



# **PRATHYUSHA ENGINEERING COLLEGE**

## **CRITERIA-7**

### **7.1 Institutional Values and Social Responsibilities**

- 7.1.6 Quality audits on environment and energy regularly undertaken by the Institution.**

**EXTERNAL REPORT ON QUALITY AUDIT**

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

## **Details of the Client**

**PRATHYUSHA ENGINEERING COLLEGE**

**Aranvoyaluppam, Thiruvallur, Tamil Nadu 602 025.**



**ESTD. 2001**

## **DATE OF AUDIT**

**22 – 23 SEPTEMBER 2020**

**(Audited and Accounted for Academic Year 2019 – 2020)**

## **AUDIT CONDUCTED AND SUBMITTED BY**

**P S QUALITY CERTIFICATION PVT LTD**

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**SYNOPSIS OF  
ENERGY, ENVIRONMENT &  
GREEN AUDIT REPORT**

**1. ACKNOWLEDGEMENT**

**Energy Earns or Simply Burns: Choice is yours....**

## **ACKNOWLEDGEMENT**

**P S QUALITY CERTIFICATION PVT LTD**, No. 415, F4, 1<sup>st</sup> Floor, Asha Vignesh Apartment, Ambattur, Tamil Nadu 600 053 is thankful to the Management, Principal, Faculty and Technical team members of **PRATHYUSHA ENGINEERING COLLEGE**, Aranvoyaluppam, Thiruvallur, Tamil Nadu 602 025 for providing an opportunity to conduct a detailed Energy, Environment and Green Audit process for the college promises.

It is our great pleasure which must be recorded here that the management of **PRATHYUSHA ENGINEERING COLLEGE** extended all possible support and assistance resulting in expeditious completion of the audit process. The audit team appreciates the cooperation and guidance extended during course of site visit and measurements. We are also thankful to the all those who gave us the necessary inputs and information to carry out this very vital exercise of green audit.

Finally, we offer our sincere thanks to all the members in the engineering division/ technical/non-technical and office members who were directly and indirectly involved with us during collection of data and conducting field measurements

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**SYNOPSIS OF  
ENERGY, ENVIRONMENT &  
GREEN AUDIT REPORT**

**2. INTRODUCTION TO  
ENERGY-ENVIRONMENT-GREEN AUDIT**

**A Thing which Burns Never Returns....**

### **2.1: Preface about Prathyusha Engineering College (PEC):**

- **PRATHYUSHA ENGINEERING COLLEGE**, Chennai popularly known as **PEC** is the brain child of the well-known industrialist and philanthropist **Shri. P. Raja Rao, the founder Chairman** of the Governing Board of the college. It is also one of the very successful dream projects of the Chairman.
- PEC is a self-financed Telugu minority non profitable, **NACC "A" Grade and NBA Accredited** Institution, approved by **AICTE, affiliated to Anna University** and managed by the Prathyusha Educational Trust. It has grown over the years with an alumni strength of above 10000 and enjoys an amazing reputation not only in Tamil Nadu but all over the country. In a span of 20 years, PEC has achieved many milestones and has carved a niche for itself amongst the reputed technical institutions in the State and the Country as well.
- **PEC is located on the Poonamallee - Thiruvallur High Road** at an hamlet called Aranvoyal in spacious serene and invigorating surroundings far from the maddening crowd and the hustle and bustle of the urban local. The lush green campus provides an ideal and congenial atmosphere to pursue education without any external distraction like noise, sound and air pollution. PEC's well planned and aesthetically designed eco-friendly campus is spread over
- **36.33 Acres of land** and has more than **4,95,695 Sq.ft. of built-in area**. The campus has ultra-modern but environment-friendly facilities and landscaped garden. Inspired by the vision of the **Chairman Shri. P. Raja Rao**, the College organizes various environmental Education and Awareness activities throughout the year.

### **2.2: Vision Statement:**

→ To emerge as a premier technical and engineering institution in the country by imparting Quality Education and thus facilitate our students to blossom into dynamic professional so that they play a vital role for the progress of the nation and for a peaceful co-existence of our fellow human being.

### **2.3: Mission Statement:**

**Prathyusha Engineering College** will strive to emerge as a premier Institution in the country by;

- Providing state-of-the-art infrastructure facilities
- Imparting quality education and training through qualified, experienced and committed members of the faculty
- Empowering the youth by providing professional leadership
- Developing centres of Excellence in frontier areas of Engineering & Technology
- Networking with Industry, Corporate and Research Organizations
- Promoting Institute-Industry partnership for the peace and prosperity of the nation

#### **2.4: Major Activities in the Institution:**



#### **2.5: Foreword about Energy-Environment-Green Audit Activity:**

- Energy audit is an inspection survey and is a major tool for analysing the energy flows in a process or system. The primary objective of the energy audit is to reduce the amount of energy utilization of a system without negatively affecting the productivity or comfort. Environment and Green audit is essentially a management tool for measuring the effects and impacts of activities undertaken in the college campus on environment more particularly atmospheric air, Soil and Water.
- Environment audit primarily analyse the utilization of all types of energy, assessment of environmental condition, estimation of annual CO<sub>2</sub> emission from all the defined activities and mapping with campus greenery system.
- Also it keeps the college accountable by examining their practices and determining what measures need to be implemented in order to maintain the sustainability.

