BHARATHIYAR
INSTITUTE OF ENGINEERING FOR WOMEN
DEVIYAKURICHI, SALEM – 636112.

7.1 Institutional Values and Social Responsibilities

7.1.3 Quality audits on environment and energy regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following

Energy, Environment & GreenAudit

Report & Certificates

and

Policy Documents

Criterion 7	Institutional Values and Best Practices	100

7.1 Institutional Values and Social Responsibilities(50)

7.1.3: Quality audits on environment and energy regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following
1. Green audit / Environment audit
2. Energy audit
3. Clean and green campus initiatives
4. Beyond the campus environmental promotion activities

Responses:

Option: A –All of the Above

1. Green audit/environmental audit report from recognized bodies.

The link for the additional information pertained to the above quality indicator framework is as follows:

TABLE OF CONTENT

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

AUDIT CONDUCTED FOR

BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN

Deviyakurichi, Thalaivasal, Attur,

Tamil Nadu 636 112, India.

DATE OF AUDIT

24 FEBRUARY 2023

AUDIT CONDUCTED BY

RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING

(Chennai ♦ Coimbatore ♦ Erode)

Mobile: +91- 80567 19372, 99420 14544 (Whatsapp) E-mail: ramkalamcect@gmail.com

ACKNOWLEDGEMENT

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. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,** Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, 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. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN** 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 college / technical / non-technical divisions and office members who were directly and indirectly involved with us during collection of data and while conducting the field measurements.

Management Team Members	
Mr. S. ELAYAPPAN., B.Sc	Chairman
Dr. A.K. RAMASAMY	Secretary
Mr. S.R.T. SELVAMANI	Treasurer
Dr. R. PUNIDHA., M.E., Ph.D.,	Principal

Audit Team Member	
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**

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

1. ACKNOWLEDGEMENT

D. P. PUNITHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (PK), SALEM (DT).

1.1: Vision:

➢ To achieve the dream of Tamil Poet **Mahakavi Bharathiyar "Kanavu Meipada Vendum"**, we committed to serve the State and the Nation by grooming Professionally Educated, broadly talented Women Engineering Graduates, developing innovative technologies through high quality Research and empowering Women Students to meet the challenges in the Society.

1.2: Mission:

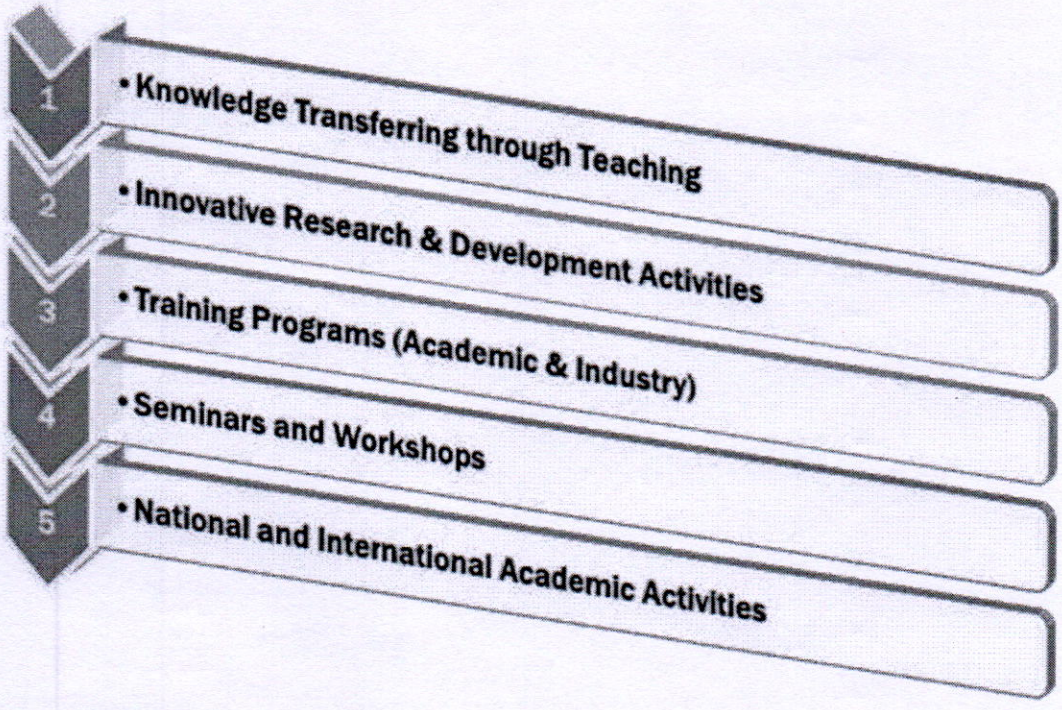
→ To prepare our students by imparting knowledge with focuses on academic competence, Social skills and moral values.

→ To empower our students as capable Engineers with inventiveness and truthfulness to meet the Technological challenges in their career.

→ To create our students having strong bond between the Institute and Industry for Technology Updation.

→ To develop our students as Intellectual leaders to emerge in their Professions.

1.3: Major Activities in the Institution:

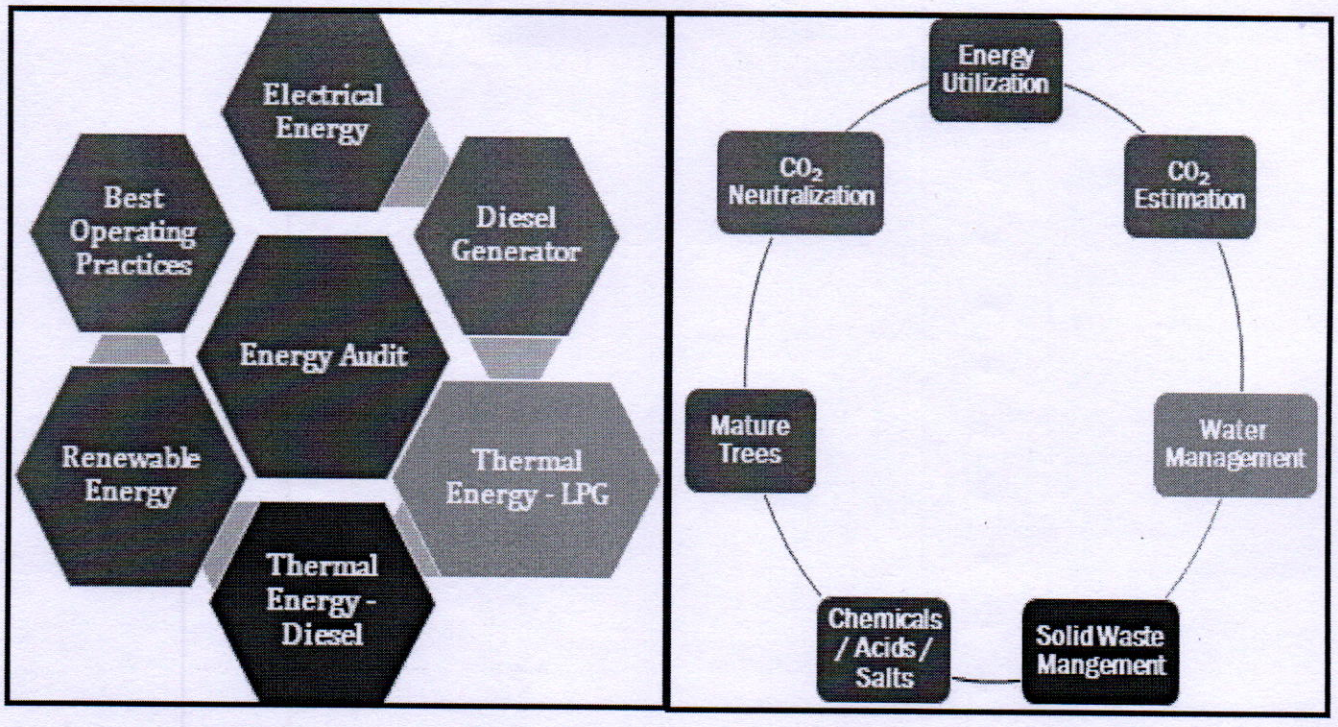


1.4: Scope of the Audit Process:

- **Energy 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).
- **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 greenery in terms of mature trees, flowering shrubs, bushes, medicinal plants, adoption of green energy generation and utilization, reduction of CO_2 due to green energy system and identification of possible implementation and enhancement of current greenery practices

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

1.5: Coverage In the Environment & Green Audit Process:



1.6: Standards Used:

- Bureau of Energy Efficiency (BEE) Guidelines to conduct the detailed energy audit process
- **ISO 14064-Part-1** – Specification with guidance at the organization level for quantification and reporting of GHG emissions and removals (Second Edition)
- **ISO 14064-Part-2** – Specification with guidance at the project level for quantification, monitoring and reporting of GHG emissions reductions or removal enhancement (Second Edition-2019)
- **ISO 14064-Part-3** – Specification with guidance for the verification and validation of GHG statements (Second Edition-2019)
- The Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard (Revised Edition) released by World Resources Institute & World Business Council for Sustainable Development – 2014
- Ministry of Environment, Forest and Climate Change Notification on **"Battery Waste Management Rules, 2020" & "E-Waste (Management) Rules, 2016", & "Solid Waste Management Rules, 2015"s**

1.7: Date of Audit:

24	FEBRARY	2023

Dr. P. PUNIDHA, M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
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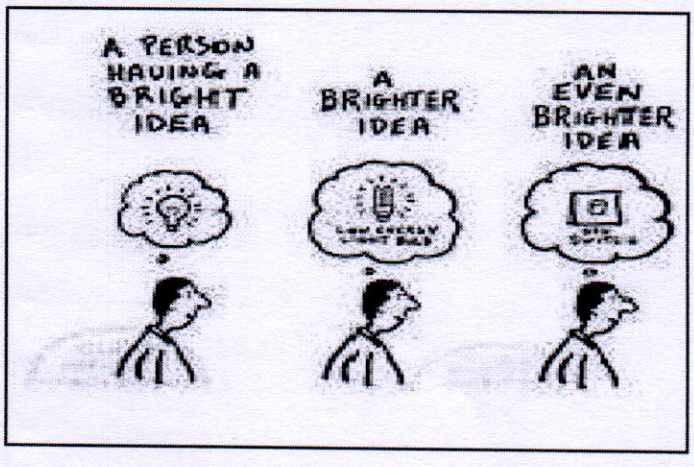
ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

2. EXECUTIVE SUMMARY & ENERGY CONSERVATION PROPOSAL (ENCONs)



Dr.R.PUNIDHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

EXECUTIVE SUMMARY

2.1 Electrical and Thermal Energy Analysis:

A detailed audit was conducted in **M/s. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,** Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India. The audit team has come out with ***06 Energy Conservation Proposals (ENCONs)*** and the summary of all the ENCONs are given below:

S. No.	Description	Parameters		
		Present	After	Savings
1.	Annual Energy Consumption	78,829 kWh + 4,349 kg	1,90,874 kWh + 3, 117 kg LPG	**28,133 kWh + 544 kg LPG**
2.	Annual CO2 Emission	77.6 Tons	52.9 Tons	**24.7 Tons**
3.	Annual Energy Cost	Rs. 11.2 Lakhs	Rs. 8.1 Lakhs	**Rs. 3.1 Lakhs**
4.	Initial Investment Required			**Rs. 3.6 Lakhs**
5.	Simple Payback Period	–	–	**Nearly 1.2 Years**
6.	Overall Energy Savings	**35.7 % Electrical + 12.5 % LPG**		

Note:

- Apart from the Energy Conservation, the audit team proposes ***10 technical recommendations*** focusing on energy, equipment's life improvement, safety and best operating practices

Audit Conducted and Verified by

(Dr. S.R. SIVARASU)

