

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

AUDIT CONDUCTED FOR

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

Dindigul – Palani Highway, Dindigul - 624 002, Tamilnadu, India.

DATE OF AUDIT

20 DECEMBER 2023



AUDIT CONDUCTED BY

RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING

(Chennai ♦ Coimbatore ♦ Erode)

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ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

1. ACKNOWLEDGEMENT

ACKNOWLEDGEMENT

The audit team of **RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING**, Coimbatore – 641 062 is thankful to the Management, Principal, Faculty and Technical team members of **M/s. SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY**, Dindigul – Palani Highway, Dindigul - 624 002, Tamilnadu, India for providing an opportunity to conduct a detailed Energy, Environment and Green Audit process in the college premises.

It is our great pleasure which must be recorded here that the Management of **M/s. SSM Institute of Engineering and Technology** extended all possible support and assistance resulting in thorough completion of the audit process. The audit team appreciates the cooperation and guidance extended during the course of site visit and measurements. We are also thankful to all those who gave us the necessary inputs and information to carry out this very vital exercise.

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

<u>Management Team Members</u>	
Shri. K. SHANMUGAVEL	Chairperson and Managing Trustee
Shri. C. KANDASWAMY	Managing Trustee
Shri. S. SRIRAM SIDDARTH	Chief Executive Officer
Dr. D. SENTHIL KUMARAN	Principal

<u>Audit Team Members</u>	
Dr. S.R. SIVARASU, Ph.D.,	BEE Certified Energy Auditor (EA-27299) Lead Auditor-ISO-14001:2015 (EMS), IGBC AP, GRIHA CP, CII CP in SWM Carbon Footprint Auditor & Implementor Mobile: +91- 80567 19372, 99420 29372
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ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

2. INTRODUCTION TO ENERGY-ENVIRONMENT-GREEN AUDIT

2.1: Preface about the Institution:

- **Sri Shanmugavel Mills (SSM)** is one of the leading business houses in Textile Industry in Dindigul District for over 30 years. SSM Group's strong desire to offer world-class high-quality Engineering Education has led to the launch of SSM Institute of Engineering and Technology at Dindigul from the academic year 2011-2012. The Trustees are optimistic about SSMIET to be a great landmark in the history of higher education in the district of Dindigul.

2.2: Vision:

- ✓ To inculcate strong knowledge of engineering among the students to excel in their domain through a standard of excellence in learning, research and transform them to face challenges and cater to the needs of the society by imparting competent technical and entrepreneurial skills with human values and ethics.

2.3: Mission:

- ☞ To encourage students to become self-disciplined individuals through appropriate teaching learning process.
- ☞ To empower students by providing conducive environment to develop them as best professionals and responsible citizens.
- ☞ To provide conceptual knowledge that supports design and development of new products and sustainable development.
- ☞ To maintain a healthy relationship with industries by establishing centres of excellence for technological training and product development.

2.4: Scope of the Audit Process:

- **Energy Audit:** To 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).
- **Environmental Audit:** Identification of history of activities, present environmental practices followed, monitoring records and known sources of environmental issues inside the college.
- **Green Audit:** Assessment on Campus greenery in terms of mature trees, flowering shrubs, bushes, medicinal plants, adoption of green energy generation and utilization, reduction of CO₂ due to green energy system and identification of possible implementation and enhancement of current greenery practices.

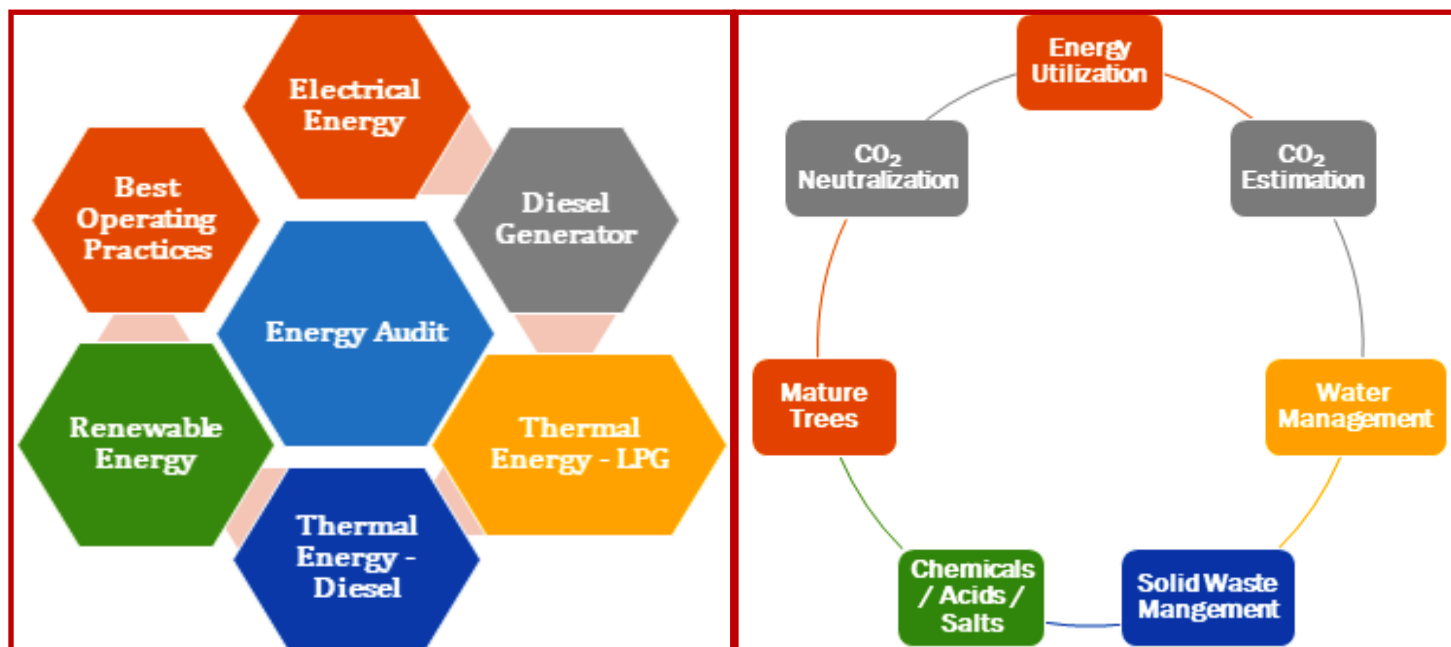
2.5: Outcomes of the Audit Process:

- Recommendations based on field measurement with achievable **Energy Conservation (ENCON)** proposals under **No cost/Low cost and Cost Investment categories**
- **Minimization of present energy cost** by adjusting and optimizing energy usage and reduction of energy wastage without affecting the regular activities
- **Identification of possible cost and energy saving from energy conservation, waste reduction, reuse and recycling**
- Formation of methodology for long term road map for maintaining green environment within the campus and encourage the stakeholders for continuous improvements

2.6: Audit Approach:

The audit team completed the assessment of energy consumption in the factory premises and operating hours of each machines (system) using two approaches namely I) **Objective Approach** in which a detailed measurement was taken and II) **Subjective Approach** in which field data is collected from the maintenance department.