#### **2.6: Scope of the Audit:**

- Conduct a detailed energy audit in the college campus with a main focus to identify judicious usage of electrical and thermal energy (where, when, why and how energy is being utilized).
- To ascertain the best practices to be followed in energy conservation, energy management, recommended safety measures and continuous energy monitoring system.
- Identification of history of activities, present environmental practices followed, monitoring records and known sources of environmental issues inside the college.
- Adoption of natural resources as input (such as energy and water), processing and utilization and generation of wastes (including hazardous and toxic),



- Handling and storage of all types of wastes (Solid, liquid and grousers), transportation of waste from source to yard, reuse and recycling possibilities, storage mechanism and effective disposal.
- Measurement of effectives of pollution control (air, water and soil pollution), maintenance logs, emission test reports and routine analytical reports.
- Providing constant awareness to all stakeholders on Environment impacts, risk analysis and Ecology.

**2.7: Standards Used:**

- BEE – Bureau of Energy Efficiency – Guidelines to conduct the Energy Audit.
- The Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard (Revised Edition) released by World Resources Institute & World Business Council for Sustainable Development – 2014.

**2.8: Date of Audit:**



**SYNOPSIS OF  
ENERGY, ENVIRONMENT &  
GREEN AUDIT REPORT**

**3. EXECUTIVE SUMMARY**

**Leaks Make your Future Bleak.....**

## EXECUTIVE SUMMARY

### Electrical and Thermal Energy Analysis:

A detailed audit was conducted in **PRATHYUSHA ENGINEERING COLLEGE**, Aranvoyaluppam, Thiruvallur, Tamil Nadu 602 025; the audit team has come out with **13 Energy Conservation Proposals (ENCONs)** and the summary of all the ENCONs & Environment CO<sub>2</sub> Mapping are given below:

S. No.	Description	Parameters		
		Present	After	Savings
1.	Annual Energy Consumption	4,04,520 kWh + 19,720 kg of LPG +120 Tons of Wood + 36 Tons of Pellets	3,16,524 kWh + 17,905 kg of LPG +120 Tons of Wood + 25.1 Tons of Pellets	87,996 kWh + 1,815 kg of LPG + 10.9 Tons of Pellets
2.	Annual Energy Cost	63.81 Lakhs	50.36 Lakhs	<b>13.45 Lakhs</b>
3.	Initial Investment Required	--	--	<b>20.30 Lakhs</b>
4.	Simple Payback Period	--	--	<b>Nearly 1.5 Years</b>

S. No.	Energy Consumption			Energy Generation & CO <sub>2</sub> Neutralization		
	Description	Energy Quantity (Annum)	CO <sub>2</sub> Emitted (Tons/Annum)	Description	Energy Usage	CO <sub>2</sub> Neutralized (Tons/Annum)
1.	Electrical Energy	4,04,520 kWh	331.7	Solar Energy Generation	1,61,646 kWh	132.6
2.	Diesel (Transport + DG)	1,11,438 Litres	294.2	CO <sub>2</sub> Neutralization due to Matured Trees	1,111 No's	24.22
3.	Wood Consumption	120 Tons	228.0			
4.	Biomass Pellets	36 Tons	66.2			
5.	LPG Consumption	19,720 kg	59.2			
<b>6.</b>	<b>Total-Utilized</b>		<b>979.3</b>	<b>Total-Neutralized</b>		<b>156.8</b>
<b>7.</b>	<b>Balance CO<sub>2</sub> to be Neutralized = 822.5 Tons/Annum &amp; Per Capita CO<sub>2</sub> Consumption = 0.35 Tons/Annum <sup>1</sup></b>					

(<sup>1</sup> Total strength of students - 2,190 + Teaching and technical staff - 127 = 2,317)

**SYNOPSIS OF  
ENERGY, ENVIRONMENT &  
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**PART-A: ENERGY AUDIT REPORT**

**4. ENERGY CONSERVATION PROPOSALS  
(ENCONs)**

**You have the Power to Conserve....**

**Table-1: Energy Conservation Proposal (ENCON) along with Annual Energy and Financial Savings**

S. No.	Proposed Energy Conservation Measures	% Saving & Source	Estimated Savings		Initial Investment (Rs.)	Payback Period	CO <sub>2</sub> Reduction (Tons/Annum)
			Annual Energy Savings	Monetary Savings (Rs.)			
<b>ENCONs for Electrical Energy Savings</b>							
1.	Increasing the Energy Production from the Roof Top SPV System using regular Panel Cleaning Schedule	1 % (Electrical)	1,617 kWh	16,817	Zero Cost	Immediate	1.3
2.	Improvement in the Supply Power Factor and Avoid Low Power Factor Penalty	Reduction of DPF	--	42,098	1,00,000	2.4 Years	--
3.	Reduction of Cable Losses & Active Power Consumption using DB Level Capacitor Compensation	0.5 % (Electrical)	2,023 kWh	21,039	21,000	1.0 Year	1.7
4.	Reduction of Belt & Pulley Transmission Losses from Motor to Machine in STP Aerator Blower Motor	8 % on STP Motor	2,160 kWh	22,464	10,000	0.4 Years	1.8
5.	Replacement of Fluorescent Lamps with Energy Efficient Lamps (Swap FTL to LED Lamps)	60 % on Lighting	2,160 kWh	22,464	29,600	1.3 Years	1.8
6.	Reduction of Energy Consumption through retrofitting VFD in One of the Aerator Blower Motor	25 % on STP Motor	3,240 kWh	33,696	60,000	1.8 Years	2.7
7.	Replacement of Existing UPS with Centralized UPS and reduction Battery based E-Waste Management	2 % on UPS consumption	9,636 kWh	1,00,215	1,80,000	1.8 Years	7.9
8.	Replacement of Existing Convention Ceiling Fans into Electronically Commutated BLDC Fans	50 % on Fans	11,700 kWh	1,21,680	5,15,200	4.3 Years	9.6
9.	Reduction of Consumption in Electric Geyser used for Hot Water Generation for Bathing Application in Hostel (Both Boys & Girls) Area <b>(Fuel Substitution)</b>	(Electric to Renewable)	54,260 kWh	5,64,304	7,00,000	1.2 Years	44.5