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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.	Reduction of Cable Losses & Active Power Consumption using DB Level Capacitor Compensation.	1.0 % (Electrical)	7,883 kWh	70,947	30,000	0.4 Years
2.	Replacement of Existing Water Pumps into BEE Star Labelled Energy Efficient Pumps.	20 % Pump & Motors	3,450 kWh	31,050	40,000	1.3 Years
3.	Replacement of Fluorescent Lamps with Energy Efficient Lamps (Swap FTL to LED Lamps)	50 % on Lighting	6,000 kWh	54,000	40,000	0.7 Years
4.	Replacement of Existing Convention Ceiling Fans into Electronically Commutated BLDC Fans.	50 % on Fans Load	10,800 kWh	97,200	1,80,000	1.9 Years
5.	Reduction of LPG Consumption using Regular Burner Cleaning and Swapping of Active Burners.	5 % of LPG used for Stove	109 kg	10,464	5,000	0.5 Years
6.	Reduction of LPG Consumption in Dosa making Stove with Radiant Burners.	20 % of LPG for Dosa Stove	435 kg	41760	60,000	1.4 Years
Total			**28,133 kWh + 544 kg LPG**	**3,05,421**	**3,55,000**	–

2.2: Recommended Best Operating Practices for better Energy Conservation & Management:

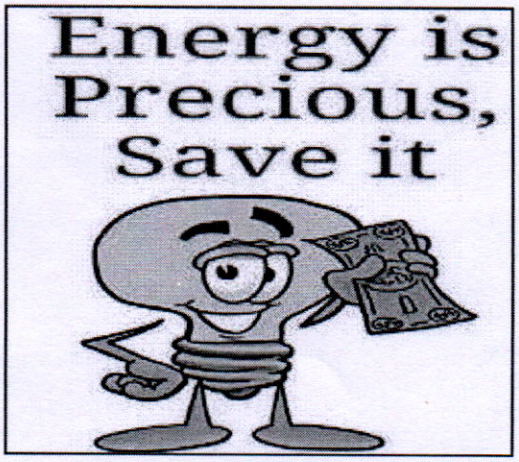
- Operate the transformer mostly at 50 % load and reduce the self-loss of the transformer.
- Replace the existing transformer into IS-1180 star rated energy efficient transformer
- Conduct Infrared Thermography audit at regular intervals and identify the thermal hotspots.
- Also conduct voltage drop test for the longest electrical path and determine the voltage regulation
- Along with the voltage drop test; conduct voltage unbalance and determine the % unbalance.
- All the SSB must be fitted with digital energy meters & connected with EMS
- Retrofit of AIRCON Energy saver & Optimization of Air Conditioning Operation
- Measure the weight of each cylinder while purchasing & Past a cylinder history tag
- Display the monthly energy & water consumption to all stakeholders

Dr.R.PUNIDHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-A: ENERGY AUDIT REPORT

3. STUDY ON ENERGY CONSUMPTION & GENERATION PATTERN



3.1: Energy Consumption Pattern (Electrical and Thermal):

S. No.	Description	Details			
Electrical Energy (Consumption)					
1.	Energy Suppliers	TANGEDCO			
2.	Availability of Electricity Services & their Demand	LT Service with Sanctioned Demand of **112 kW**			
3.	Specifications of DGs	40 kVA with internal fuel tank (100 Litre capacity)			
Annual Electricity Consumption (kWh)					
		2019-20	**2020-21**	**2021-22**	**2022-23**
EB (kWh)		92,123	57,457	79,682	78,829
Thermal Energy (Consumption)					
4.	Types of Thermal Energy Used	Liquified Petroleum Gas (LPG)			Cooking
		Diesel (Ordinary)			Transport + DG
Annual Fuel Consumption					
		2019-20	**2020-21**	**2021-22**	**2022-23**
LPG (kg)		6,513	819	4,154	4,349
Diesel-Transport (L)		26,223	24,841	24,603	28,727
Diesel-DG (L)		206	206	287	383
General Loads (Both Electrical and Thermal)					
5.	Lighting System	• **Indoor lighting:** All the indoor lighting is fitted with Energy Efficient LED lamps.			
		• **Outdoor lighting:** All the street lightings are LED based energy efficient lamps.			
6.	Lighting Feeder	• Lighting loads are separated from raw power and are supplied through lighting distribution board			
7.	Fan Loads (Ceiling)	• All the indoor ceiling fans are conventional fans			
8.	HVAC System	• Unitary air conditioning system installed in the required places • Most of the AC units are **BEE star rated** and the outdoor units are mostly placed in shade • A welcome step in the energy conservation is; all the air-conditioned rooms are set with 24°C as room temperature as per BEE norms			

Dr. R. PRINDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

9.	Motors and Pump loads	• Mainly used for water distribution, purification, waste water treatment • Small motors are used in kitchen equipment's • Necessary sensors are placed to on/off to motor; when the overhead tanks filled with water.
10.	Uninterrupted Power System (UPS)	• All the computers, servers, surveillance systems, projectors, telephonic units are connected with UPS with nominal back up time of **30 min.**

Table-2: Annual Consumption of Electrical & Thermal Energy Parameters (for the year 2022-2023)

S. No.	Month	Electricity Consumption (kWh)	LPG Consumption (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jan-22	3,301	507	10	2,890	2,900
2.	Feb-22	4,150	390	21	2,456	2,477
3.	Mar-22	4,678	390	27	1,945	1,972
4.	Apr-22	7,035	351	15	3,010	3,025
5.	May-22	9,032	351	17	2,578	2,595
6.	June-22	9,128	312	32	2,840	2,872
7.	July-22	9,230	332	31	2,210	2,241
8.	Aug-22	7,025	273	80	2,800	2,880
9.	Sep-22	5,800	410	29	2,300	2,329
10.	Oct-22	7,010	390	51	1,783	1,834
11.	Nov-22	6,320	293	32	1,731	1,763
12.	Dec-22	6,120	351	38	1,801	1,839
Total		**78,829**	**4,349**	**383**	**28,344**	**28,727**

➢ **The cost of the Electricity is Rs.9.20/kWh & The cost of the LPG is nearly Rs.94.60/kg**

Table-3: Annual Consumption of Electrical & Thermal Energy Parameters (for the year 2021-2022)

S. No.	Month	Electricity Consumption (kWh)	LPG Consumption (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jan-21	3,205	702	9	2,440	2,449
2.	Feb-21	4,254	371	7	2,245	2,252
3.	Mar-21	4,568	351	24	1,800	1,824
4.	Apr-21	8,035	371	11	3,006	3,017
5.	May-21	9,421	371	11	2,118	2,129
6.	June-21	9,642	234	36	2,242	2,278
7.	July-21	9,762	234	25	1,866	1,891
8.	Aug-21	6,928	195	90	2,711	2,801
9.	Sep-21	5,388	371	20	2,002	2,022
10.	Oct-21	7,072	371	23	258	281
11.	Nov-21	5,940	215	8	1,628	1,636

Dr. P. PRINCIPAL, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

12.	Dec-21	5,467	371	23	2,000	2,023
Total		**79,682**	**4,154**	**287**	**24,316**	**24,603**
➢ **The cost of the Electricity is Rs.9.56/kWh & The cost of the LPG is nearly Rs.93.60/kg**						

Table-4: Annual Consumption of Electrical & Thermal Energy Parameters (for the year 2020-21)

S. No.	Month	Electricity Consumption (kWh)	LPG Consumption (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jan-20	5.223	234	9	1.732	1.741
2.	Feb-20	5.267	312	7	1.873	1.880
3.	Mar-20	7.706	273	23	1.882	1.905
4.	Apr-20	6.943	0	11	3.284	3.295
5.	May-20	4.815	0	11	2.366	2.377
6.	June-20	4.475	0	35	2.422	2.457
7.	July-20	4.185	0	25	1.905	1.930
8.	Aug-20	3.020	0	10	3.000	3.010
9.	Sep-20	4.254	0	19	2.002	2.021
10.	Oct-20	3.625	0	24	306	330
11.	Nov-20	3.560	0	9	1.824	1.833
12.	Dec-20	4.384	0	23	2.039	2.062
Total		**57,457**	**819**	**206**	**24.635**	**24.841**
➢ **The cost of the Electricity is Rs.9.00/kWh & The cost of the LPG is nearly Rs.92.0/kg**						

Table-5: Annual Consumption of Electrical & Thermal Energy Parameters (for the year 2019-2020)

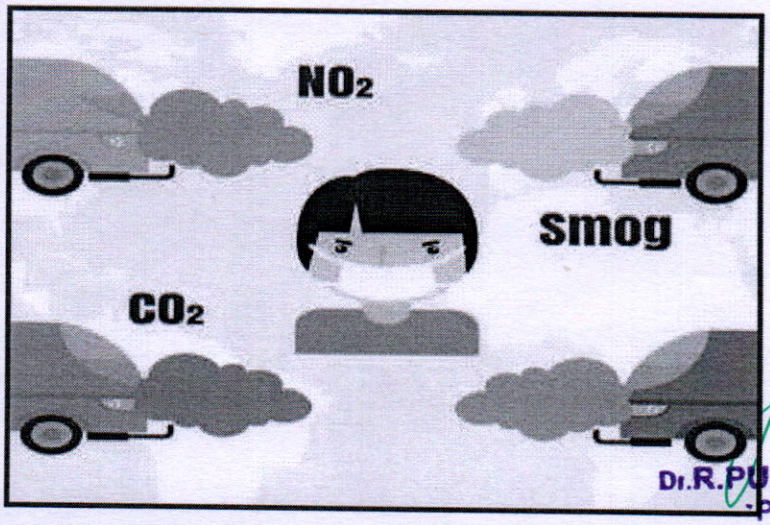
S. No.	Month	Electricity Consumption (kWh)	LPG Consumption (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jan-19	8,236	312	9	1,840	1,849
2.	Feb-19	7,866	332	7	1,735	1,742
3.	Mar-19	8,139	293	24	1,772	1,796
4.	Apr-19	9,126	332	11	3,185	3,196
5.	May-19	7,039	702	11	2,265	2,276
6.	June-19	8,957	332	35	2,341	2,376
7.	July-19	6,310	702	25	1,802	1,827
8.	Aug-19	9,324	702	9	3,010	3,019
9.	Sep-19	6,460	702	20	2,500	2,520
10.	Oct-19	6,805	702	23	1701	1,724
11.	Nov-19	7,163	702	8	1,932	1,940
12.	Dec-19	6,698	702	23	2,140	2,163
Total		**92,123**	**6,513**	**206**	**26,223**	**26,429**
➢ **The cost of the Electricity is Rs.9.00/kWh & The cost of the LPG is nearly Rs.66.0/kg**						

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-B: ENVIRONMENT AUDIT

4. ESTIMATION OF CO_2 EMISSION & NEUTRALIZATION

(ELECTRICITY, DIESEL, LPG, SOLAR PV, WIND ENERGY SYSTEM & MATURE TREES)



4.1: Assessment of Annual Energy Usage:

Table-6 shows the types of energy carriers used for their regular operation in the college campus along with application area and their source.

Table-6: Energy Carriers, Application area and their sources used for College Operation

S. No.	Type of Energy Carrier	Application Area	Source of Procurement
1.	Electricity (LT Consumer)	Powering to all class room/laboratory equipment's/Lightings/Fans/HVAC & Allied System/Motors / Pumps	TANGEDCO
2.	Diesel	Transport vehicles and Diesel Generator (Captive Generation)	Authorised distributor
3.	Liquified Petroleum Gas (LPG)	Used for cooking application	
4.	Mature Trees, Shrubs & Flowering Bushes	Nearly **1,246 Nos** of different varieties with nearly **10 years** old.	
		Lush greenery covered with higher number of Shrubs, Flowering Bushes & Maintaining the water bodies (existing)	

4.2: Environmental System: CO_2 Balance Sheet:

The following tables provide the balance sheet indicating various energy carriers associated with the regular activities and their CO_2 mapping.

Table-7: Environmental System: CO_2 Balance Sheet (for the year 2022-23)

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	78,829 kWh	64.6	Trees	1,246 Nos	27.2
2.	Diesel	28,727 Litres	75.8			
3.	LPG	4,349 kg	13.1			
Total Emission			153.5	Total-Neutralized		27.2
Balance CO_2 to be Neutralized = 126.4 Tons/Annum.						