2.7: Coverage in Energy- Environment & Green Audit Process:



2.8: List of Faculties assisted the Audit Process: & Data Collection:

S. No.	Faculty Details	Contribution
1.	Mr. D. MANOJ Assistant professor, Department of EEE	Data collection of Electrical Energy Consumption, Details of EB Utility, Details of Units Generated using DG.
2.	Dr. K. RAJESH Associate professor, Department of ECE	Data collection regarding AC Loads
3.	Dr. M.P. KARTHICK Assistant professor, Department of Civil Engg.,	Data collection about RO & Sewage Treatment Plant (STP)
4.	Mr J. CHRISTHU RAJA Technician, Department of EEE	Data collection on LPG
5.	Mr. K. KUMARESAN Electrician, SSMIET	Details of UPS/Inverters, Details of Interior Lightings & Fan system
6.	Mr. G. SELVAMANI PRO	Details about Toilet Flushing System, List of Fuel Consumption for Transport Vehicles.
7.	Mr. C. RAGURAM Supervisor-(Maintenance)	Data collection regarding List of Matured Trees & Flowering Shrubs in the College Campus

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

3. EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Energy Analysis:

- A detailed audit was conducted **M/S. SSM Institute of Engineering and Technology**, Dindigul
– Palani Highway, Dindigul - 624 002, Tamilnadu, India.
- The audit team has come out with **Energy Conservation Proposals (ENCONs)** and the summary of all the ENCONs are given below:

S. No.	Description	Parameters		
		Present	After	Savings
1.	Annual Energy System	3,19,219kWh + 2,736 kg LPG	2,96,623 kWh + 1,750 kg LPG	51,481 kWh + 986 kg LPG
2.	Annual Financial Terms	Rs. 45.9 Lakhs	Rs. 38.5 Lakhs	Rs. 7.4 Lakhs
3.	Initial Investment	Rs.7.7 Lakhs		
4.	Simple Payback Period	Nearly 01 Years (12.5 Months)		
5.	Overall Energy Reduction	14.8 % Electricity + 36.0 % LPG		

Note:

- Apart from the Energy Conservation, the audit team proposes **many technical recommendations** focusing on energy, equipment's life improvement, safety and best operating practices.
- All types of energy carriers (like **Electricity & LPG**) used for regular applications are considered for this audit process.

Audit Conducted & Verified by

(Dr. S.R. SIVARASU)

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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
			Annual Energy Savings	Monetary Savings (Rs.)		
1.	Replacement of Fluorescent Lamps with Energy Efficient Lamps (Considering only 50 Nos of Lamps in Phase-I Implementation swapping to LED Lamps)	50 % on Lighting	3,000 kWh	37,200	30,000	0.8 Years
2.	Reduction of Belt & Pulley Losses from Motor to Machine in STP Aerator Blower	8 % on STP Blower	3,200 kWh	39,680	20,000	0.5 Years
3.	Reduction of Cable Losses and Active Power Consumption using Capacitor Compensation	1 % on Electrical	3,481 kWh	43,164	20,000	0.5 Years
4.	Reduction of Energy Consumption through retrofiting VFD in One of the Aerator Blower	20 % on STP Motor	10,000 kWh	1,24,000	60,000	0.5 Years
5.	Replacement of Existing Water Pumps into BEE Star Labelled EE Pumps	20 % STP Pump	10,800 kWh	1,33,920	80,000	0.6 Years
6.	Replacement of Existing Convention Ceiling Fans into EC BLDC Fans Considering only 200 Nos of fans in Phase-I Implementation swapping to BLDC Fans)	50 % on Fans Load	21,000 kWh	2,60,400	3,60,000	1.4 Years
7.	Reduction of LPG Consumption using Burner Cleaning and Swapping of Active Burners.	5 % of LPG for Stoves	137 kg	14,563	10,000	0.7 Years
8.	Reduction of Heat Energy Exposed in the Boiler Outer Side + Steam Pipes Lines using TCC	5 % of Boiler	137 kg	14,563	20,000	1.4 Years
9.	Reduction of LPG Consumption by converting VOT system in to Liquid Off-Take System	Technology Substitution	164 kg	17,433	25,000	1.4 Years
10.	Reduction of LPG Consumption in Dosa making Stove with Radiant Burners.	20 % LPG on Dosa Stove	274 kg	29,126	60,000	2.1 Years
11.	Reduction of LPG Consumption in Boiler Feed Water Pre-heating using Solar Thermal Energy	Fuel Substitution	274 kg	29,126	80,000	2.7 Years
Total		51,481 kWh + 986 kg LPG		7,43,176	7,65,000	–

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-A: ENERGY AUDIT REPORT

4. STUDY ON ENERGY CONSUMPTION PATTERN

4.1: Assessment of Existing Electrical and Thermal Energy Systems:

S. No.	Description	Details			
Electrical Energy Usage					
1.	Name of the customer	SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY			
2.	Communication Address	Dindigul – Palani Highway, Dindigul - 624 002, Tamilnadu, India			
3.	Service Number Type of Supply & Tariff	SC No 05-909-450-0382; High Tension; Tariff-IIB			
4.	Tariff Structure: ➤ Old: Before July 2023 ➤ New: From July 2023	ToD	Up to Aug-2022	Up to June-23	From July-23
		Industrial	Rs. 6.35/kWh	Rs. 7.50/kWh	Rs. 7.65/kWh
		Peak Hour	Rs. 1.27/kWh	Rs. 1.69/kWh	Rs. 1.90/kWh
		Night Rebate	Rs.0.3175/kWh	Rs.0.3375/kWh	Rs.0.4125/kWh
		Fixed Charge	Rs. 350/kVA	Rs. 550/kVA	Rs. 562/kVA
		90 % of the Permitted PD			
5.	Energy Suppliers	Tamilnadu Generation & Distribution Corporation (TANGEDCO)			
6.	Generator Details	250 kVA (Inbuilt fuel tank – 460 L)			
7.	DG Operation	Manual Operation only			
Annual Electrical Energy Consumption, Electricity Consumption from DG & Diesel Consumption					
Electricity	3,19,219 kWh	Diesel for DG	9,828 Litres	Units Generated	65,520 kWh
Thermal Energy Used					
8.	Liquified Petroleum Gas (LPG)		Cooking		
	Diesel (Ordinary)		Transport+ DG		
Annual Energy Consumption of Thermal System					
LPG		2,736 kg	Diesel for Transport	65,923 Litres	
General Loads (Both Electrical and Thermal)					
9.	Lighting System	❖ Indoor lighting: The management is now committed to convert the existing FTL into LED in a phased manner			
		❖ Outdoor lighting: All the street lightings are LED based energy efficient lamps			
		❖ Requested to retrofit timer based ON-OFF control in the existing street lighting system			
10.	Fan Loads (Ceiling)	❖ All the ceiling fans are conventional type only which consumes nearly 60-70 W/fan at maximum position.			

		❖ The audit team requested to change the conventional fans into BLDC based Electronically Commutated fans in a phased manner. The average power consumption will be 35 W/fan at maximum position (More than 50 % reduction)
11.	Air Conditioning System	<ul style="list-style-type: none"> Mostly BEE star rated ACs and the outdoor units are mostly placed in shaded area of the respective building
12.	Motors and Pump loads	<ul style="list-style-type: none"> Mainly used for water distribution, purification and waste water treatment Small motors are used in hotel kitchen equipment's & in the canteen
13.	Uninterrupted Power System (UPS)	<ul style="list-style-type: none"> All the computers, servers, surveillance systems, projectors, telephonic units are connected with UPS with nominal back up time of 15-30 min. Total capacity of the UPS is nearly 220 kVA.

Table-2: Annual Energy Consumption and Energy Generation (2022-23)

S. No.	Month	Electricity Consumption (kWh)	LPG Consumed (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jun-22	28,637	228	660	4,153	4,813
2.	Jul-22	26,535	228	954	3,667	4,621
3.	Aug-22	28,936	228	681	3,947	4,628
4.	Sep-22	32,094	228	1,200	4,795	5,995
5.	Oct-22	29,487	228	1,218	4,823	6,041
6.	Nov-22	31,611	228	999	6,150	7,149
7.	Dec-22	28,691	228	717	6,401	7,118
8.	Jan-23	24,601	228	795	6,322	7,117
9.	Feb-23	29,230	228	645	6,230	6,875
10.	Mar-23	32,165	228	648	7,427	8,075
11.	Apr-23	27,111	228	585	4,743	5,328
12.	May-23	29,006	228	726	7,265	7,991
Total		3,48,104	2,736	9,828	65,923	75,751
<ul style="list-style-type: none"> The cost of the electricity is Rs. 12.40/kWh. The cost of the LPG is Rs.106.30 /kg 						

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PART-B: ENVIRONMENT AUDIT REPORT

5. ESTIMATION OF CO₂ EMISSION & NEUTRALIZATION (ELECTRICITY, LPG, DIESEL & MATURE TREES)

5.1: Assessment of Annual Energy Usage:

Table-3 shows the types of energy carriers used for their regular operation in the college campus along with application area and their source.

Table-3: Energy Carriers, Application area and their sources used for College Operation

S. No.	Type of Energy Carrier	Application Area	Source of Procurement
1.	Electricity (HT Service)	Powering to all electrical / electronic / HVAC equipment's	From TANGEDCO
2.	Diesel	Transport vehicles and Diesel Generator (Captive Generation)	From authorised distributor
3.	Liquified Petroleum Gas (LPG)	Used only for cooking	
4.	Mature Trees, Bushes & shrubs	The college has nearly 651 mature trees of different varieties which are more than 10 years old .	

5.2: Environmental System: CO₂ Balance Sheet:

- CO₂ Balance sheet is the indicator on the carbon emission and their neutralization in a year
- As per the Environmental Management System (EMS); only Scope-1 & Scope-2 based energy consumption is accounted.
- The following tables provide the balance sheet indicating various energy carriers associated with the regular activities and their CO₂ mapping.

Table-4: Environmental System: CO₂ Balance Sheet (2022-23)

S. No.	Annual Energy Consumption & CO ₂ Emission			Annual CO ₂ Neutralization		
	Description	Energy Quantity	CO ₂ Emission (Tons)	Description	Parameters	CO ₂ Neutralized (Tons)
1.	Electricity	3,48,104 kWh	285.4	Electricity (DG)	65,520 kWh	53.7
2.	Diesel	75,751 Litres	200.0	Mature Tree	651 Nos	14.2
3.	LPG	2,736 kg	8.2	Solar Thermal ¹	7,240 kWh	5.9
Total Emission			493.6	Total-Neutralized		73.9
Balance CO ₂ to be Neutralized = 419.8 Tons/Annum						

(¹ Electrical equivalent is being considered)

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 LPG = $\left[\text{LPG Consumption (kg)} \times \frac{3.0 \text{ kg of CO}_2 \text{ emission}}{\text{kg of LPG Consumption}} \right]$
A mature tree is able to absorb nearly CO ₂ at a rate of 21.8 kg/annum; $\frac{(21.8 \times 651)}{1,000} = 14.2 \frac{\text{Tons}}{\text{Annum}}$

5.4: Recommendations:

From the above discussion points; it is evident that activities taken forward to neutralize the CO₂ is predominant and to become a **Net-Zero Carbon Emission** buildings. The management has to plan several activities achieve the target.

- Increase the foot print of trees planted inside the college campus.
- Encourage the students to plant more trees and account them all.
- It is a right time to install considerable amount of roof top solar PV plant and generate the electricity. This must reduce the utility supply and hence reduce the direct CO₂ reduction.
- **As per the Solar Policy-2019** from Government of Tamilnadu; for any educational institutions have to implement substantiate a minimum of **6 % of its energy generation from renewable energy source**.
- Convert existing convention street lightings into solar based battery-operated lightings.
- 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.