S. No.	Proposed Energy Conservation Measures	% Saving & Source	Estimated Savings		Initial Investment (Rs.)	Payback Period	CO <sub>2</sub> Reduction (Tons/Annum)
			Annual Energy Savings	Monetary Savings (Rs.)			
<b>ENCONs for Thermal Energy Savings (LPG + Biomass Pellets)</b>							
10.	Reduction of LPG Consumption using Regular Burner Cleaning and Swapping of Active Burners.	3 % of LPG used for Stove	237.0 kg	16,590	5,000	0.3 Years	0.7
11.	Reduction of LPG Consumption in Dosa making Stove by replacing the Conventional Burner with Radiant Burners	20 % of LPG used for Dosa Stove	1,578 kg	1,10,460	2,00,000	1.8 Years	4.7
12.	Reduction of Heat Energy Exposed in the Boiler Outer Side + Steam Pipes Lines (Especially in Pipes Joints) using Thermo Ceramic Coating (TCC)	10 % of Biomass Pellets	3,600 kg	86,400	50,000	0.6 Years	6.6
13.	Reduction of Pellets + Electricity Consumption in Boiler Feed Water Pre-heating + Hot Water for Plate Washing using Solar Thermal Energy System <b>(Fuel Substitution)</b>	(Electric + Pellets to Renewable)	7,300 kg of Pellets + 1,200 kWh of Electricity	1,87,680	1,60,000	0.9 Years	14.4
<b>Total</b>			<b>87,996 kWh + 1,815 kg of LPG + 10,900 kg of Pellets</b>	<b>13,45,906</b>	<b>20,30,800</b>	<b>--</b>	<b>97.7</b>

**Audit Conduced & Verified by,**

*S.R. Sivarasu*

**Dr. S.R. SIVARASU**

**Dr. S.R. SIVARASU, Ph.D.,**  
**BEE Certified Energy Auditor (EA-27299)**  
**Lead Auditor - ISO 14001: EMS**  
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**PART-B: ENVIRONMENT AUDIT REPORT**

**5. ESTIMATION OF  
CO<sub>2</sub> EMISSION AND NEUTRALIZATION  
(ELECTRICITY, DIESEL, LPG, WOOD & PELLETS)**

**Reduce, Reuse, Recycle**

### **5.1: Assessment of Annual Energy Usage:**

Table-2 shows the types of energy carriers used for their regular operation in the college campus along with application area and their source.

**Table-2: Energy Carriers, Application area and their sources used for College Operation**

<b>S. No.</b>	<b>Type of Energy Carrier</b>	<b>Application Area</b>	<b>Source of Procurement</b>
1.	Electricity (HT)	Powering to all electrical / electronic / HVAC equipment's	From TANGEDCO
2.	Diesel	Transport vehicles and Diesel Generator (Captive Generation)	From authorised distributor
3.	Liquefied Petroleum Gas (LPG)	Cooking + some laboratory experiments	
4.	Solar PV Plant (100 kW + 25 kW)	Powering to all electrical / electronic / HVAC equipment's	Self-Generation (Roof Top) in Main & Library Building
5.	Electric Geyser	For bathing & Vessel cleaning	Fitted in hostel and mess
6.	Manure Creation	Veggie Waste mixed with dry leafs generated in the campus	
7.	Matured Trees	The college is located in a lush greenery and nearly <b>1,111 no's</b> of various varieties of matured trees are available with more than 10 years old. Apart from that; the management is planted and maintaining several flowering shrubs and bushes in order to provide eye catching visual treat.	

### **5.2 Balance Sheet indicating CO<sub>2</sub> Emission and Neutralization:**

One of the prime goal of the Environment audit is to assess the CO<sub>2</sub> emission and neutralization of the respective university/college and is a best tool to chalk out the plans to reduce it from the present values. Table-3 provides the balance sheet indicating various energy carriers associated with the regular activities of the college and their CO<sub>2</sub> mapping.



**Table-3: Energy Balance Sheet Indicating the Mapping of CO<sub>2</sub> from overall Energy Consumption, & Neutralization**

S. No.	Energy Consumption			Energy Generation & CO <sub>2</sub> Neutralization		
	Description	Energy Quantity (Annum)	CO <sub>2</sub> Generated (Tons/Annum)	Description	Energy Usage	CO <sub>2</sub> Neutralized (Tons/Annum)
1.	Electrical Energy	4,04,520 kWh	331.7	Solar Energy Generation	1,61,646 kWh	132.6
2.	Diesel (Transport + DG)	1,11,438 Litres	294.2	CO <sub>2</sub> Neutralization due to Matured Trees	1,111 No's	24.2
3.	Wood Consumption	120 Tons	228.0			
4.	Biomass Pellets	36 Tons	66.2			
5.	LPG Consumption	19,720 kg	59.2			
6.	<b>Total CO<sub>2</sub> Generated</b>		<b>979.3</b>	<b>Total CO<sub>2</sub> Neutralized</b>		<b>156.8</b>
7.	<b>Balance CO<sub>2</sub> to be Neutralized = 822.5 Tons/Annum &amp; Per Capita CO<sub>2</sub> Consumption = 0.35 Tons/Annum<sup>1</sup></b>					

(<sup>1</sup> Total strength of students - 2,190 + Teaching and technical staff - 127 = 2,317)

**Observations:**

- From the above table; it is evident that the college is now trying to neutralize their CO<sub>2</sub> emission through various initiatives like i) Installation of roof top solar PV system, ii) Reduction of LPG consumption by switching from LPG into Biomass pellets, iii) Planting more no. of trees and iv) implementing various energy conservation measures (FTL to LED conversion, conventional fan to BLDC fans, Energy efficient motor replacement, judicious use of all types of energy etc.,)
- Reduction of wood consumption by replacing the entire boiler cooking system reduces huge amount of CO<sub>2</sub>. Even though the wood is being generated from their own source, burning the wood causes more local pollutant. The management has to think and go for fuel substitution.