Table-8: Environmental System: CO_2 Balance Sheet (for the year 2021-2022)

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	79,682 kWh	65.3	Trees	1,246 Nos	27.2
2.	Diesel	24,603 Litres	65.0			
3.	LPG	4154 kg	12.5			
Total Emission			142.8	Total-Neutralized		27.2
Balance CO_2 to be Neutralized = 115.6 Tons/Annum.						

Dr.R.PUNIDHA M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIYASAL (TK), SALEM (DT).

Table-9: Environmental System: CO_2 Balance Sheet (for the year 2020-2021)

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	57,457 kWh	47.1	Trees	1,246 Nos	27.2
2.	Diesel	24,841 Litres	65.6			
3.	LPG	819 kg	2.5			
Total Emission			115.2	Total-Neutralized		27.2
Balance CO_2 to be Neutralized = 88.0 Tons/Annum.						

Table-10: Environmental System: CO_2 Balance Sheet (for the year 2019-2020)

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	92,123 kWh	75.5	Trees	1,246 Nos	27.2
2.	Diesel	26,429 Litres	69.8			
3.	LPG	6,513 kg	19.5			
Total Emission			164.9	Total-Neutralized		27.2
Balance CO_2 to be Neutralized = 137.7 Tons/Annum.						

4.3: Calculation Table:

For Electricity = $\left[\text{kWh x } \frac{0.82 \text{ kg of CO2 emission}}{\text{kWh}}\right]$
For Diesel = $\left[\text{Diesel Consumption (Litre)x } \frac{2.64 \text{ kg of CO2 emission}}{\text{Litre of Fuel Consumption}}\right]$
For LPG = $\left[\text{LPG Consumption (kg)x } \frac{3.0 \text{ kg of CO2 emission}}{\text{kg of LPG Consumption}}\right]$
For Wood = [Wood Consumption (kg)x 1.9 kg of CO2 Emission]
A mature tree is able to absorb nearly CO_2 at a rate of 21.8 kg/annum; $\frac{(21.8\,x1{,}246)}{1{,}000} = 27.2\ \frac{\text{Tons}}{\text{Annum}}$

4.4: References:

[1] https://ecoscore.be/en/info/ecoscore/co2

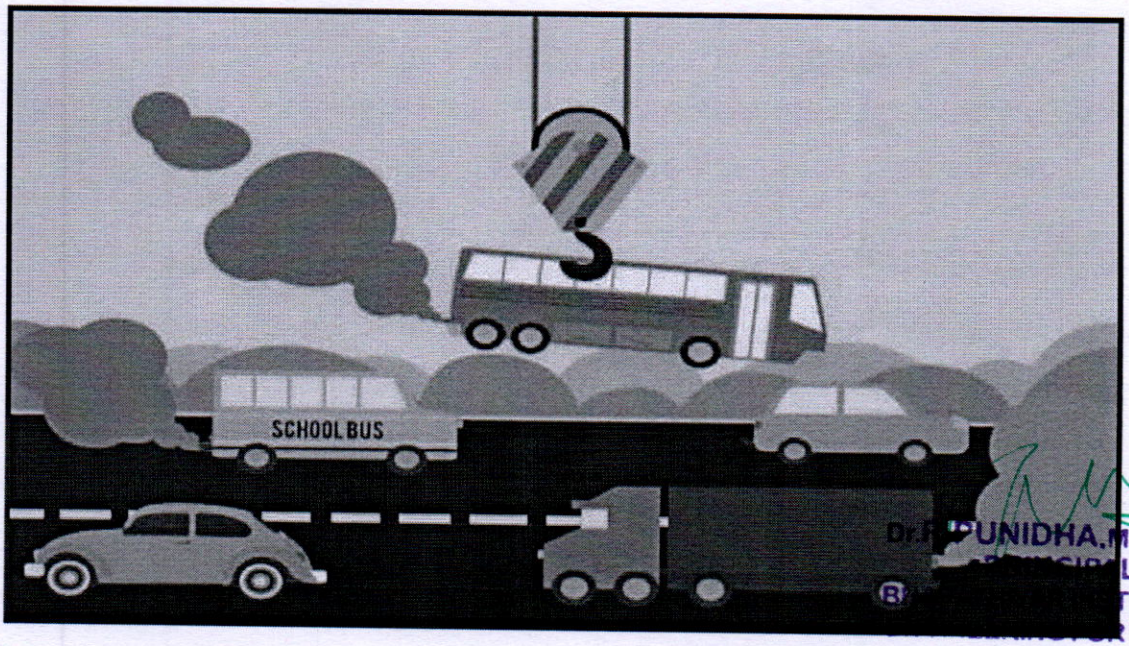
[3] http://www.tenmilliontrees.org/trees/#:~:text=A%20mature%20tree%20absorbs%20carbon,the%20average%20car's%20annual%20mileage

Dr.R PUNIDHA M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-B: ENVIRONMENT AUDIT

5. TRANSPORT & REFRIGERANT GASES IN AC SYSTEM



5.1: 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-11.

Table-11: List of Transporting Vehicles available in the College

S. No.	Type of Vehicle	Type of Engine	Fuel used	No. of vehicles	Pollution certified (Y/N)
1	BUS	BS-II	Diesel	09	Yes

5.2: Air Conditioning System along with its Refrigerant:

Most of the unitary AC system has **R-22** as refrigerant which has **Global Warning Potential (GWP) of 1,810** and **Ozone Depletion Potential (ODP) is Medium.** Some of the newly installed AC system are having R-32 as refrigerant which has **Global Warning Potential (GWP) of 675** and **Ozone Depletion Potential (ODP) is Zero.**

Table-12: Availability of the Unitary AC system in the Entire College Campus

S. No.	Location	Capacity	Quantity	Total TR Capacity
1.	Main Block	1.5 TR	5	7.5 TR
2.	EEE Block	1.5 TR	3	4.5 TR
3.	S&H Block	1.5 TR	3	4.5 TR
4.	Mech Block	1.5 TR	1	1.5 TR
5.	Library Block	1.5 TR	2	3.0 TR
Total			**14 Nos**	**21.0 TR**

- The most common refrigerant in the past was a CFC, most commonly called as Freon. Freon was a brand name for a refrigerant "R-12" by DuPont. In the 1990s and 2000s, the CFCs were replaced with HCFCs (hydrochlorofluorocarbon) and the most common HCFC is "R-22". 50-60% of Air Conditioners in India still (in 2016) use HCFCs. However, HCFCs are just marginally better than CFCs as they contain chlorine, which is harmful for the environment. As per Indian Government's plan, HCFCs will be phased out from India by the year 2030.
- **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

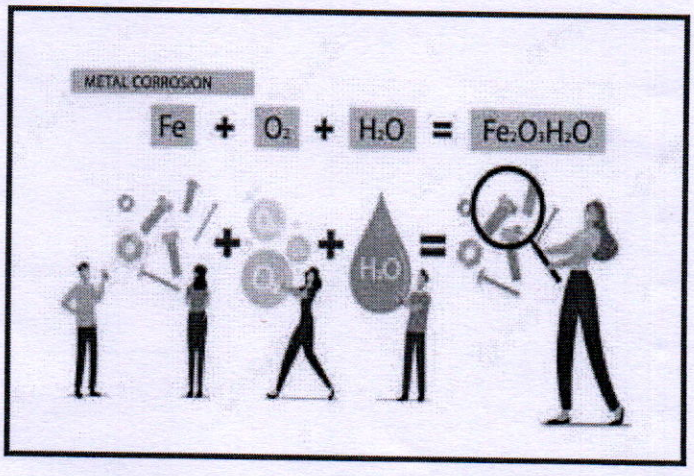
Dr.R.PUNITHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIDHAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYARICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENVIRONMENT & GREEN AUDIT REPORT

ENVIRONMENT AUDIT REPORT

6. USAGE OF CHEMICALS, SALTS & ACIDS

(STORAGE, HANDLING & BEST OPERATING PRACTICES)



Dr.R.PUNIDHA M.E.,PH.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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

The science departments 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 preventaccidents
- 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

6.2: 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 STP
- Only trained teaching and non-teaching staffs are handling the chemicals and also, they are well trained to handle any abnormal situations
- Laboratories with chemicals are well ventilated with proper emergency exits. Adequate and correct sequence of fire extinguishers are placed near all the laboratories

Fig.1: Storage of Chemicals/Salts/Acids & Storage (General Engineering Laboratory)

Dr.R.PUNITHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

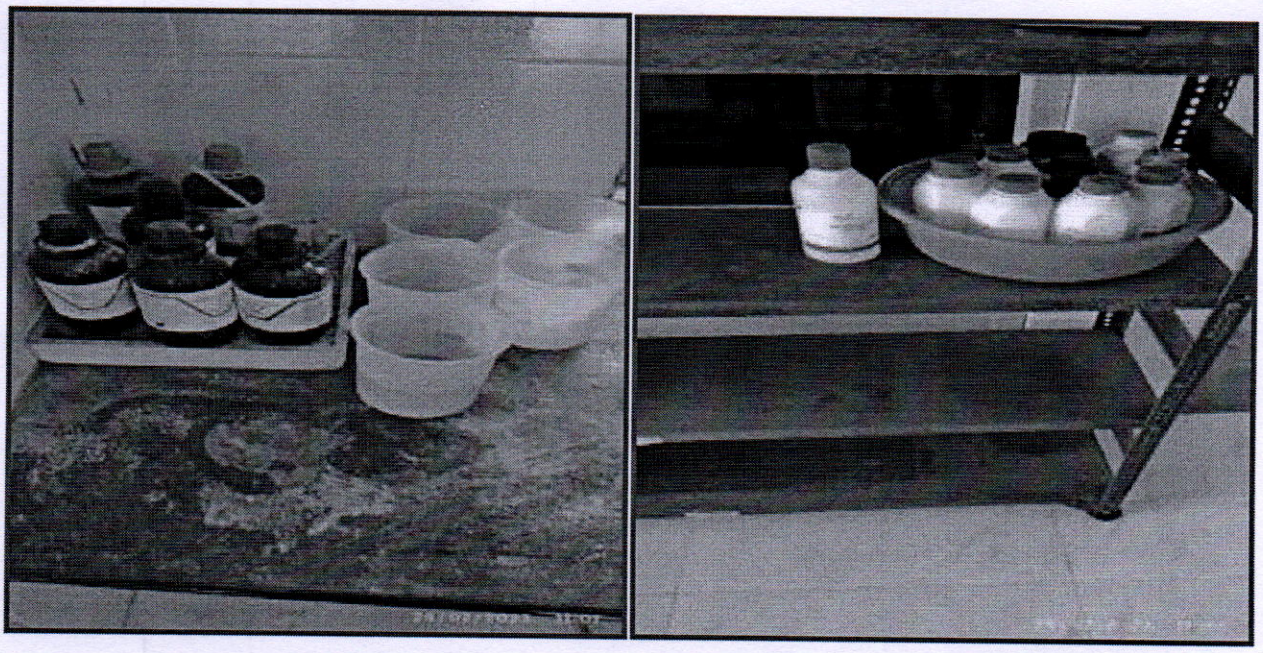


Fig.2: Storage of Chemicals/Salts/Acids & Storage – Sand Bed for Concentric Chemicals

6.3: 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

6.4: 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-13 shows the cleaning agents used to clean the above-mentioned area;