5.5: References:

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

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



CO₂ Emission:
493.6 Tons/Annum



Planned CO₂ Reduction
73.9 Tons/Annum



CO₂ to be Neutralized
419.8 Tons/Annum

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-B: ENVIRONMENT AUDIT REPORT

6. TRANSPORT & REFRIGERANT GASES IN AC SYSTEM

6.1: List of Transport Vehicles:

Pollution level of all vehicles are regularly monitored and are maintained within the prescribed limit since the college is committed to provide green environment for better atmosphere. The list of transporting vehicles along with their type of engine are represented in Table-5.

Table-5: List of Transporting Vehicles available in the College

S. No.	Type of Vehicle	Fuel used	No. of vehicles	Pollution certified (Y/N)
1.	Bus	Diesel	20	Yes
2.	Jeep	Diesel	02	Yes
Total No. of Vehicles			22	Yes

6.2: Details of Pollution Free Transport Vehicles & Copy of Pollution Certificate:

- The college is committed to green environment not only in the campus; but also, to the entire atmosphere. In order to commute the students and staff; the management is operating vehicle services from various places to the college.
- These vehicles are well maintained by a set of dedicated bus operators and are continuously monitored by the management officials.
- No history of accidents (either major and/or minor) for the past five years. Maintaining best performance on the engine, tyre and other accessories.
- Maintaining proper records on each trip, fuel consumption, distance travelled, no. of passengers and mileage (kmpl)
- All the drives and helpers are well experienced with good track records on i) fuel economy, ii) maintenance free operation, iii) accident free and iv) student friendly.
- All the vehicles are checked periodically and are having valid pollution certificate and certificate of insurance. These vehicles are fitted with Bharat Standard (BS)-IV type engines. However, the management has a commitment to convert the vehicles to BS-VI; once the life time of the vehicles are ended.
- The college administration is also providing skill development training to the bus operator through renowned experts and improve their productivity. Further the management is also conducting regular medical camps for all the bus operator through which i) complete body check-up, ii) blood pressure, iii) blood sugar level, iv) vision check-up and v) other general medical examination are carried out.
- High Speed Diesel (HSD) is used as fuel for all the vehicles; which emits less CO₂ in the atmosphere than compared to conventional fuel. Further; the fuel is procured from a single consumer and hence it maintains the quality and provides good engine life.

Form 59

[See rules 115 (2)]

Pollution Under Control Certificate

Authorised By
State Transport Department

Date : 25/07/2023
Time : 14:55:53 PM
Validity upto : 24/01/2024

Test Validity

QR Code

Certificate SL No. : TN05700050015194
Registration No. : TN57AL3722
Date of Registration : 08/Aug/2014
Month & Year of Manufacturing : June-2014
Valid Mobile Number : *****0215
Emission Norms : BHARAT STAGE III
Fuel : DIESEL
PUC Code : TN0570005
GSTIN :
Fees : Rs. 110.00
(GST to be paid extra as applicable)
MIL observation : No

Vehicle Photo with Registration plate
60 mm x 30 mm

Vehicle Number

Sr. No.	Pollutant (as applicable)	Units (as applicable)	Emission limits	Measured Value (upto 2 decimal places)
1	2	3	4	5
Idling Emissions	Carbon Monoxide (CO)	percentage (%)		
	Hydrocarbon, (THC/HC)	ppm		
High idling emissions	CO	percentage (%)		
	RPM	RPM	2500 ± 200	
	Lambda	-	1 ± 0.03	
Smoke Density	Light absorption coefficient	1/metre	2.45	1.16

This PUC certificate is system generated through the national register of motor vehicles and does not require any signature.

Note : 1. Vehicle owners to link their mobile numbers to registered vehicle by logging to <https://puc.parivahan.gov.in>

Authorised Signature with stamp of PUC operator
60mm x 20 mm

Fig.1: Sample Pollution Certificate for a Transport Vehicle

6.3: List of Air Conditioning System along with its Refrigerant:

Most of the AC system has both R-22 as refrigerant which has different **Global Warning Potential (GWP)** and **Ozone Depletion Potential (ODP)**.

Table-6: List of Multi-variant AC System available in the SSM CET

S. No.	Location	Quantity	Refrigerant Type	Global Warning Potential (GWP)	Ozone Depletion Potential (ODP)
1.	A-Block Principal Cabin	1	R-22	1810	Medium
2.	Office –AO cabin	1	R-22	1810	Medium
3.	Principal Cabin	1	R-22	1810	Medium
4.	M.D. Cabin	1	R-22	1810	Medium
5.	B-Block Second Floor VLSI Lab	1	R-22	1810	Medium
6.	B-Block Second Floor CAD	1	R-22	1810	Medium
7.	Server room	1	R-22	1810	Medium
8.	Seminar Hall-I	Centralized	Not Available Clearly		
9.	Seminar Hall-II	Centralized	Not Available Clearly		
10.	Video Conference Hall	Centralized	Not Available Clearly		
11.	Placement Cell	Centralized	Not Available Clearly		
12.	IQAC Cell	1	R-22	1810	Medium

- **Note:** The most environment-friendly refrigerants that are available in Indian market currently are “R-290” and “R-600A”. They are Hydrocarbons and their chemical names are “Propane” for R-290 and “Iso-Butane” for R-600A.
- They are completely halogen free, have no ozone depletion potential and are lowest in terms of global warming potential. They also have high-energy efficiency but are highly flammable as they are hydrocarbons. (Kindly refer: <https://www.bijlibachao.com/air-conditioners/comparison-of-various-refrigerants-r-410a-r-22-r-290-r-134a-used-for-air-conditioners-and-refrigerators.html>).

Refrigerant	Global Warming Potential	Ozone Depletion Potential
R-22	1810	Medium
R-410A	2088	Zero
R-32	675	Zero
R-134A	1430	Zero
R-290	3	Zero
R-600A	3	Zero

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PART-B: ENVIRONMENT AUDIT REPORT

7. USAGE OF CHEMICALS, SALTS & ACIDS

(STORAGE, HANDLING & BEST OPERATING PRACTICES)

7.1: Handling of Chemicals/Salts/Acids used in the Laboratories:

The science departments & **Department of S & H and Civil Engineering** use chemicals for experimental applications and are having strict safety rules as follows;

- Well trained faculty and lab assistants who have knowledge about the hazardous nature of each and every chemical are only allowed to handle the chemicals safely
- Strictly follow the manufacturer's instruction on the container in order to prevent accidents
- Volatile or highly odorous chemicals, fuming acids are stored in a ventilated area
- Chemicals are stored in eye level and never on the top shelf of storage unit
- All stored chemicals; especially flammable liquids are kept away from heat and direct sunlight. Reactive chemicals are not stored closely
- Hazardous and corrosive chemicals are kept on sand platform to avoid corrosion
- First aid box and fire extinguishers are readily available in the laboratory

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.

