO plant) must be maintained indicating the water inlet, treated and outlet water quantity
- Install sensor based water controller in each Over Head Tanks and reduce the water waste and power required to operate the pump
- Energy required to process the water treatment must be calculated
- Overall cost of treated water by accounting i) consumables, ii) manpower iii) energy and iv) other conventional expenses
- Use the treated water at the maximum in whatever possible areas and try to minimize the fresh water intake (from any source)
- Set a policy and fix a target for usage of treated water; ensure that the plan is being executed without any deviation. Increase the % of usage of treated water year by year
- With the advent of smart technologies, it is possible to have centralized monitoring in real-time using Internet of Things (IoT), Geographic Information System (GIS) software, etc. as per **Jal Jeevan Mission**, Department of Drinking Water & Sanitation **Ministry of Jal Shakti**
- Awareness campus must be conducted to all the stakeholders at regular interval. Through this initiative; Painting, Photography, Slogan and Poster making contest are conducted to create consciousness among the students and faculties



#### **IV. Waste Management:**

- Cotton, Syringe, Needles are to be kept separately as these are treated as Bio-Medical wastes
- **Dust bins** must be placed to collect these bio-medical wastes
- After COVID; mask, sanitizer bottles, gloves and other medical items must be trashed only through the yellow bins
- This must be informed to all the students and stakeholders. Suitable steps have to be taken to disseminate this information
- All the solid wastes are to be properly stored in a separate place and should be maintained as a record mentioning its quantity
- Food waste must be weighted and marked in a record before keeping into the digester unit. This must be checked with the amount of gas generated using suitable calculation and check with the designed output
- Any waste items given to trust office or to the 3<sup>rd</sup> party must have a record of the respective department
- **Reduction of Paper:** Work out a policy to move towards paperless office. Present system of paper usage may be reviewed and wherever possible; digitalize the activities and reduce the paper
- Use bar code scanning to identify the location, row and seat number of candidates during examination and avoid paper information pasted in the notice board
- Publish the internal marks, model examination marks through student ERP.
- Make attendance report, feedback, payments, salary slip in digital platform and if necessary take prints (only office copy)
- Adopt College Management System (CMS) and try to automate
- Automation saves energy, saves man power, saves paper, leads to better transparency, efficient manpower utilization and thus saves cost

#### **V. Impart Training to Faculty and Technical Staffs:**

- ❖ **Energy Conservation and Management**
- ❖ **Environmental impact and assessment**
- ❖ **Fire and Safety (Operation and Handling)**

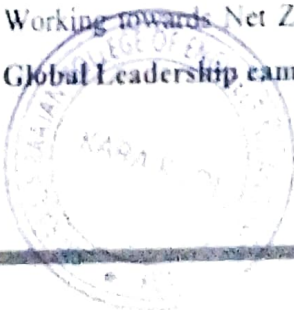




- ❖ **Electrical maintenance, AC, Battery Maintenance & Safety**
- ❖ **Emergency Preparedness**
- ❖ **E- Waste, Chemicals Handling & Solid Waste Management**
- ❖ **Training for Transport employees)**
- ❖ **Training for Faculty and Student son Vehicle Operation**
- ❖ **Training for Kitchen Employees**
- ❖ **General Medical Camps for Employees**
- ❖ **Training on Stress Management and Yoga**

**VI. Way Forward towards Energy & Environmental Sustainability:**

- Prepare an exclusive **Energy and Environment Policy** based on the energy and environment practices followed in the campus. This must reflect the i) Present energy consumption & generation, ii) Projection of energy need, iii) Commitment by the college to conserve energy ( in terms of percentage ), iv) Roadmap to achieve the commitment, v) Facilities needed to achieve the same, vi) Roles and responsibilities of all stakeholders, vii) Interim and final review mechanism, viii) Corrective measures, if the results deviates from the committed value and ix) Benchmarking, Case study preparation, Knowledge sharing and rewards
- Implement ENCON sand best operating practices proposed in the audit report and measure the results
- Adopt effective Waste Management Policy and reduce the food print of waste generation (Net zero waste campus)
- Practice appropriate ISO standards for System Management. The audit team highly recommend to follow
  - i) **ISO-9001 (Quality Management System), ISO-14001 (Environmental Management System) and ISO- 50001 (Energy Management System)**
- Working towards Net Zero Energy and Net Zero Water Campus and achieve **Gold rated Global Leadership campus(as per IGBC rating) and/or 4-star rated campus**



# COMPLETION OF THE REPORT

This report is prepared as a part of the Energy, Environment and Green Audit process conducted at Sri Raaja Raajan College of Engineering & Technology, Kaikurichi, Pudukkottai, Tamil Nadu, India by YoJo Network and Training Center, Kumbakonam 612 001, Thanjavur Dt, Tamilnadu.



PRINCIPAL

Sri Raaja Raajan College of Engg. & Tech.  
Amaravathipuram, Kaikudi - 630 301  
Sivagangai Dist. Tamil Nadu

LEAD AUDITOR  
YOJO NETWORK  
MAT STREET  
KUMBAKONAM-612 001  
THANJAVUR DIST.

Dr. A. ARUMUGAM  
PROFESSOR &  
DEPARTMENT OF BOTANY  
ALAGAPPA UNIVERSITY  
KARAIKUDI - 630 003, TAMIL NADU, INDIA