### **5.3: Calculation Table:**

For Electricity = $\left[ \text{kWh} \times \frac{0.82 \text{ kg of CO}_2 \text{ emission}}{\text{kWh}} \right]$
For Diesel = $\left[ \text{Diesel Consumption (Litre)} \times \frac{2.64 \text{ kg of CO}_2 \text{ emission}}{\text{Litre of Fuel Consumption}} \right]$
For Wood = $\left[ \text{Wood Consumption (Litre)} \times \frac{1.9 \text{ Tons of CO}_2 \text{ emission}}{\text{Tons of Consumption}} \right]$
For Pellets = $\left[ \text{Pellet Consumption (kg)} \times \frac{1.84 \text{ kg of CO}_2 \text{ emission}}{\text{kg of Pellet Consumption}} \right]$
For LPG = $\left[ \text{LPG Consumption (kg)} \times \frac{3.0 \text{ kg of CO}_2 \text{ emission}}{\text{kg of LPG Consumption}} \right]$
A matured tree can able to absorb nearly CO <sub>2</sub> at a rate of 48 lbs./year (nearly 21.8 kg); hence total CO <sub>2</sub> to be neutralized is $\frac{(21.8 \times 1111)}{1,000} = \mathbf{24.2 \frac{Tons}{Annum}}$

### **References:**

<sup>1</sup> <https://ecoscore.be/en/info/ecoscore/co2>

<sup>3</sup> <http://www.tenmilliontrees.org/trees/#:~:text=A%20mature%20tree%20absorbs%20carbon,the%20average%20car's%20annual%20mileage>



**CO<sub>2</sub> Emission:**  
**979.3 Tons/Annum**



**Present CO<sub>2</sub> Neutralization**  
**156.8 Tons/Annum**



**CO<sub>2</sub> to be neutralized**  
**822.5 Tons/Annum**

### **5.4: Conclusion and Recommendations:**

From the above discussion points; it is evident that activities taken forward to neutralize the CO<sub>2</sub> is predominant and to become a Net-Zero Carbon Emission buildings. The management has to plan several activities to achieve the target.

- Increase the foot print of trees planted inside the College campus premises.
- Encourage the students to plant more trees and account them all.
- Identify higher fuel consuming vehicle and either rework or replace it.
- Conduct training programmes for the transport staffs at regular interval and encourage them to maintain the vehicles at good condition throughout the year.

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**6. WATER UTILIZATION,  
CONSERVATION &  
WATER MANAGEMENT**

**Our Earth, Our Habitat, Our Home**

### **6.1: Source of Water, Storage and Distribution:**

Water is one of the main consumable in the college campus. **PRATHYUSHA ENGINEERING COLLEGE** gets water from three different sources i) Fresh water from the bore well, ii) Rain Water Harvesting (RWH) and iii) Treated water from RO & STP. Table-4 shows the source of water, location of storage along with their application.

**Table-4: Source of Water, Location of Storage and Application**

Type of Water	Source	Location of Storage	Application
Fresh water	Bore water (Available in inside the campus)	Stored in a tank (located in front of the mess)	Cooking, Utensil Cleaning, Bathing and Clothing washing and given as input to water dispensers
Rain Water	Rain Water collected through i) buildings run offs and ii) road run-offs	Collected and stored in various places	Used to increase the ground water level
		Percolated to underground	
Treated Water from RO & STP	From R) & STP plant	Used for i) Gardening, ii) Toilet flushing and iii) some portion letting out	

### **6.2: Reverse Osmosis (RO) Plant and Treated Water for Drinking Application:**

- The college management is keen on providing uninterrupted, safe and healthy drinking water to all; throughout the year. This water is being checked in an accredited laboratory and ensures that the water is potable.
- The specifications of RO Plant and distribution of potable water to the entire campus is given in Table-5.

**Table-5: Specifications of RO Plant and Potable Water Distribution System**

S. No.	Parameters	Description
1.	Total no. of RO Plant	• 01No (Top of the mess building)
2.	Capacity of each RO Plant	• 4,000 Litre/hour (Four membrane with 1,000 litres/hour capacity)
3.	Source of raw water	• Bore water located inside the campus (used to store in a <b>60,000 litre</b> cement underground tank and then pumped to overhead tank of <b>15,000 litre</b> cement tank.
4.	% of RO & grey water output	• 25 % of RO water and 75 % of grey water <b>(For every 4 litre of raw water input; 1 litre of RO water is the output)</b>

### **6.3: Water Control Taps for General Application:**

The PEC, the Openable taps (mostly metal) are employed for all water distribution and utilization application and hence the user has to utilize only the required quantity of water.



**Openable Hardened Metal Tap without Aerator for Hand Washing (College Toilet Area)**

**Fig.1: Different Types of Taps used in Water Distribution Network**

### **6.4: Sewage Treatment Plant (STP):**

- It must be appreciated that the management of **PRATHYUSHA ENGINEERING COLLEGE** has implemented an integrated sewage wastewater treatment plant. The detailed specification of the STP is represented in Table-6.