Table-13: Cleaning Agents used for Floor and Vessel Cleaning

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

Dr.R.PUNIDHA M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

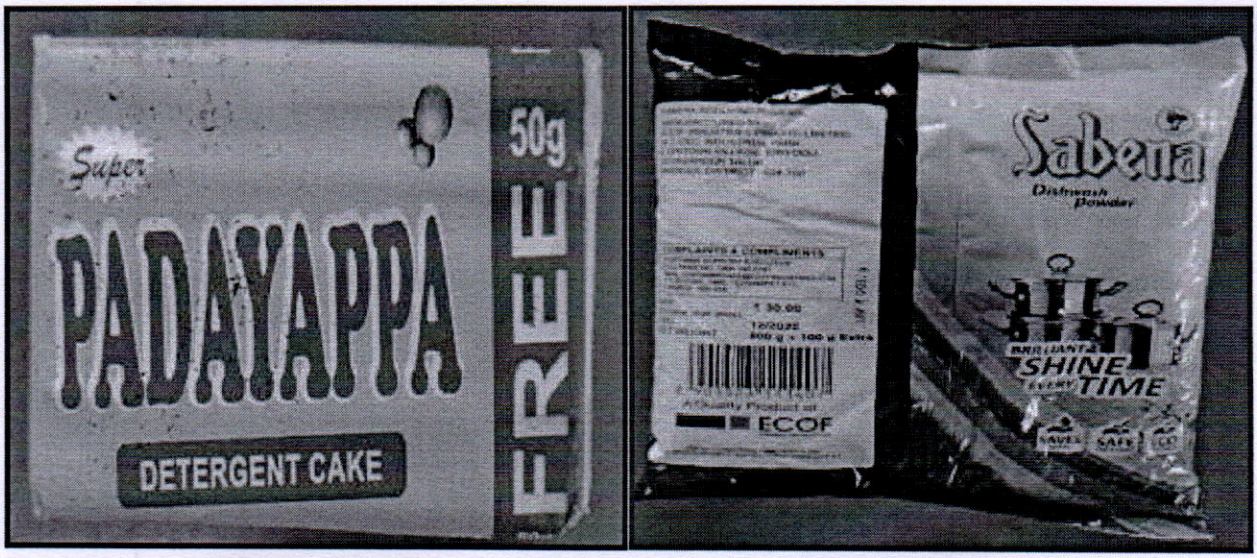


Fig.3: Cleaning & Refreshing Agents used for Vessel & Floor Cleaning

6.5: Recommendations: Eco Friendly – Green Cleaning Agents:

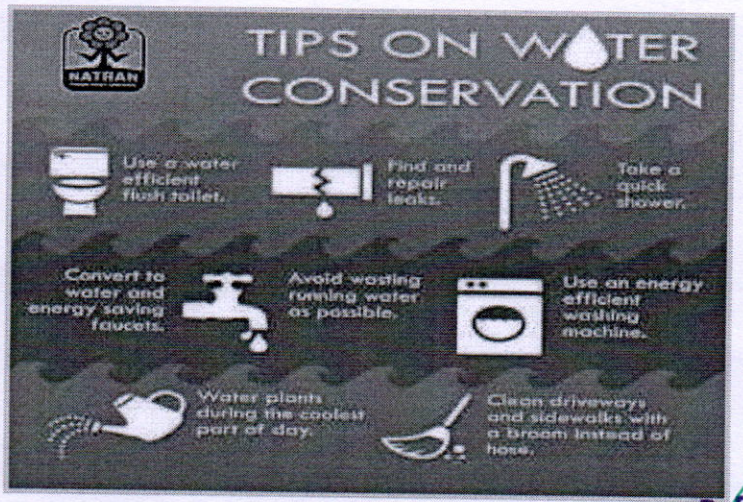
- On an average; the cleaning agents used today have about 62 harmful chemicals like Paraben, Phosphates or Chlorides. A lot of them are multi-purpose cleaners
- It is recommended to use natural ingredients like orange peel extract & vinegar. It leaves a mild and pleasant fragrance after use. The formula 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 shows the sample eco-friendly Green Pro certified cleaning agents

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

ENVIRONMENT & GREEN AUDIT REPORT

GREEN AUDIT REPORT

7. WATER UTILIZATION, WASTE WATER MANAGEMENT



D. R. PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

7.1: Source of Water, Storage and Distribution:

Table-14 shows the source of water, location of storage along with their application.

Table-14: Source of Water, Location of Storage and Application

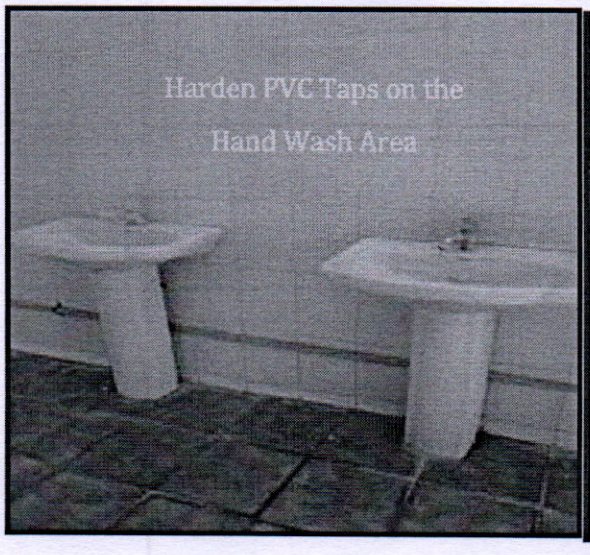
Type of Water	Source	Application
Drinking Water	• Bore water – **1 No** • Near A-Block (750 ft)	Drinking & Cooking (through RO)
		Utensil Cleaning, Bathing & Cloth Washing
Rain Water	Collected from i) buildings run off and ii) road run-offs	Used to increase the ground water level
Grey Water from RO Plant	Final treated water from RO plant	Gardening application

7.2: Treated Water for Drinking Application:

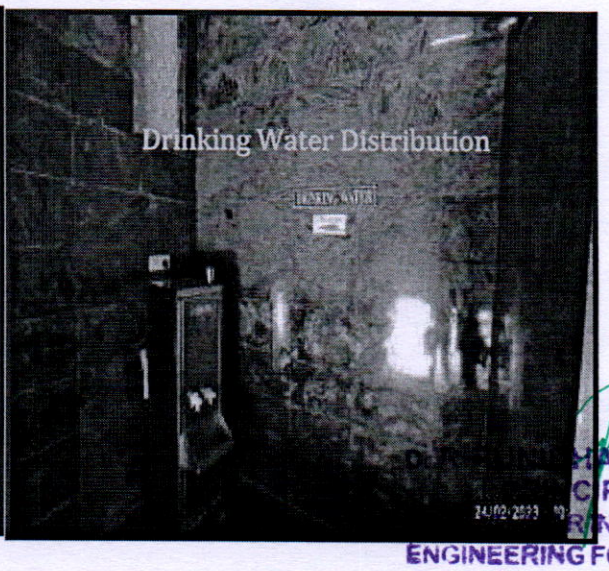
- **1 No** of borewell are available in the college campus connected with 7.5 HP pump running for nearly 5 hours/day.
- The college management is keen on providing uninterrupted, safe and healthy drinking water to all; throughout the year.
- The college has one RO plant of **1,500 LPH** capacity to treat bore water and ensure best quality of potable water. The RO water is then stored in a HPDE tank of **3,000 Litre capacity**.
- For one litre of water input; only 25 % is the RO water & the remaining 75 % is grey water. This water is then used for gardening application.
- All the overhead tanks storing the drinking water are cleaned at regular intervals and the water management team has been maintaining a cleaning schedule
- In A-Block nearly **10,000 litre capacity** cement tanks + C- Block **25,000 litre** cement tanks are placed
- These tanks are cleaned every month during the monthly maintenance schedule. These tanks are cleaned for every three months once.

7.3: Water Control Taps & Water Distribution for General Application:

In the college, the Openable taps (Both PVC + Metal) are employed for all water distribution and utilization application and hence the user can utilize only the required quantity of water.



Harden PVC Taps on the Hand Wash Area



Drinking Water Distribution

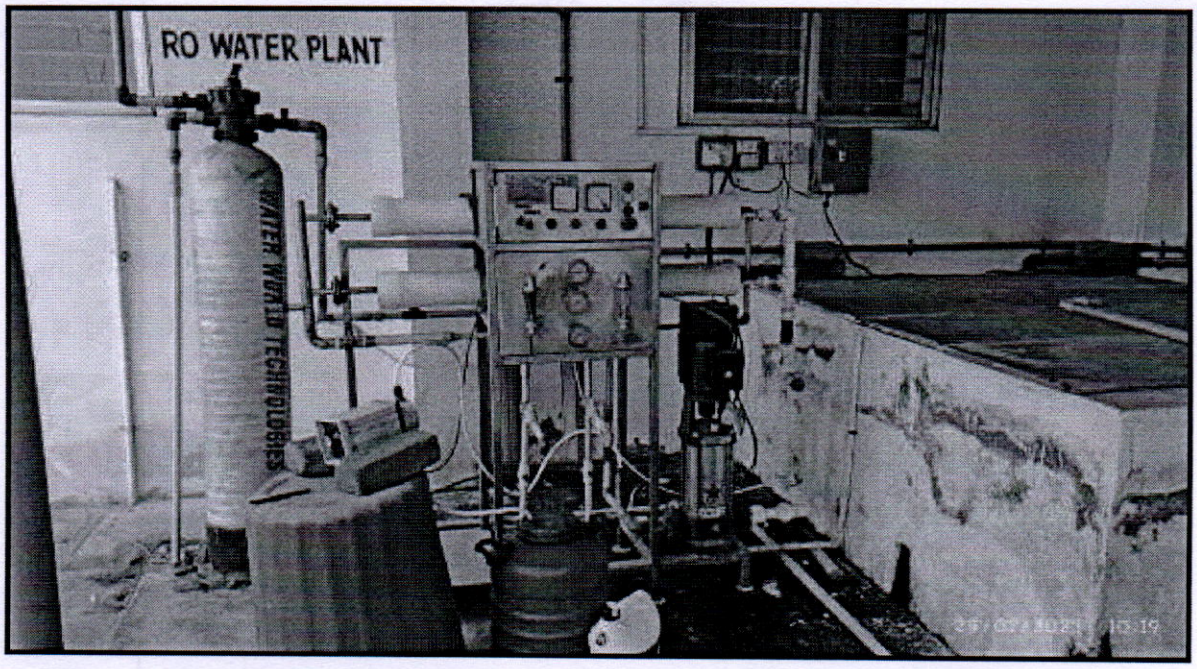
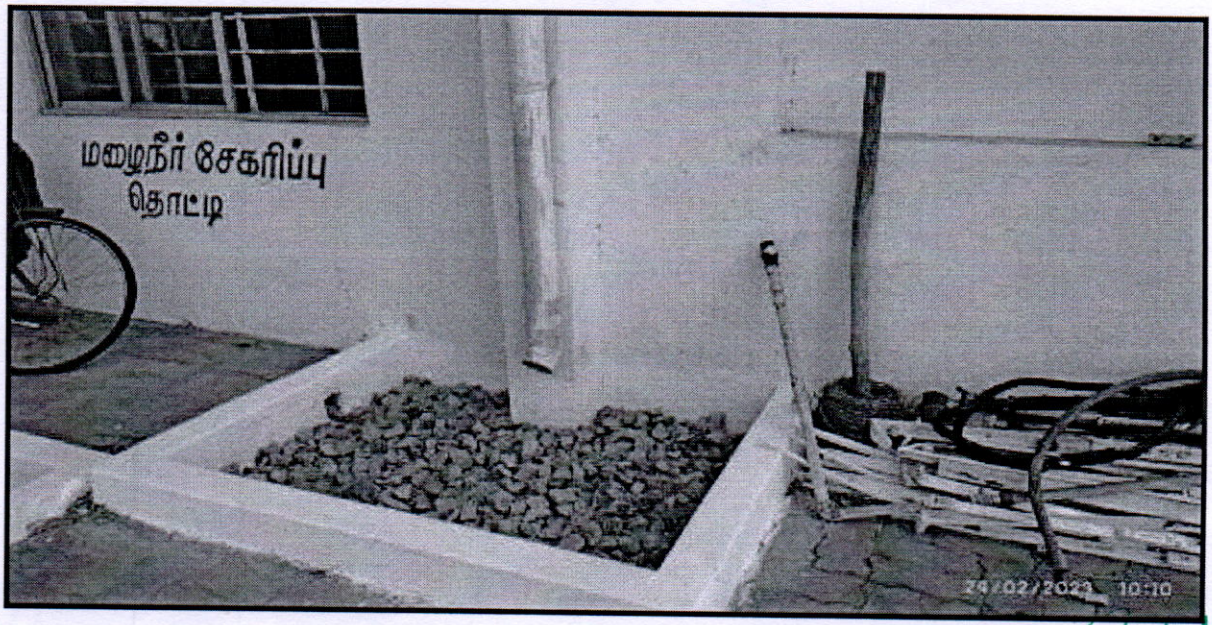


Fig.5: Different Types of Taps used in Water Distribution Network & RO Plant

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

- The audit team appreciates the effects taken by the management of **BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN for** harvesting the rain water almost in all buildings.
- Nearly **105 os of RWH pits** are erected and in operation to capture the building run-off rains in the entire college (Almost all high-rise building has one RWH with adequate capacity)
- 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.