- Most of the chemicals, salts and acids used in the science departments are inorganic in nature and no harmful effects are created during the experiment process
- However, after completion of each experiment, the wastes are washed in the water sink and are rooted to common choke pit.
- Only trained teaching and non-teaching staffs are handling the chemicals and also, they are well trained to handle any abnormal laboratories with chemicals are well ventilated with proper emergency exits. Adequate and correct sequence of fire extinguishers are placed near all the laboratories





Fig.2: Storage of Chemicals/Salts/Acids Storage

7.3: Recommendations:

- ⇒ Display the Dos and Don'ts inside the laboratory
- ⇒ Print the Dos & Don'ts in the Students laboratory manual
- ⇒ During the first class, demonstrate a PPT presentation and explain the safety procedures
- ⇒ Provide training to the teaching and technical staffs member on latest updates on chemical storage, handling, and safe disposal
- ⇒ Also encourage to conduct such type of training programmes by the faculty member to nearby schools and college (as an outreach programme)
- ⇒ Fix the First Aid Box (with all necessary medicines)
- ⇒ Place the names (along with their photo and mobile number) of the professionals training to handle fire extinguishers
- ⇒ Prepare & adopt a **Chemical Policy** (Including procurement, storage, handling, distribution, & disposal

7.4: Use of Chemical for Vessels & 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 monitor i) the cleaning of vessels, kitchen floor, dining hall, store room and gas station. Table-7 shows the cleaning agents used to clean the above-mentioned area;

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

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



Fig.3: Protecting Equipments & Cleaning Agents used for Vessel & Floor Cleaning

7.5: Recommendations: Eco Friendly – Green Cleaning Agents:

- It is recommended to use natural ingredients like orange peel extract & vinegar. It leaves a mild and pleasant fragrance after use. The formula is free from all harmful chemicals & toxins. It is pH-neutral, gentle on the skin as well as on the surface where it is used
- Also, these products are **IGBC GreenPro** certified. GreenPro is a mark of guarantee that the product is environment friendly throughout its life cycle



Fig.4: Green Pro Certified Eco-Friendly Cleaning Agents (ZERODER)

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PART- C: GREEN AUDIT REPORT

8. WATER UTILIZATION, CONSERVATION & WATER MANAGEMENT

8.1: Source of Water, Storage and Distribution:

Table-8 shows the source of water, location of storage along with their application.

Table-8: Source of Water, Location of Storage and Application

Type of Water	Source	Application
Fresh Water	Product RO Plant	Drinking application
Bore Water	Total No. of Bore-7(Running only 3 bore) 2 Nos (650 ft depth each) 1 Nos (750 ft depth) Canteen nearby: 1 No. Temple (main gate): 1 No. Main Auditorium:1 No	Utensil Cleaning, Bathing, Cloth Washing & RO Plant
Open Well	1 Nos (60 ft depth) Near Boys Hostel: 1 No.	Gardening, Boys Hostel, Girls hostel use
Rain Water Harvesting System (RWHS)	Collected from Size of the Tank: Length: 1 00 feet (30.48m) Breath: 60 feet (18.29m) Depth: 13 feet (3.96m) Volume of the Tank: 2207.61 m ³ Average Annual Rainfall: 700 mm Total volume of rain water harvested: 22,07,610 Litres (2207.61 m ³) Area: 557.47 m ³	➤ Used to increase the ground water ➤ To store building run-off only

8.2: Details of the Water Utilities, Storage, Motor Capacity and Approximate Run Hours:

The following table provides the details of the Water Utilities, Storage, Motor Capacity and Approximate Run Hours available inside the college for regular application.

Table-9: Details of the Water Utilities, Storage, Motor Capacity and Approximate Run Hours

S. No.	Location	Depth	Motor Capacity	Storage - I	Motor Capacity	Storage - II
1.	Canteen nearby	650 ft	5.5 kW	RO plant nearby sump (60,000 L)	5.5 kW	A – Block; (HDPE OH Tank) 12,000 L x 1 No;
2.						B – Block; (HDPE OH Tank) 12,000 L x 1 No
3.						C – Block; (HDPE OH Tank) 12,000 L x 1 No
4.	Temple (main gate)	650ft	4.4 kW	Nearby Main Gate sump (1,00,000 L)	5.5kW	Mess (HDPE OH Tank) 12,000 L x 1 No
5.						Boys Hostel; (HDPE OH Tank) 12,000 L x 1 No
6.						Girls Hostel (HDPE OH Tank)

						12,000 L x 1 No	
7.						RO Plant – 2; (HDPE Tank) 2,000 L x 1 No	
8.	Main Auditorium	–	5.5 kW	Open well	5.5 kW	Boys Hostel; 12,000 L x 1 No	
						Girls Hostel; 12,000 L x 1 No	
9.	RO Plant - 1	–	0.7 kW	RO plant nearby sump (6,000 L)	3.7 kW	HDPE Tank 1000 L x 2 Nos	A, B, C – Block, Office
10.	RO Plant - 2	–	0.7 kW	Nearby Mess sump (2,000 L)	3.7 kW	HDPE Tank 1000 L x 1 No	Mess, Boys Hostel, Girls Hostel

Note:

- ☞ All the Over Head (OH) tanks are made using cement construction.
- ☞ The maintenance team ensure to clean the tank for every six months (Twice in an year)
- ☞ Bleaching power is mostly used to clean the inside tank.

8.3: Treated Water for Drinking Application:

- The college management is keen on providing uninterrupted, safe and healthy drinking water to all; throughout the year.
- Water dispenser are provided at appropriate places offering the treated water for the students (Both Normal and Hot temperature)
- The overhead tanks storing the well water are cleaned at regular intervals and the water management team has been maintaining a cleaning schedule Utensil Cleaning, Bathing & Cloth Washing.