**Table-6: Specifications of Sewage Treatment Plant (STP)**

Location	Back side of the college
Collection Tank Capacity	19,756 Litres
Sludge Bed	Sludge content given to sludge bed; dried and used as manure
• <b>Usage of Treated Water:</b> Being utilized in gardening application using direct pipe line and movable water tank.	

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

- The audit team appreciates the effects taken by the management of **PRATHYUSHA ENGINEERING COLLEGE** for harvesting the rain water almost in all the 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 is located close to each pits.



**Fig.2: Rain Water Harvesting Pits located in each Buildings**

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**7. USAGE OF CHEMICALS, SALTS & ACIDS  
(STORAGE, HANDLING, AND BEST OPERATING PRACTICES)**

**Say no to pollution & Yes to Recycle**

### **7.1: General Instructions given to the Students while working in the Laboratory:**

- Never work in the lab unless a demonstrator or a teacher is present.
- Never taste any chemicals and don't allow chemicals to come in contact with your skin.
- Don't throw waste into the sink; rather they must be thrown into the waste bins.
- Keep all the doors and windows open while working the laboratory.
- Sulphuric acid must be diluted only when it is in cold condition.
- Reagent bottles must never be allowed to accumulate on the work bench.
- Containers used for reactions must be properly labelled.
- Working space should be cleaned immediately.
- Protection and safety is most important.
- While entering the laboratory, everyone must wear lab coat and shoes.
- Prior knowledge on hazardous property of the chemicals is must.
- Seek the advice of faculty and technical staffs during emergency.
- Know the location of first aid box and fire extinguishers located in the laboratory.
- Don't attend any self-medical practices either for you or for your fellow students.

### **7.2: Storage of Chemicals/Salts/Acids:**

Less concentrated chemicals, salts and acids are stored in proper racks, cupboards and high concentrated acids are stored in separate area filled with sand. Storage practices are represented below in Fig. 3 &4.



**Fig. 3: Chemicals, Salts and Agents are separately placed for laboratory application**



**Fig. 4: Concentrated acids are stored in sand bed (Best practice)**

**7.3: Cleaning Agents (Soap & Powders) used for Vessel & Floor Cleaning:**

In order to maintain hygiene in the College campus; the administration regularly clean the floors and restrooms. In addition to this; the hostel management has to clean i) the vessels, kitchen floor, dining hall, store room and gas station. Table-7 shows the cleaning agents used to clean the above area;

**Table-7: Cleaning Agents used for Floor and Vessel Cleaning**

S. No.	Cleaning Agents	Application
1.	Cleaning Powder & Vessel Cleaning Soap	Vessel Cleaning
2.	Soap Oil & Bleaching Powder	Floor Cleaning

**7.4: Recommendations: Eco Friendly - Green Cleaning Agents:**

- On an average; the cleaning agents used today have about 62 harmful chemicals like Paraben, Phosphates or Chlorides. A lot of them come from multi-purpose cleaners.
- Also these produces are **Indian Green Building Council (IGBC) GreenPro** certified.
- Fig. 5 shows the sample eco-friendly Green Pro certified cleaning agents.



**Fig. 5: Sample eco-friendly Green Pro certified cleaning agents**



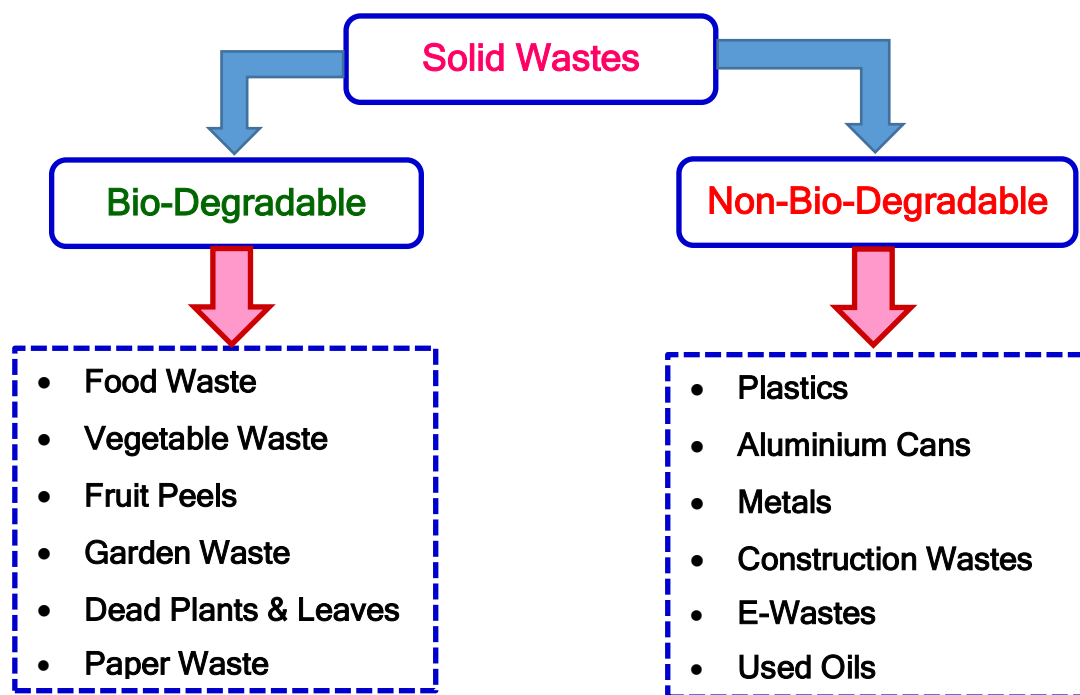
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**8. WASTE HANDLING &  
MANAGEMENT**

**Save the environment in present for  
better life in future**

**8.1: Solid Waste Management System:**

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



**8.2: Process of Waste Management:**

The college management practiced some methods to treat the waste generated and Table-8 shows the process of treating the solid waste generated inside the college campus.