Dr.R.PUNIDHA, M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

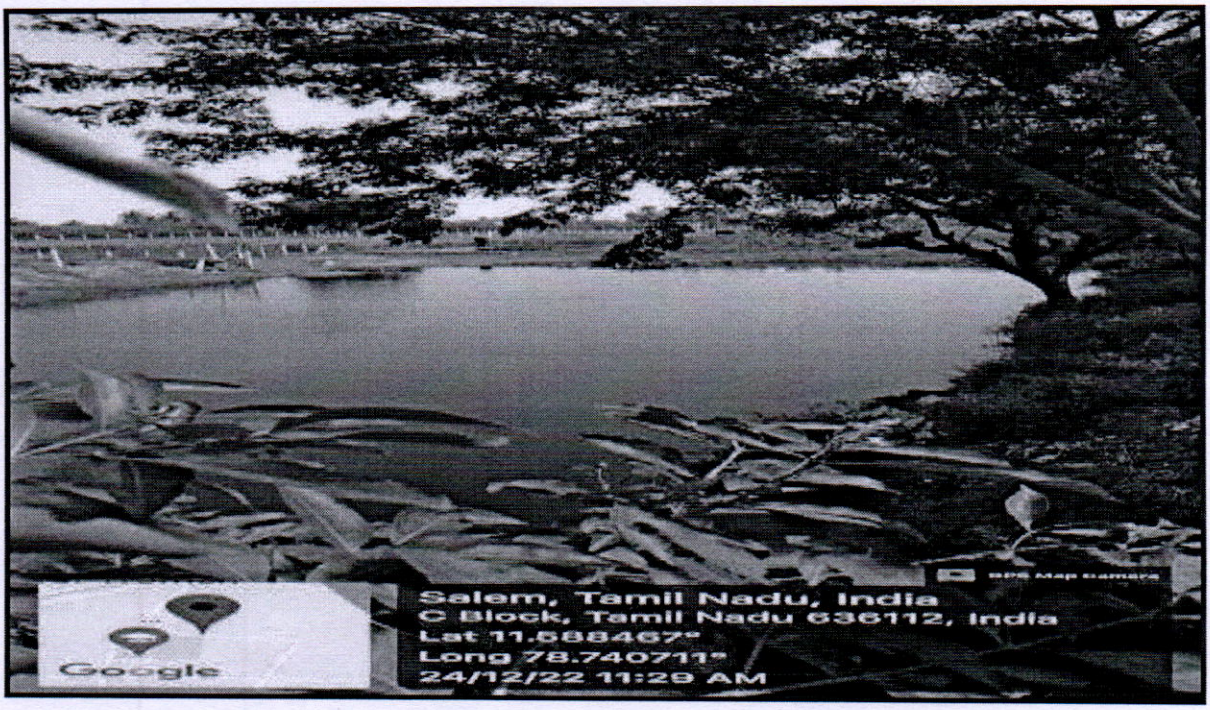


Fig.6: Rain Water Harvesting Pits & Common Pond

7.5: 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 mast be conducted (in future) before installing an RWH and after RWH.

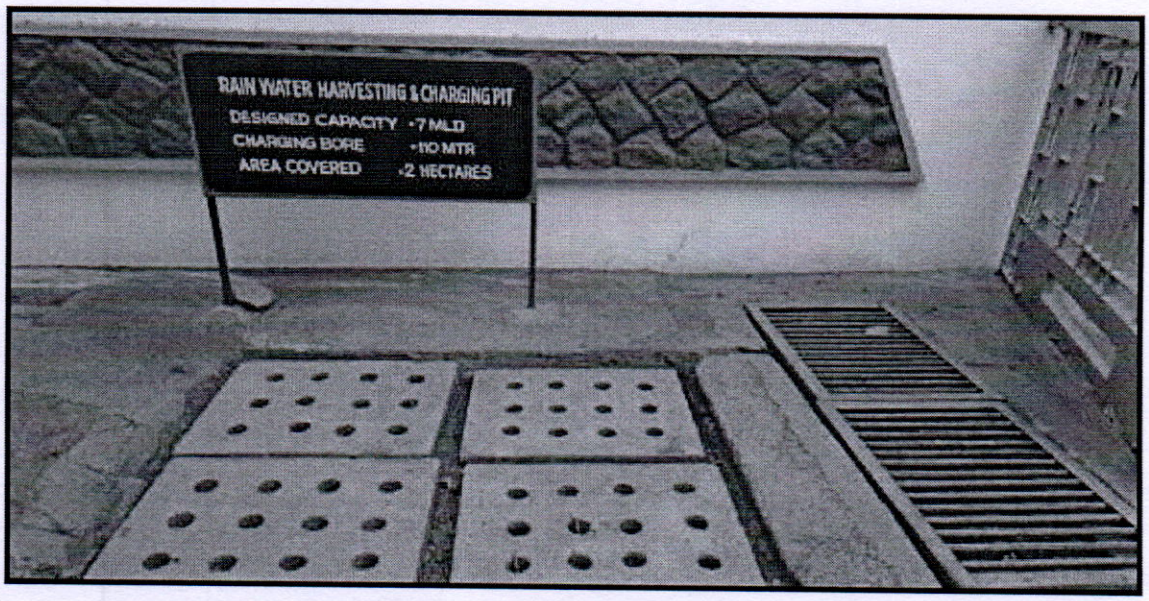


Fig.7: Sample Photo: RWH with Name Board Representation

Dr R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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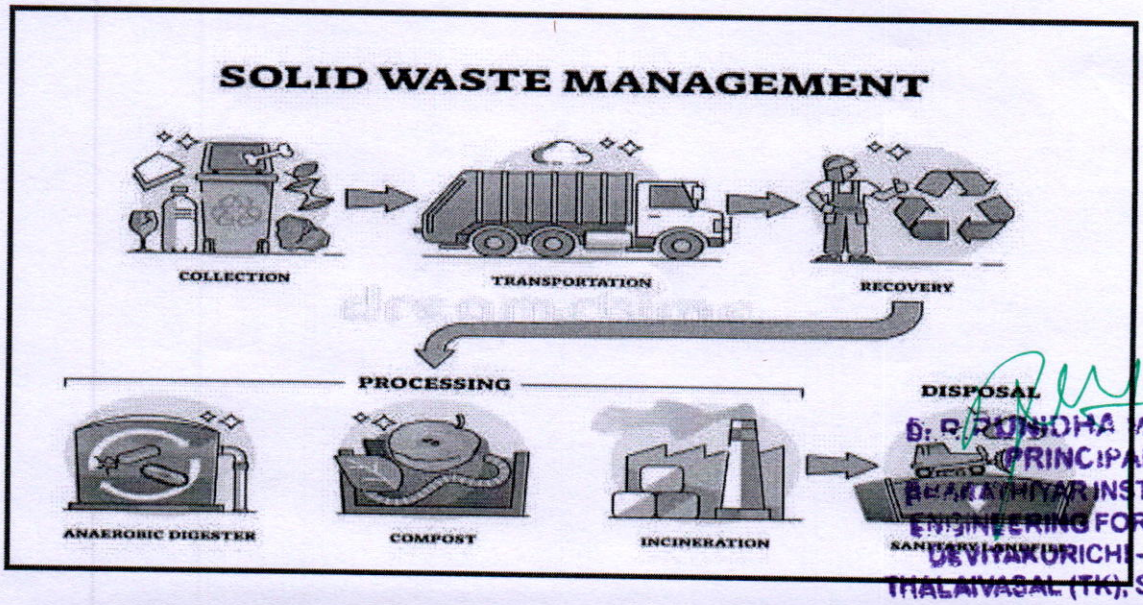
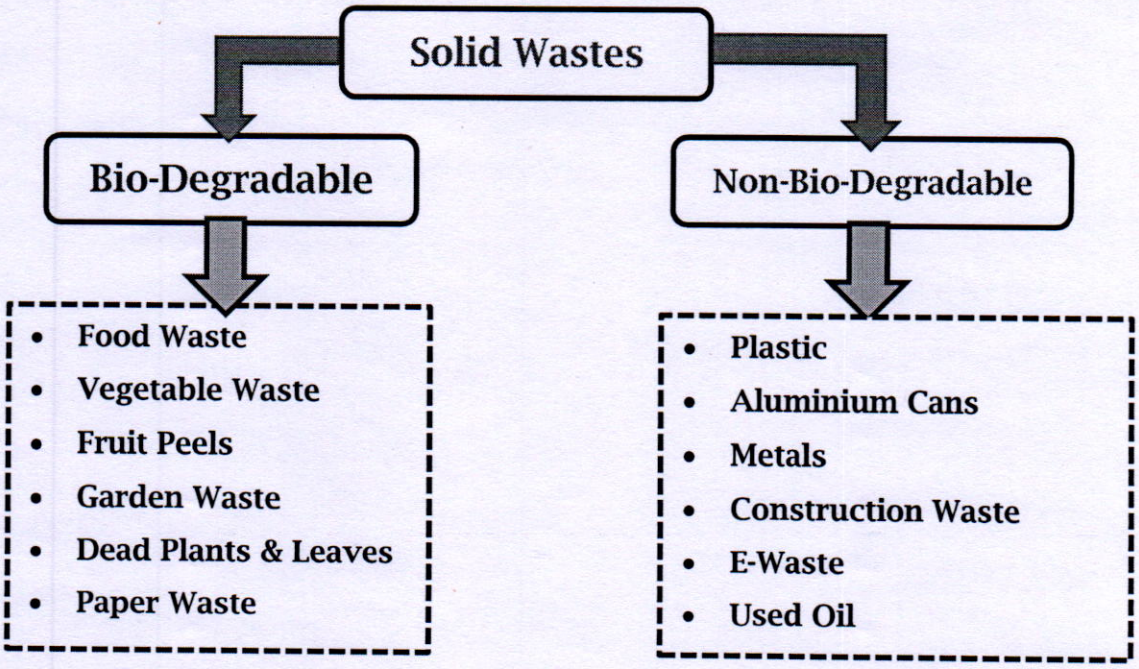
PART-B: ENVIRONMENT AUDIT REPORT

8. WASTE HANDLING & MANAGEMENT



8.1: Solid Waste Management System:

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



8.2: Process of Waste Management:

The college management practised some methods to treat the waste generated and Table-15 shows the process of treating the solid waste generated inside the college campus.