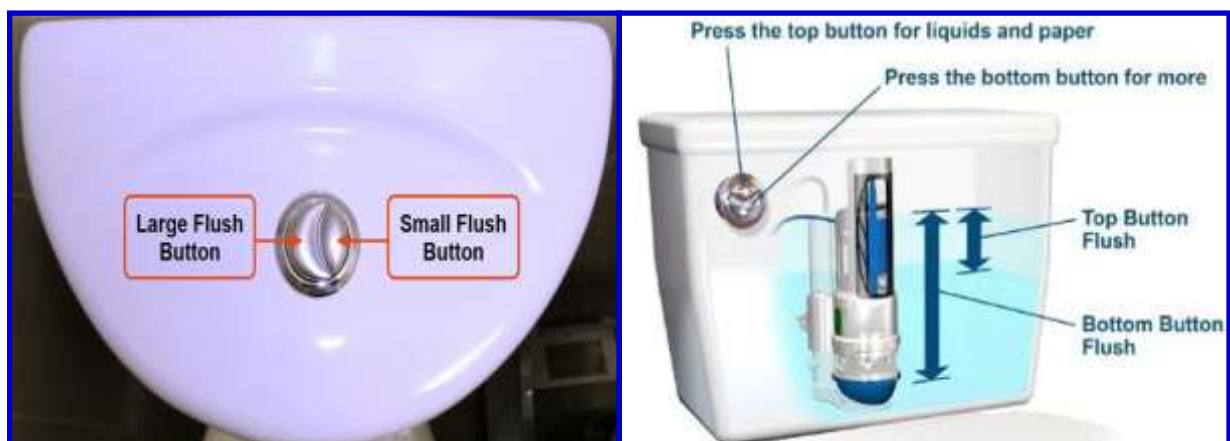
8.4: Water Savings in Foreign Toilets:

- The list of availability of Indian & Foreign style toilets are presented in the below Table-10.

Table-10: List of Indian & Foreign Style Toilets

S. No.	Location	Description (Quantity)	
		Indian	Foreign
1.	B-Block Ground Floor	12	6
2.	B-Block First Floor	0	14
3.	B-Block Second Floor	0	12
4.	B-Block Third Floor	0	12
5.	C-Block Ground Floor	0	12
6.	C-Block First Floor	0	12
7.	C-Block Second Floor	0	12
Total		12	80

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



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

- The audit team appreciates the effects taken by the management of **SSM Institute of Engineering and 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 pit
- The building run off are collected through each pit mostly located in each building. Common area and road run-off are properly collected and routed to nearby water body.
- The specifications of the integrated Rain Water Harvesting (RWH) system is given below;

S. No.	Description	Data
1.	Size of the tank	→ Length: 100 feet → Breadth: 60 feet → Depth: 13 feet
2.	Volume of the tank	2,207.6 m ³
3.	Average Annual Rainfall	700 mm
4.	Area	557.47 m ²
5.	Installation	2018



Fig.5: Based Rain Water Harvesting System

8.6: General Recommendations for Rain Water Harvesting:

- RWH has been fitted with their specifications indicating their i) year of installation, ii) approximate average rainfall and duration in the RWH location and iii) filter cleaning schedule (if any).
- Conduct a GIS based study on the improvement of ground water table especially before the rainy session and after rainy session. Compare the data and ensure that the water table improves due to percolation of rain water.
- Similar study must be conducted (in future) before installing an RWH and after RWH.
- Increase the no. of RWH pits and may be developed to place at least 2 per building.



Fig.6: Sample Name Board In front a Rain Water Harvesting System

8.7: Recommendations - Water Saving Boards:

It is recommended to place **SAVE Water** boards at appropriate places and ensure that, this will be done as a student movement.



8.10: Sewage Treatment Plant:

- It must be appreciated that the management of SSM-IET has implemented conventional wastewater treatment (with a capacity of 160 kLs/day).
- All the sewage waters are collected in main tank with a capacity of 120 & 60 kL. It is then agitated using raw sewage pump (2 HP motor of two no's are used) for specified period of time and then let it out to filter tank.
- From the main tank; the treated water is then passed to Aerator tank having 5.5 kW/7.5 HP blower used to deliver dissolved oxygen at 4-6 bar pressure. However, this motor is operated based on the quantity of the sewage collected. If the quantity is less (during lean period of college operation), this motor is turned off manually.
- Urea + TFA (Trifluoroacetic Acid) urea acts as an effective catalyst for sludge removal and processing is being added at regular interval.

- **Sludge Treatment and Usage:** All the sludges are settled in the tank and pumped back to main tank. Once the quantity of the sludge is appreciable; then it will be taken out and used as manure for gardening.
- The detailed specifications of the STP plants located inside the college is being represented below:

Table-JJ: Specification of the Sewage Treatment Plant (STP) to treat the Sewage

Location	Main Plant	Near Ladies Hostel
Collection Tank	120 kL	60 kL
Aeration – I Tank	200 kL	100 kL
Bar Screen Chamber	8 kL	6 kL
Deep Settler - I & II	60 kL	40 kL
Water Cleaning Sump	60 kL	30 kL
Treated Water Tank	60 kL	30 kL
No. of Sludge Bed	6 Nos (1.5 m x 1.5 m x 1.3 m)	6 Nos (1.2 m x 1.2 m x 1.3 m)
Application of sludge	Used as Manure	



Fig;JJ: Location of the Sewage Treatment Plant (STP) of 180 kL/day Capacity

8.8: General Recommendations:

- It is advisable to replace all the old taps without aerator into aerator-based taps in a phased manner.
- Aerators helps to reduce and regulate water flow and also offer the following benefits;
 - ✓ Lower Water Bills & Improved Water Pressure
 - ✓ Increased Filtration & Minimized Splashing
- All the pump motor must be fitted and controlled by floating sensor and hence the motors are automatically ON and OFF. It avoids the overflow; saves water and electrical energy.

- All the buildings are fitted with water flow meters & hence the water utilization must be properly accounted. Similar to the water flow meter; energy consumption of all pumping motors is recorded using panel board meters.
- Fault and leakage in the water distribution line will be promptly informed by the respective in-charges to the maintenance team and immediately arrested.