**Table-8: Process of Waste Management**

S. No.	Waste Type	Waste Treatment
<b>Bio-Degradable Waste Management</b>		
1.	Food and Vegetable Waste	<ul style="list-style-type: none"> <li>Collected &amp; given to 3<sup>rd</sup> party for farming</li> <li>Nearly 20-25 kg of food + vegetable waste generated per day</li> </ul>
2.	Garden Wastes and Plant Leaves	<ul style="list-style-type: none"> <li>Daily collected and dumped in a bins</li> <li>All the pins are daily taken to storage yard and mixed with cow dung creating vermin-composting for creation of manure.</li> <li>This is used as a manure for gardening application.</li> </ul>
3.	Examination Paper Waste	Collected, segregated, stored and sold to 3 <sup>rd</sup> party for recycling.
4.	Construction & Demolition Wastes	Mostly used for i) land filling and ii) for their own construction.

Non-Bio-Degradable Waste Management		
5.	Used cooking oils from the Canteen and Mess	<ul style="list-style-type: none"> <li>The canteen and hostel authorities are using the cooking oils only one time and maintain hygienic environment and sold the one time used oil to authorised recycler.</li> <li>Also small quantity of the oil being used for boiler firing.</li> </ul>
6.	Plastics, Wooden and Metal Wastes, Transport Oil + Tyres, Transport Batteries, Construction Wastes & E-waste	<ul style="list-style-type: none"> <li>All the Non-Bio-Degradable Waste are collected and placed inside the college. These wastes are then given to 3<sup>rd</sup> party at regular interval.</li> <li>Transport oil is being used for the college application (Boiler firing)</li> </ul>

### **8.3: List of Approved E Wastes:**

E-Waste – Electrical	E-Waste – IT & Communication
<ul style="list-style-type: none"> <li>Motors and Starters</li> <li>Fans, Lamps and Luminaries</li> <li>Electrical Drives</li> <li>Heater Coils</li> <li>Broken/Fired Cables</li> <li>Air Conditioning System</li> <li>Power Distribution Panels</li> <li>Electronic Music Instruments</li> <li>Electronic GYM Equipment's</li> <li>Electronic Attendance System</li> <li>Analog &amp; Digital Measuring Instruments</li> </ul>	<ul style="list-style-type: none"> <li>Copier/Printers &amp; Fax Machines</li> <li>Power Stripes &amp; Power Supplies</li> <li>UPS/Servo Stabilizers/Inverters</li> <li>Batteries</li> <li>Wi-fi-Modems, Routers, Toggle</li> <li>Network Cables, Switches, Hubs</li> <li>Phone, Intercom &amp; PBX</li> <li>Audio &amp; Video Equipment's/Remote Controls, Projectors</li> <li>Printed Circuits Boards</li> <li>Barcode/QR scanners</li> </ul>

### **8.4: E-Waste Management Committee (A Sample):**

S. No	Name and Department	Responsibility
1.	Principal	Chairperson
2.	Member-1:	Co-ordinator (SPOC)
3.	Member-2:	Member
4.	Member-3: Electronics Maintenance	Member
5.	Member-4: Electrical Maintenance	Member
6.	Member-5: IT & Network Maintenance	Member
7.	Member-6: General Maintenance	Member



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www.virogreen.in

### Certificate of Destruction

**COD No : VGIN190515**  
**CPCB REG No: B-29016(1881)/1(Reg) 10/HWMD**

**Company Name : M/s. PRATHYUSHA ENGINEERING COLLEGE**  
**Company Address : ARANVOYALKUPPAM, POONAAMALLEE-  
TIRUVALLUR ROAD,  
TIRUVALLUR,  
Pincode: 602025**

**Company Ref : 12612**  
**Date Collected : 05/02/2020**  
**Date Received : 05/02/2020**  
**GRN No : VGIN-2069**  
**Date of Destruction : 12/02/2020**

This document certifies that all the below mentioned items were received and processed in an environmentally responsible manner by **Virogreen India Private Limited ., Chennai**

This further certified that the items identified below had been properly disposed in an environmentally responsible manner, utilizing the process and equipment available in accordance with the Company procedures or written instructions where applicable. This "Certificate Of Destruction" is issued based on a series of specific activities; including collection, identification, separation and treatment by mechanical process or manual means, whereby material elements are destroyed from the "ITEMS" for use in the form of raw materials and is deemed no longer fit for original intended purpose, and recycled wherever possible.

Further Virogreen India Private Limited, Chennai Acknowledges that the data has been destroyed as per **NIST 800-88 standards** and all electronic data on the functional storage device have been overwritten by means of a destruction write, all storage devices deemed to be non- functional have been shredded or otherwise destroyed.