Table-15: Process of Waste Management

S. No.	Waste Type	Waste Treatment
Bio-Degradable Waste Management		
1.	Food and Vegetable Waste	• Collected and given to nearby farming
2.	Garden Wastes and Plant Leaves	• Daily collected and dumped in a yard • Taken back safely to nearby site for composite
3.	Paper Waste	• Collected and stored in a separate place • Sold to third party for recycling
Non-Bio-Degradable Waste Management		
4.	Plastics	• 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 third party
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

8.3: Standards Followed for Waste Handling & Management:

1. Bio-Medical Waste Management Rules – 2016
2. Solid Waste Management Rules – 2016
3. E-Waste Management Rules – 2016

8.4: List of Approved E Waste:

E-Waste – Electrical	E-Waste – IT & Communication
• Motors and Starters	• Copier/Printers & Fax Machines
• Fans, Lamps and Luminaries	• Power Stripes & Power Supplies
• Electrical Drives	• UPS/Servo Stabilizers/Inverters
• Heater Coils	• Batteries
• Broken/Fired Cables	• Wi-fi-Modems, Routers, Toggle
• Air Conditioning System	• Network Cables, Switches, Hubs
• Power Distribution Panels	• Phone, Intercom & PBX
• Electronic Music Instruments	• Audio & Video Equipment's/Remote Controls, Projectors
• Electronic GYM Equipments	
• Electronic Attendance System	• Printed Circuit Boards
• Analog & Digital Measuring Instruments	• Barcode/QR scanners

8.5: 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 singing 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)

Dr. K. PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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

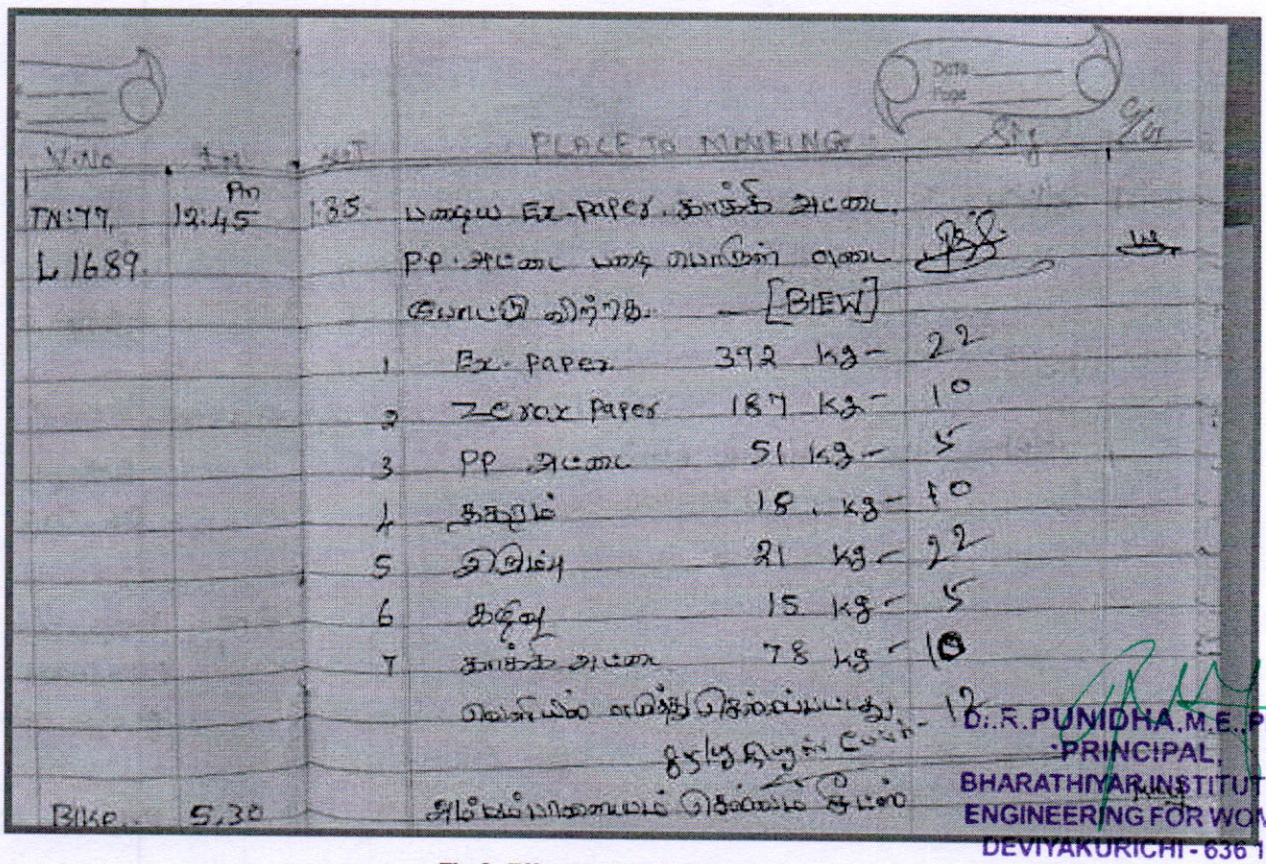


Fig.9: Effective Waste Disposal

D.R.PUNIDHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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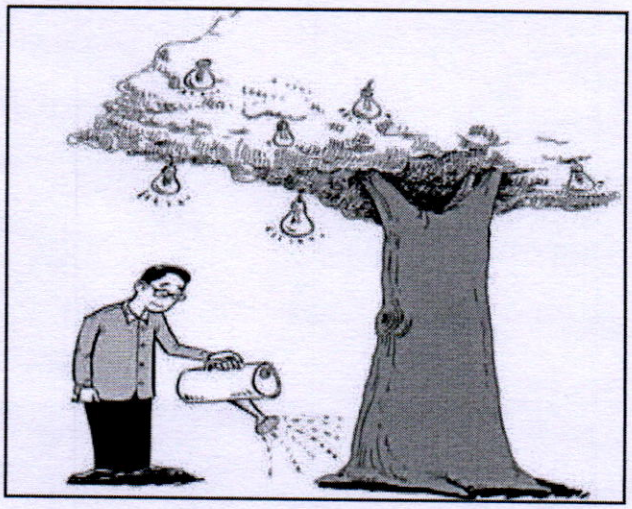
PART-C: GREEN AUDIT REPORT

7. ASSESSMENT ON MATURE TREES

&

BIO-DIVERSITY

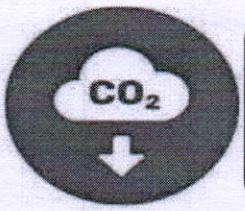


9.1: Campus Greenery:

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 ***1,246 with nearly 25 varieties of trees.*** Apart from the mature trees; preserving the ecology; the entire college campus is planted with various flowering shrubs and bushes. Table-16 shows the list of mature trees available inside the college + hostel campus.

Table-16: List of Mature Trees Available in the College Campus

S. No.	Description	Quantity
1.	Matured Trees + Flowering Shrubs	1,246
Total		1,246



No. of Mature Trees, Flowering shrubs & Bushes available in the campus is **1,246** which contributes for a reduction of **27.2 Tons of CO_2 Emission/Annum**

9.4: One Student – One Tree:

This is an Initiative of AICTE to increase the green coverage inside the campus and committed to reduce the Urban Heat Island Effect (UHIE), through NSS volunteers (or any other Green club); One Student: One Tree scheme. Through this scheme, college may plan to plant nearly 2,000 trees in future, make the entire campus with complete green cover and maintain a excellent bio-diversity.

9.3: 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.

9.5: Bio-Diversity in the Campus:

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

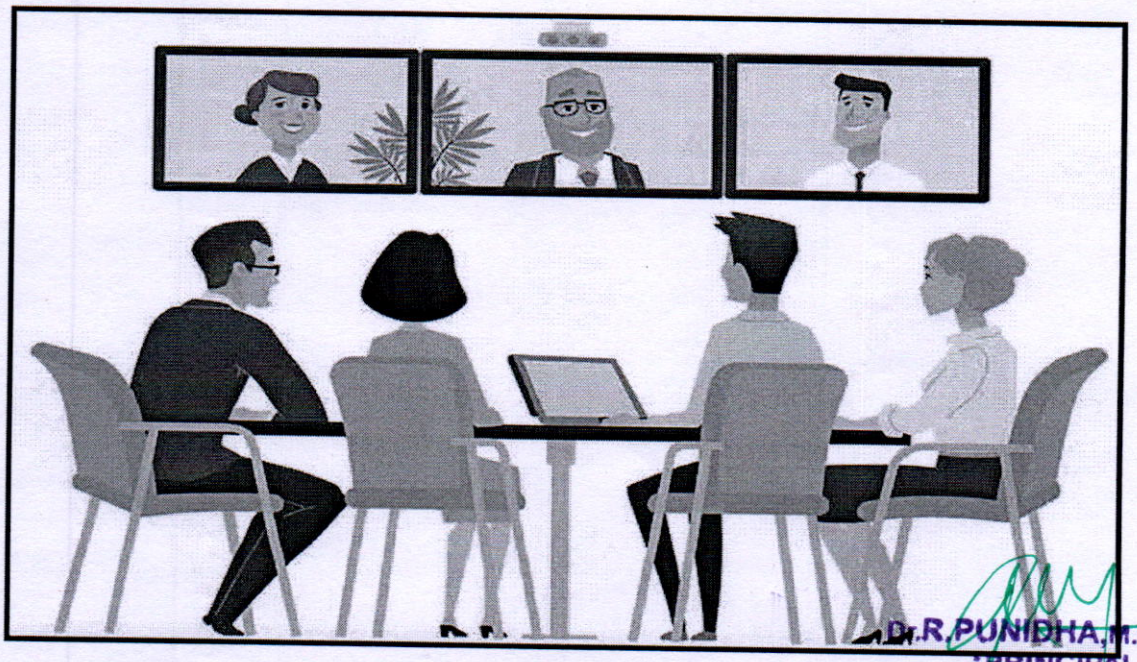
9.6: Recommendations to maintain Bio-Diversity:

- **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.

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

10. AUDIT SUMMARY & CONCLUSION



SUMMARY OF THE AUDIT PROCESS:

In order to make the **BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN** 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 APFC & FC. Fine tune reactive power based on the load condition
- In a phased manner, ceiling fans must be changed from conventional fans into BLDC fans.
- Implement Energy Management System (EMS) to accurately measure & monitor energy flow
- Diesel flow meter must be fitted with each DG and calculate the UPL accurately
- Prepare suitable formats for all energy consumption and regularly follow the records. At regular intervals conduct internal audits to assess the effectiveness of the practice. Make proper corrections; if it deviates from the standard operating procedure
- Regularly conduct i) Illumination study, ii) Thermal comfort study, iii) Flue gas study on DG, and Boiler, iv) Water quality assessment (for all types of water utilized) and v) Indoor and ambient air quality study

II. Energy Conservation & Management – Thermal Energy:

- Regularly clean the stove burners and ensure that the flame should be in light bluish colour
- Try with radiant burner in dosa making machines and save energy. This provides more convenience 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:

- 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
- Retrofit aerator-based water taps for good water savings. For hand washing applications, all the pipes must be fitted with aerators
- In future; install Bio-Sewage Treatment Plant as it reduces the amount of energy required to operate the plant and environmentally friendly operation
- Captures almost 100 % rain water harvesting through i) Recharging pits and ii) Open well storage pits
- Properly follow scientific method for 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
- Energy required to process the water treatment must be calculated
- Overall cost of treated water by accounting i) consumables, ii) manpower iii) energy and iv) other conventional expenses
- Use the treated water at the maximum in whatever possible areas and try to minimize the fresh water intake (from any source)

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

- Set a policy and fix a target for usage of treated water; ensure that the plan is being executed without any deviation. Increase the % of usage of treated water year by year
- With the advent of smart technologies, it is possible to have centralized monitoring in real-time using Internet of Things (IoT), Geographic Information System (GIS) software, etc. as per **Jal Jeevan Mission,** Department of Drinking Water & Sanitation **Ministry of Jal Shakti**
- Awareness campus must be conducted to all the stakeholders at regular interval. Through this initiative; Painting, Photography, Slogan and Poster making contest are conducted to create consciousness among the students and faculties

IV. 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**

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 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 ASSOCHEM GEM rating)

COMPLETION OF THE REPORT

This report is prepared as a part of the Energy, Environment and Green Audit process conducted at **BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,** Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India by **RAM KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING,** Coimbatore – 641 062.

BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN, DEVIYAKURICHI - 636 112, THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

ANNEXURE:

AUTHORISED CERTIFICATES OF THE AUDITOR

D..R.PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112
THALAIVASAL (TK), SALEM (DT).