8.9: Installation on Fire extinguishers:

- The college has installed Fire extinguishers at all the vulnerable points.
- They are also refilled and in good condition (with adequate pressure indicated in the meter)



Fig.7: Sample Fire extinguishers & First Aid Kit Placed in the College

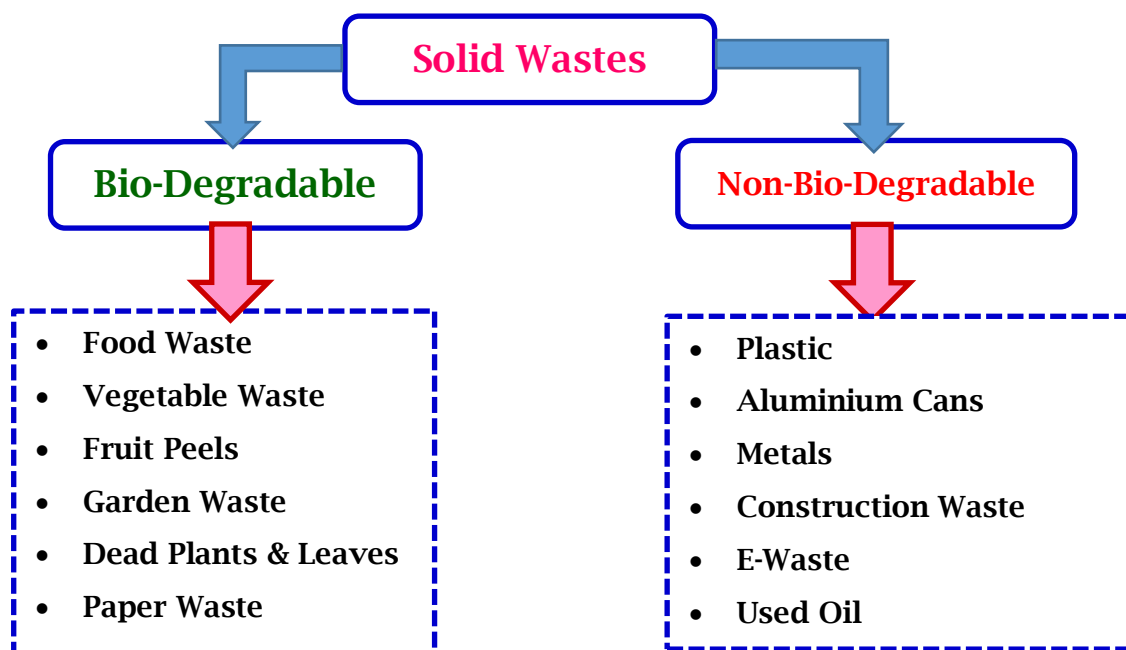
ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART – C: GREEN AUDIT REPORT

9. WASTE HANDLING & MANAGEMENT

9.1: Solid Waste Management System:

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



9.2: Process of Waste Management:

The college management practised some methods to treat the waste generated and Table-11 shows the process of treating the solid waste generated inside the college campus.

Table-11: Process of Waste Management

S. No.	Waste Type	Waste Treatment
Bio-Degradable Waste Management		
1.	Food and Vegetable Waste	<ul style="list-style-type: none">Collected and given to nearby fam
2.	Garden Wastes and Plant Leaves	<ul style="list-style-type: none">Daily collected and dumped in a yard
3.	Paper Waste	<ul style="list-style-type: none">Collected and stored in a separate place
		<ul style="list-style-type: none">Sold to third party for recycling
		<ul style="list-style-type: none">Daily paper waste stored in a yard
Non-Bio-Degradable Waste Management		
4.	Plastics	<ul style="list-style-type: none">Banned in the college campus (Welcome step).The chemical/salt storage containers are disposed to third party
5.	Construction Waste	Mostly used by their own construction and used for internal land filling
6.	Metals	Construction metals or metals from any other sources are stored & sale to third party for recycling
7.	Transport Oil + Tyres	Stored in a separate place and sold to third party
8.	DG Engine oil & Coolant	Stored in a separate place and sold to Construction Purpose Only

9.	Vehicle& Computer Batteries	Procuring new batteries with buyback offer (old battery replacement)
10.	Used edible oil	Almost zero waste. Mostly used for internal cooking and frying.
11.	E-Waste Management	Used for sale to third party for recycling

9.3: Standards Followed for Waste Handling & Management:

1. Solid Waste Management Rules – 2016
2. E-Waste Management Rules – 2016
3. Hazardous Waste Management Rules – 2016 (Management & Transboundary)
4. Battery Management Rules – 2001 (Management & Handling)

9.4: General Note:

- Prepare a flow chart for collection of E-waste from Generation to Disposal and paste it on appropriate places
- An electronic weighing scale (with suitable capacity) must be installed in the storage yard and should be properly calibrated
- One emergency lamp (with UPS supply) must be installed along with suitable fire extinguisher. Ensure proper ventilation in the yard
- Form rule for declaring the waste as E-Waste & Assign the signing authorities
- Identify a third-party vendor to procure the E-waste from the college
- Establish MoU with that party. Disseminate the following information at appropriate places i) E-Waste Policy, ii) Process Methodology, iii) Copy of MoU with third party vendor, iv) Contact persons mobile number and E-mail.
- Identify certain vehicle to carry the waste from generation to storage yard
- Provide training to the man power who are handling the waste
- Maintain separate Delivery Challan, Billing, weighing mechanism for handling the E-Waste
- Update the status of E-waste (through digital circular) to all the concerned management representatives, faculty members and staff at regular intervals (month wise is good)





Fig.8: Solid Waste Management (Collection, Segregation, Storage & Safe Disposal)

APeX Powelec

New No.42/Old.31, North Road, West CIT Nagar, Nandanam, Chennai - 600 035.
Tel: +9144 24322339, 24351571, Mob: 98414 42295, 98410 42293, 98414 22634.
E-mail: apex_ups_2000@yahoo.com / sales@apexups.com. www.apexups.com

Ref: DAT/SSM/0124
Dtd: 08.09.2023

To,
SSM Institute of Science & Technology
Dindigul

Dear Sir

Sub: Quotation for Supply of Battery.

With Reference to discussions had with you, we are herewith giving our best price as follows.

PRICE PROPOSAL

Sl.No	Description	Qty	Unit Price Rs	Amount Rs
1	Cost of 12V 26AH Quanta SMF Battery Warranty: 2Years	30Nos	2700/-	81,000/-
2	GST @ 28%			22,680/-
3	SUB TOTAL			1,03,680/-
4	Less: Buyback of Old Condemned Battery	30No's	350/-	(10,500/- 15000)
5	TOTAL			93,180/-

TERMS AND CONDITION

Tax : GST Mentioned as above
Payment : 100% advance with order
Validity : 10 days
Delivery Period : Immediate
Delivery Charges : Free of cost at Chennai/ Outstation extra as applicable on TO PAY Basis

We hope that the above rates are highly competitive and we are expecting your favorable orders at the earliest.
Thanking you and assuring you our best services and attention always.