Index	Description	Qty	
		Nos	Kgs
1	E Waste	-	2010

**Person Incharge : Mr. Mariapohraj**  
**Designation : Warehouse Manager**  
**Date : 12/02/2020**



---

Factory : S/No.297/1B-2, No.49, Pappankuppam Village, S.R.Kandigai Road,  
Gummidipoondi – 601 201 Thiruvallur Dist, Tamil Nadu, India.  
(CIN No: U52392TN2002PTC049211)  
Ph : +91-44-2651 2449. Mob: +91 99408 31313. Email: reachus@virogreen.in






**Fig.6: E-Waste Destruction Certificate by Authorized 3<sup>rd</sup> Party**

**SYNOPSIS OF  
ENERGY, ENVIRONMENT &  
GREEN AUDIT REPORT**

**PART-C: CAMPUS GREENERY AUDIT REPORT**

**9. ASSESSMENT ON LIST OF  
MATURED TREES AND GREEN  
ENERGY GENERATION**

**Trees are life, don't cut them**

### **9.1: Campus Greenery:**

The college is completely covered with matured trees grown for more than 10 years. The total number of matured trees available in the college campus is **1,111 with nearly 15 varieties of trees.** Apart from the mature trees; preserving the ecology; the entire college campus is planted with various flowering shrubs and pushes. Table-9 shows the list of matured trees available inside the college + hostel campus.

**Table-9: List of Matured Trees Available in the College Campus**

S. No.	Name of the Tree	Botanical Name	Quantity
1.	Teak Tree	Tectona grandis	165
2.	Neem Tree	Azadirachta indica	99
3.	Pongan Tree	Millettia pinnata	96
4.	Bayur Tree	Pterospermum acerifolium	46
5.	Banyan Tree	Ficus benghalensis	68
6.	Florida royal palm	Roystonea regia	42
7.	Common Guava	Psidium guajava	45
8.	Indian Elm	Ulmaceae	24
9.	Indian almond	Combretaceae	167
10.	West Indian mahogany	Meliaceae	41
11.	Fountain tree	Bignoniaceae	50
12.	Mayflower	Caesalpinaceae	28
13.	Java plum	Myrtaceae	40
14.	Baheda	Combretaceae	200
15.	Star gooseberry	Phyllanthaceae	165
<b>Total</b>			<b>1,111</b>



**Total No. of Matured Trees available in the college campus is 1,111 which contributes for reduction of 24.2 Tons of CO<sub>2</sub> emission/Annum**

### **9.2: Roof Top Solar Photovoltaic System:**

- The college has installed solar PV plants (100 kW in main building + 25 kW in Library building) and generating power. These power is being connected in the MV panels and are utilized by the campus load. Each plants are properly connected to the respective inverter through Array Junction Box (AJB).
- All the conductive parts are properly earthed at respective buildings and ensures safety.
- Table-10 shows the Annual Energy Generation from Roof Top Solar PV Plant.

**Table-10: Annual Energy Generation from Roof Top Solar PV Plant**

S. No.	Month	Total Energy Generation (kWh)
1.	Apr-19	16,906
2.	May-19	13,597
3.	Jun-19	14,642
4.	Jul-19	14,407
5.	Aug-19	14,879
6.	Sep-19	14,309
7.	Oct-19	8,517
8.	Nov-19	9,636
9.	Dec-19	12,010
10.	Jan-20	15,018
11.	Feb-20	15,006
12.	Mar-20	12,719
<b>Average</b>		<b>13,471</b>
<b>Total</b>		<b>1,61,646</b>



Annual energy saved from the roof top solar PV system is **1,61,646 kWh** which reduces **132.6 Tons of CO<sub>2</sub> Emission/Annum.**

**SYNOPSIS OF  
ENERGY, ENVIRONMENT &  
GREEN AUDIT REPORT**

**10. AUDIT SUMMARY &  
CONCLUSION**

**Save Energy: Save Future Generation....**



## **SUMMARY OF THE AUDIT PROCESS:**

In order to make the **PRATHYUSHA ENGINEERING COLLEGE** campus 100 % energy efficient; Environmental sustainability and lush Greenery; the audit team recommends to implement the following measures:

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

- Monitor the health of the Automatic Power Factor Controller (APFC) and Fixed Capacitor (FC). Fine tune reactive power based on the load condition and avoid Disincentive Power Factor penalty.
- Regularly clean the solar PV panel as per the prepared schedule and improve the power generation.
- Optimize the Sewage Treatment Plant (STP) blower operation and conserve the energy.
- In a phased manner, ceiling fans must be changed from conventional fans into BLDC fans. Also change Flourcent Tube Light (FTL) into LED with adequate illumination levels.
- Implement Energy Management System (EMS) to accurately measure & monitor energy flow.
- Replace the existing transformer with IS-1180; Energy Efficiency transformer with optimized power capacity. Normally the rating of the transformer should be twice that of the average annual recorded demand.
- 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 no. 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.
- Replace the electric geyser into solar thermal energy system and reduce the running cost of the heating application (since the solar energy is free).
- Prepare suitable formats for all energy consumption and regularly follow to records. At regular interval; 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 Diesel Generator (DG) and Boiler, iv) Ambient and Indoor air quality assessment and v) Water quality study for treated water (STP & RO).

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

- Regularly clean the stove burners and ensure that the flame should be in light bluish colour.
- Use Thermal Ceramic Coating (TCC) painting on hot surfaces and reduce the exposed energy.
- Try with radiant burner in dosa making machines and saves energy. This provides more convenient to the human working on the stove (reduction of exposure to heat radiation).
- In future; plan to replace the existing Vapour Off Take (VoT) LPG layout into Liquid Off Take (LoT) system which saves good amount of LPG by reducing the left over LPG in the cylinder.

### **III. Water Conservation & Management (RO & STP):**

- Utilize more amount of treated water from STP and RO plants since most of the approving agencies like AICTE, UGC etc are now requesting to utilize the treated water.
- Quantity the amount 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 savings 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.
- In future; install Bio-Sewage Treatment Plant as it reduces the amount of energy required to operate the plant and environmental friendly operation.
- 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/Salts and safe disposal through 3rd party.