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.

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

TÜV NORD

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

CQI | IRCA CERTIFIED COURSE

CQI | IRCA APPROVED TRAINING PARTNER

Dr.R.PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

IGBC

CII
Confederation of Indian Industry

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

GRIHA

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

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

CII

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

IGBC

e-Learning

Issued by CII Sohrabji Godrej Green Business Centre

Issued on 9 June 2021

HSSERisk Academy

CERTIFICATE

OF APPRECIATION

EMPOWERING PEOPLE THROUGH KNOWLEDGE TRANSFER

THIS CERTIFICATE IS AWARDED TO

Sivarasu Rathinavelu

FOR SUCCESSFUL COMPETION 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's 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

01092021I006

HSSE Risk
MANAGEMENT SERVICES
www.hsserisk.com

Dr. UNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

AUDIT CONDUCTED FOR

BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN

Deviyakurichi, Thalaivasal, Attur,

Tamil Nadu 636 112, India.

DATE OF AUDIT

05 JANUARY 2022

AUDIT CONDUCTED BY

RAM-KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING

(Chennai ♦ Coimbatore ♦ Erode)

Mobile: +91- 80567 19372, 99420 14544 (Whatsapp) E-mail: ramkalamcect@gmail.com

Dr.R. P[illegible]NIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ACKNOWLEDGEMENT

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. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,** Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, 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. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN** 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 college / technical / non-technical divisions and office members who were directly and indirectly involved with us during collection of data and while conducting the field measurements.

Management Team Members	
Mr. S. ELAYAPPAN., B.Sc	Chairman
Dr. A.K. RAMASAMY	Secretary
Mr. S.R.T. SELVAMANI	Treasurer
Dr. R. PUNIDHA., M.E., Ph.D.,	Principal

Audit Team Member	
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**

Dr.R.PUNIDHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

1. ACKNOWLEDGEMENT

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIDHAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

1.1: Vision:

➢ To achieve the dream of Tamil Poet **Mahakavi Bharathiyar "Kanavu Meipada Vendum",** we committed to serve the State and the Nation by grooming Professionally Educated, broadly talented Women Engineering Graduates, developing innovative technologies through high quality Research and empowering Women Students to meet the challenges in the Society.

1.2: Mission:

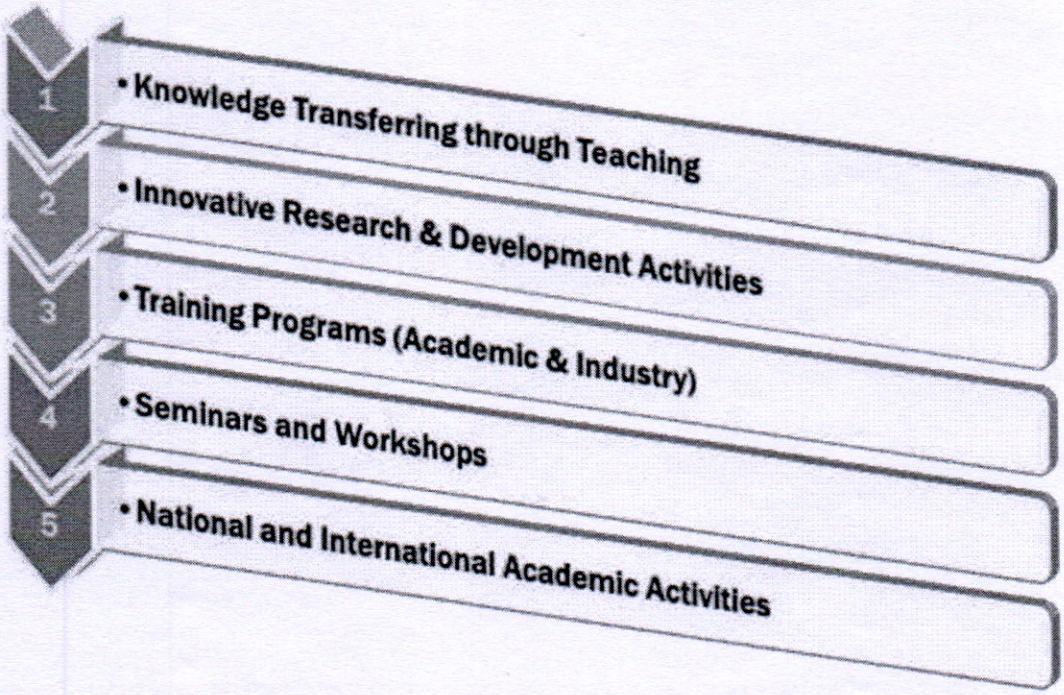
→ To prepare our students by imparting knowledge with focuses on academic competence, Social skills and moral values.

→ To empower our students as capable Engineers with inventiveness and truthfulness to meet the Technological challenges in their career.

→ To create our students having strong bond between the Institute and Industry for Technology Updation.

→ To develop our students as Intellectual leaders to emerge in their Professions.

1.3: Major Activities in the Institution:

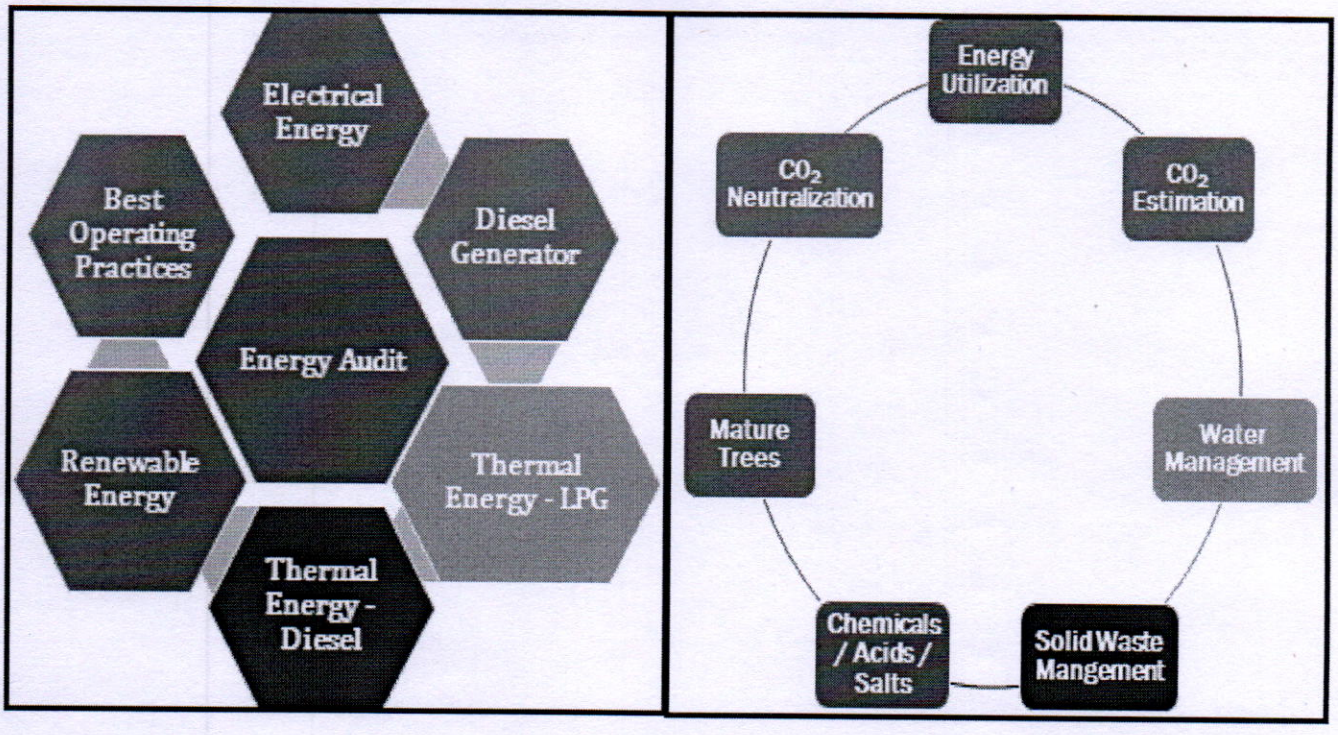


1.4: Scope of the Audit Process:

- **Energy 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).
- **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 greenery in terms of mature trees, flowering shrubs, bushes, medicinal plants, adoption of green energy generation and utilization, reduction of CO_2 due to green energy system and identification of possible implementation and enhancement of current greenery practices

Dr.R.PUNITHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

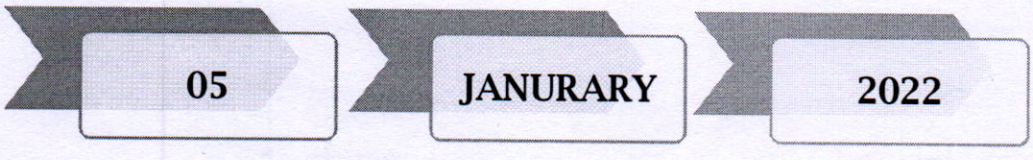
1.5: Coverage In the Environment & Green Audit Process:



1.6: Standards Used:

- Bureau of Energy Efficiency (BEE) Guidelines to conduct the detailed energy audit process
- **ISO 14064-Part-1** – Specification with guidance at the organization level for quantification and reporting of GHG emissions and removals (Second Edition)
- **ISO 14064-Part-2** – Specification with guidance at the project level for quantification, monitoring and reporting of GHG emissions reductions or removal enhancement (Second Edition-2019)
- **ISO 14064-Part-3** – Specification with guidance for the verification and validation of GHG statements (Second Edition-2019)
- The Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard (Revised Edition) released by World Resources Institute & World Business Council for Sustainable Development – 2014
- Ministry of Environment, Forest and Climate Change Notification on **"Battery Waste Management Rules, 2020" & "E-Waste (Management) Rules, 2016", & "Solid Waste Management Rules, 2015"s**

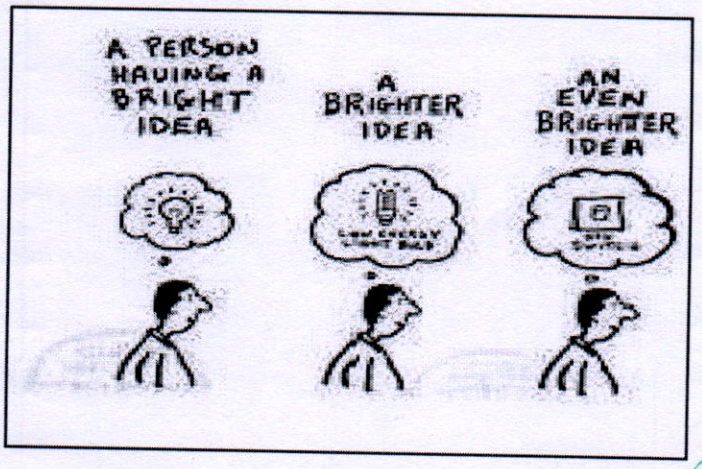
1.7: Date of Audit:



Dr.R.PUNIDHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

2. EXECUTIVE SUMMARY & ENERGY CONSERVATION PROPOSAL (ENCONs)



EXECUTIVE SUMMARY

2.1 Electrical and Thermal Energy Analysis:

A detailed audit was conducted in **M/s. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,** Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India. The audit team has come out with ***06 Energy Conservation Proposals (ENCONs)*** and the summary of all the ENCONs are given below:

S. No.	Description	Parameters		
		Present	After	Savings
1.	Annual Energy Consumption	79,682 kWh + 4,154 kg	51,549 kWh + 3, 610 kg LPG	**28,133 kWh + 544 kg LPG**
2.	Annual CO2 Emission	77.8 Tons	53.1 Tons	**24.7 Tons**
3.	Annual Energy Cost	Rs. 11.3 Lakhs	Rs. 8.2 Lakhs	**Rs. 3.1 Lakhs**
4.	Initial Investment Required			**Rs. 3.6 Lakhs**
5.	Simple Payback Period	–	–	**Nearly 1.2 Years**
6.	Overall Energy Savings	**35.3 % Electrical + 13.1 % LPG**		