Yours faithfully,
For APEX POWEELEC
R. Thiruganadam
(9841047304)

Final rate = Rs. 88680/-
For ECE Lab power back up purpose

**Fig.9: Sample Invoice copy for Old Battery Replacement with Buy-Back Offer
(Effective Battery Management)**

SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY, DINDIGUL

GATE PASS

Date: 26-02-2022

From

System administrator,
SSMIET,
Dindigul-624002.

To

The Principal
SSMIET
Dindigul-624002

Respected Sir,

(Sub: Requisition to gatepass for scrap -Reg.)

S.NO	MATERIALS	COUNT	PRICE
1	Monitor CRT ✓	12 x 100 ✓	1200 ✓
2	Monitor LCD ✓	12 x 50 ✓	600 ✓
3	SMPS ✓	28 x 30 ✓	840 ✓
4	Cabinet	14 x 20 ✓	280 ✓
5	Harddisc	3 x 50 ✓	150 ✓
6	Mother Board	11 (kg) ✓	640 ✓
7	Cisco Switch	2 x 40 ✓	80 ✓
		Total	3790 ✓

The above Mentioned Scrap materials are Taken from Department of CSE Hardware Lab, and Server room and Its given to (Sai Scraps Madurai +91 8610204299) Kindly provide a permission and gate pass to the same.

Non Returnable

Thank you

Do Rep 26/02/22
System administrator

Administrative Officer

[Signature]
Principal

verified
[Signature]
26/2/22

Fig.9: Sample Gate Pass to dispose the Old E-Waste Generated inside the College

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART - C: GREEN AUDIT REPORT

10. ASSESSMENT ON MATURE TREES, & BIO-DIVERSITY

10.1: 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 **20 with many varieties of trees.**

Table-12: List of Mature Trees available in the College Campus

S. No.	Location	Name of the Tree	Quantity
1.0	Entire Campus Location	Variety of Mature Trees	651



Total No. of Mature Trees available in the college campus is 651 which contributes for reduction of 14.2 Tons of CO₂ emission/Annum

14.5: Hot Water Generation using Solar Thermal System:

- In order to promote more green generation; the management has installed Solar Thermal system in the staff quarter's roof top and generates hot waters for bathing application
- It is a good practice to use renewable energy-based system for hot water generation by avoiding conventional heating methods (electricity or wood based)
- The specifications of the existing solar thermal hot water system are shown in Table-24.

Table-24: Specifications of the Solar Thermal Hot Water System

Total Capacity (LPD)	500 Litre x 2 Nos
Make and Model	GOODSUN
Location	Boys hostel
Panel Orientation	North - South face
Source of Water	Bore & Open Well
Application	Bathing only
Year of Installation	2016
Total Capacity	1,000

Energy Calculation:

S. No	Description	Parameters
1.	Assuming 70 % of the total capacity is being utilized	$= (0.8 \times 1,000)$ $= 800 \text{ Litres/Day}$
2.	Energy required to heat the water from ambient (25°C) to maximum of 60°C (Normal bathing temperature)	$= m \times C_p \times \Delta t$ $= 800 \times 1 \times (60-25)$ $= 28,000 \text{ kcal/Day}$

3.	Considering 10 % cumulative losses in the electric heating element + electrical network; then energy input to the heater is given by,	$= \frac{28,000}{0.9}$ = 61,111 kcal/day
4.	Electrical energy required to heat up the same quantity of water for the same condition is given by;	$= \frac{62,222}{860}$ = 36.2 kWh/Day
5.	If the college is running for nearly 200 full working day; then annual energy savings will be;	7,240 kWh/Annum



Annual energy saved from the solar hot water system used for bathing is **7,240 kWh** which reduces **5.9 Tons of CO₂ Emission/Annum**.

10.2: Recommendations to Grow 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 workspace can help remove at least three household toxins (benzene, formaldehyde, and trichloroethylene)



TULSI: Generates more oxygen per day



Aloe Vera:

- Removes benzene and formaldehyde
- Eliminate harmful microorganism and absorb dust



Snake Plant:

- Removes Xylene, Benzene, Formaldehyde, Trichloroethylene toxins.



Spider Plant:

- Removes CO and Formaldehyde
- Absorbs Nicotine



Money Plant (Devil IVY):

- **Best air purifying plant**
- **Remove benzene & Formaldehyde**



Bosten Fern:

- **High humidity application**
- **Remove xylene & Formaldehyde**



Chrysanthemum:

- **Removes Ammonia, Xylene, Benzene & Formaldehyde**



Kimberly Queen Fern:

- **Works well in carriage**
- **Absorb vehicular exhaust**

10.3: Recommendations for Miyawaki Forest:

Miyawaki is a technique (also called *Potted Seedling Method*) as that helps build dense, native, multi-layered forests. The approach is supposed to ensure that plant growth is 10 times faster and the resulting plantation is 30 times denser than usual. It involves planting dozens of native species in the same area, and becomes maintenance-free after the first three years. The overall density of the forest is beneficial in lowering temperature, making soil nutritious, supporting local wildlife and sequestration of carbon.



10.4: 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.



Fig. 11: Presence of Open Well inside the College Campus

10.5: 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.

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

11. AUDIT SUMMARY & CONCLUSION

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

II. Water Conservation & Management:

- Utilize more amount of treated water; since most of the approving agencies like AICTE, UGC etc., are now requesting to utilize the treated water
- To check the quantity of water utilized by each building 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 environmentally 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/Salts and safe disposal through 3rd party
- Water treatment log 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
- 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

III. 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 Students on Vehicle Operation**
- ❖ **Training for Kitchen Employees**
- ❖ **General Medical Camps for Employees**
- ❖ **Training on Stress Management and Yoga**

IV. 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 needed 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
- 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 report is prepared as a part of the Energy, Environment and Green Audit process conducted at **SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY**, Dindigul – Palani Highway, Dindigul -624 002, Tamilnadu, India. by **RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING**, Coimbatore-641 109 Tamil Nadu, India.

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**
son / daughter of Mr. **P RATHINAVELU** 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.

Place : Chennai, India

Date : 22nd April, 2019

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

Controller of Examination



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

it is hereby certified that

Dr. S. R. Sivarasu

has successfully completed the above mentioned course and examination

08th - 12th December 2017

Coimbatore, India

Certificate No. 3521 2982 02

Delegate No. 71968

for TÜV NORD CERT GmbH

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.

TÜV NORD CERT GmbH

Langemarckstraße 20

45141 Essen

www.tuev-nord-cert.com