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

- ❖ **Energy Conservation & Management**
- ❖ **Training on Environmental impact and assessment**
- ❖ **Fire and Safety (Operation and Handling)**
- ❖ **Electrical maintenance & Safety**
- ❖ **Electrical wiring, layout preparation & maintenance**
- ❖ **AC & Battery Maintenance**
- ❖ **Emergency Preparedness**
- ❖ **E-Waste and Chemicals Handling**
- ❖ **Solid waste management**
- ❖ **Training for Transport employees** (Improvement in fuel economy, reduce accidents, vehicle cleanness, 100 % attendance, student friendly approach and overall maintenance of the vehicle)
- ❖ **Training for Faculty and Students on Vehicle Operation** (Preferably by PCRA or any other authorised service providers)
- ❖ **Training for kitchen employees** (LPG savings, improvement in productivity, equipment operation and best practices to be followed)
- ❖ **General medical camps for employees**
- ❖ **Training on Stress management and Yoga**

#### **V. 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) Road map to achieve the commitment, v) Facilities need to achieve the same, vi) Roles and responsibilities of all stake holders, 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 all proposed ENCONs and 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 **Platinum rated Global Leadership campus (as per IGBC rating)** and/or **5-star rated campus** (as per GRIHA rating) and/or **GEM-5 rated campus** (as per ASSOCHAM GEM rating).

## COMPLETION OF THE REPORT

This synopsis is prepared as a part of the Energy, Environment and Green Audit conducted at **PRATHYUSHA ENGINEERING COLLEGE**, Aranvoyaluppam, Thiruvallur, Tamil Nadu 602 025 by **P S QUALITY CERTIFICATION PVT LTD**, No. 415, F4, 1<sup>st</sup> Floor, Asha Vignesh Apartment, Ambattur, Tamil Nadu 600 053.

**SYNOPSIS OF  
ENERGY, ENVIRONMENT &  
GREEN AUDIT REPORT**

***Annexure:***  
**AUTHORISED CERTIFICATES OF THE AUDITOR**

Reg No.: EA-27299



Certificate No.: 9645/19

# National Productivity Council (National Certifying Agency) **PROVISIONAL CERTIFICATE**

This is to certify that **Mr./Mrs./Ms. SIVARASU SULUR RATHINAVELU**  
**P RATHINAVELU**  
son / daughter of Mr.....has passed the National certification Examination for Energy Auditors held in September 2018, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India. He / She is qualified as **Certified Energy Manager** as well as **Certified Energy Auditor**.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for Accredited Energy Auditor and issuance of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the Bureau of Energy Efficiency issues an official certificate.

Digitally Signed by: K V R RAJU  
Mon Apr 22 16:22:42 IST 2019  
Controller of Examination, NPC AIP Chennai

Place : Chennai, India  
Date : 22nd April, 2019

Controller of Examination



## ISO 14001:2015 Lead Auditor (Environmental Management Systems) Training course

it is hereby certified that

**Dr. S. R. Sivasasu**

has successfully completed the above mentioned course and examination

08<sup>th</sup> - 12<sup>th</sup> December 2017

Coimbatore, India

Certificate No. 3521 2982 02  
Delegate No. 71968

Essen, 2018-01-11

Course 18125 is certified by CQI/IRCA and meets the training requirements for those seeking certification under the IRCA EMS auditor certification scheme.

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## The Indian Green Building Council


hereby certifies that

**Sivarasu S R**

has successfully demonstrated knowledge on the Green Building Design & Construction, Building Standards & Codes, IGBC Resources & Processes and Green Design Strategies & their Impacts, required to be awarded the title of

**IGBC Accredited Professional**

  
**K S Venkatagiri**  
Executive Director  
CII-Godrej GBC

  
**V Suresh**  
Chairman  
Indian Green Building Council

  
**Gurmit Singh Arora**  
Vice-Chairman  
Indian Green Building Council

200239

20 June 2020



## GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT

### GRIHA CERTIFIED PROFESSIONAL CERTIFICATE

This is to certify that

*Sivarasu sr*

has qualified as a **GRIHA** Certified Professional For V. 2015

Date of issue: 18th September 2020

Note : This certification is valid only for GRIHA version 2015.

  
Chief Executive Officer  
GRIHA Council



Confederation of Indian Industry

This is to certify that

**SIVARASU S R**

is a

**CII Certified Professional in Sustainable Waste Management**

**K S Venkatagiri**  
Executive Director  
CII - Godrej GBC

**Pradeep Bhargava**  
Chairman  
CII GreenCo Council



Issued by CII Sohrabji Godrej Green Business Centre

Issued on 9 June 2021

CIGBC-SWM-0621-298

**HSSERisk Academy**

# CERTIFICATE OF APPRECIATION

THIS CERTIFICATE IS AWARDED TO

*Sivarasu Rathinavelu*

FOR SUCCESSFUL COMPLETION OF TRAINING COURSE ON

- ISO 14064-1:2018
- ISO 14064-2:2019
- ISO 14064-3:2019
- ISO 14066:2011
- ISO 14067:2018

AND CERTIFY HIM/ HER AS

**IMPLEMENTOR & AUDITOR  
CARBON FOOTPRINT MANAGEMENT**

This certificate is awarded for successful completion of Global Virtual Training course conducted from August 27, 2021 to September 01, 2021. It serves as a proof of his/her knowledge, competence and ability to implement, verify and validate carbon footprint as per above mentioned standards and methods. This certificate was awarded on August 01, 2021.

01.09.21

DATE

SIGNATURE

010920211006

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