Note:

- Apart from the Energy Conservation, the audit team proposes ***10 technical recommendations*** focusing on energy, equipment's life improvement, safety and best operating practices

Audit Conducted and 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
IGBC - AP, GRIHA - CP
Mobile: 80567 19372, 99420 29372
E-Mail: ramkalamcect@gmail.com

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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.	Reduction of Cable Losses & Active Power Consumption using DB Level Capacitor Compensation.	1.0 % (Electrical)	7,883 kWh	70,947	30,000	0.4 Years
2.	Replacement of Existing Water Pumps into BEE Star Labelled Energy Efficient Pumps.	20 % Pump & Motors	3,450 kWh	31,050	40,000	1.3 Years
3.	Replacement of Fluorescent Lamps with Energy Efficient Lamps (Swap FTL to LED Lamps)	50 % on Lighting	6,000 kWh	54,000	40,000	0.7 Years
4.	Replacement of Existing Convention Ceiling Fans into Electronically Commutated BLDC Fans.	50 % on Fans Load	10,800 kWh	97,200	1,80,000	1.9 Years
5.	Reduction of LPG Consumption using Regular Burner Cleaning and Swapping of Active Burners.	5 % of LPG used for Stove	109 kg	10,464	5,000	0.5 Years
6.	Reduction of LPG Consumption in Dosa making Stove with Radiant Burners.	20 % of LPG for Dosa Stove	435 kg	41760	60,000	1.4 Years
Total			**28,133 kWh + 544 kg LPG**	**3,05,421**	**3,55,000**	–

2.2: Recommended Best Operating Practices for better Energy Conservation & Management:

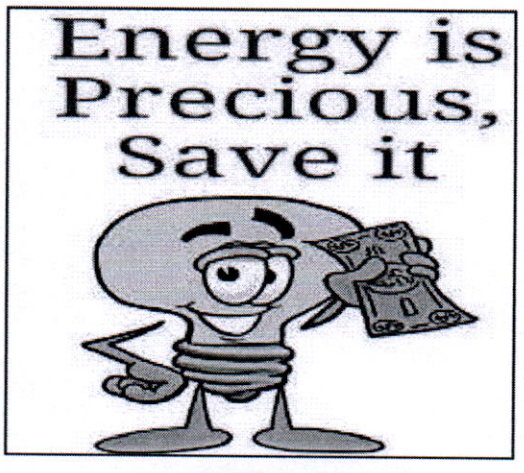
- Operate the transformer mostly at 50 % load and reduce the self-loss of the transformer.
- Replace the existing transformer into IS-1180 star rated energy efficient transformer
- Conduct Infrared Thermography audit at regular intervals and identify the thermal hotspots.
- Also conduct voltage drop test for the longest electrical path and determine the voltage regulation
- Along with the voltage drop test; conduct voltage unbalance and determine the % unbalance.
- All the SSB must be fitted with digital energy meters & connected with EMS
- Retrofit of AIRCON Energy saver & Optimization of Air Conditioning Operation
- Measure the weight of each cylinder while purchasing & Past a cylinder history tag
- Display the monthly energy & water consumption to all stakeholders

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-A: ENERGY AUDIT REPORT

3. STUDY ON ENERGY CONSUMPTION & GENERATION PATTERN



Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

3.1: Energy Consumption Pattern (Electrical and Thermal):

S. No.	Description	Details		
Electrical Energy (Consumption)				
1.	Energy Suppliers	TANGEDCO		
2.	Availability of Electricity Services & their Demand	LT Service with Sanctioned Demand of **112 kW**		
3.	Specifications of DGs	40 kVA with internal fuel tank (100 Litre capacity)		
Annual Electricity Consumption (kWh)				
	2019-20	**2020-21**	**2021-22**	
EB (kWh)	92,123	57,457	79,682	
Thermal Energy (Consumption)				
4.	Types of Thermal Energy Used	Liquified Petroleum Gas (LPG)	Cooking	
		Diesel (Ordinary)	Transport + DG	
Annual Fuel Consumption				
	2019-20	**2020-21**	**2021-22**	
LPG (kg)	6,513	819	4,154	
Diesel-Transport (L)	26,223	24,841	24,603	
Diesel-DG (L)	206	206	287	
General Loads (Both Electrical and Thermal)				
5.	Lighting System	• **Indoor lighting:** All the indoor lighting is fitted with Energy Efficient LED lamps. • **Outdoor lighting:** All the street lightings are LED based energy efficient lamps.		
6.	Lighting Feeder	• Lighting loads are separated from raw power and are supplied through lighting distribution board		
7.	Fan Loads (Ceiling)	• All the indoor ceiling fans are conventional fans		
8.	HVAC System	• Unitary air conditioning system installed in the required places • Most of the AC units are **BEE star rated** and the outdoor units are mostly placed in shade • A welcome step in the energy conservation is; all the air-conditioned rooms are set with **24°C** as room temperature as per BEE norms		

Dr.P.PANDHAMEE, Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

9.	Motors and Pump loads	• Mainly used for water distribution, purification, waste water treatment • Small motors are used in kitchen equipment's • Necessary sensors are placed to on/off to motor; when the overhead tanks filled with water.
10.	Uninterrupted Power System (UPS)	• All the computers, servers, surveillance systems, projectors, telephonic units are connected with UPS with nominal back up time of **30 min.**

Table-2: Annual Consumption of Electrical & Thermal Energy Parameters (for the year 2021-2022)

S. No.	Month	Electricity Consumption (kWh)	LPG Consumption (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jan-21	3,205	702	9	2,440	2,449
2.	Feb-21	4,254	371	7	2,245	2,252
3.	Mar-21	4,568	351	24	1,800	1,824
4.	Apr-21	8,035	371	11	3,006	3,017
5.	May-21	9,421	371	11	2,118	2,129
6.	June-21	9,642	234	36	2,242	2,278
7.	July-21	9,762	234	25	1,866	1,891
8.	Aug-21	6,928	195	90	2,711	2,801
9.	Sep-21	5,388	371	20	2,002	2,022
10.	Oct-21	7,072	371	23	258	281
11.	Nov-21	5,940	215	8	1,628	1,636
12.	Dec-21	5,467	371	23	2,000	2,023
Total		**79,682**	**4,154**	**287**	**24,316**	**24,603**

➢ **The cost of the Electricity is Rs.9.56/kWh & The cost of the LPG is nearly Rs.93.60/kg**

Table-3: Annual Consumption of Electrical & Thermal Energy Parameters (for the year 2020-21)

S. No.	Month	Electricity Consumption (kWh)	LPG Consumption (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jan-20	5.223	234	9	1.732	1.741
2.	Feb-20	5.267	312	7	1.873	1.880
3.	Mar-20	7.706	273	23	1.882	1.905
4.	Apr-20	6.943	0	11	3.284	3.295
5.	May-20	4.815	0	11	2.366	2.377
6.	June-20	4.475	0	35	2.422	2.457
7.	July-20	4.185	0	25	1.905	1.930
8.	Aug-20	3.020	0	10	3.000	3.010
9.	Sep-20	4.254	0	19	2.002	2.021
10.	Oct-20	3.625	0	24	306	330
11.	Nov-20	3.560	0	9	1.824	1.833

12.	Dec-20	4.384	0	23	2.039	2.062
Total		**57,457**	**819**	**206**	**24.635**	**24.841**
➢ **The cost of the Electricity is Rs.9.00/kWh & The cost of the LPG is nearly Rs.92.0/kg**						

Table-4: Annual Consumption of Electrical & Thermal Energy Parameters (for the year 2019-2020)

S. No.	Month	Electricity Consumption (kWh)	LPG Consumption (kg)	Diesel Consumed (L)		
				DG	Transport	Total
1.	Jan-19	8,236	312	9	1,840	1,849
2.	Feb-19	7,866	332	7	1,735	1,742
3.	Mar-19	8,139	293	24	1,772	1,796
4.	Apr-19	9,126	332	11	3,185	3,196
5.	May-19	7,039	702	11	2,265	2,276
6.	June-19	8,957	332	35	2,341	2,376
7.	July-19	6,310	702	25	1,802	1,827
8.	Aug-19	9,324	702	9	3,010	3,019
9.	Sep-19	6,460	702	20	2,500	2,520
10.	Oct-19	6,805	702	23	1701	1,724
11.	Nov-19	7,163	702	8	1,932	1,940
12.	Dec-19	6,698	702	23	2,140	2,163
Total		**92,123**	**6,513**	**206**	**26,223**	**26,429**
➢ **The cost of the Electricity is Rs.9.00/kWh & The cost of the LPG is nearly Rs.66.0/kg**						

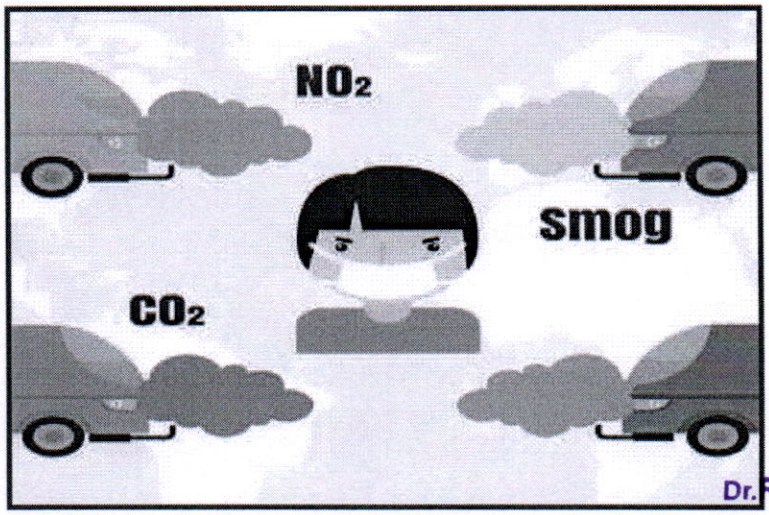
D. F. RUNIDRA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-B: ENVIRONMENT AUDIT

4. ESTIMATION OF CO_2 EMISSION & NEUTRALIZATION

(ELECTRICITY, DIESEL, LPG, SOLAR PV, WIND ENERGY SYSTEM & MATURE TREES)



Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
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THALAIVASAL (TK), SALEM (DT).

4.1: Assessment of Annual Energy Usage:

Table-5 shows the types of energy carriers used for their regular operation in the college campus along with application area and their source.

Table-5: Energy Carriers, Application area and their sources used for College Operation

S. No.	Type of Energy Carrier	Application Area	Source of Procurement
1.	Electricity (LT Consumer)	Powering to all class room/laboratory equipment's/Lightings/Fans/HVAC & Allied System/Motors / Pumps	TANGEDCO
2.	Diesel	Transport vehicles and Diesel Generator (Captive Generation)	Authorised distributor
3.	Liquified Petroleum Gas (LPG)	Used for cooking application	
4.	Mature Trees, Shrubs & Flowering Bushes	Nearly **1,246 Nos** of different varieties with nearly **10 years** old.	
		Lush greenery covered with higher number of Shrubs, Flowering Bushes & Maintaining the water bodies (existing)	

4.2: Environmental System: CO_2 Balance Sheet:

The following tables provide the balance sheet indicating various energy carriers associated with the regular activities and their CO_2 mapping.

Table-6: Environmental System: CO_2 Balance Sheet (for the year 2021-2022)

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	79,682 kWh	65.3	Trees	1,246 Nos	27.2
2.	Diesel	24,603 Litres	65.0			
3.	LPG	4154 kg	12.5			
Total Emission			142.8	Total-Neutralized		27.2
Balance CO_2 to be Neutralized = 115.6 Tons/Annum.						

Table-7: Environmental System: CO_2 Balance Sheet (for the year 2020-2021)

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	57,457 kWh	47.1	Trees	1,246 Nos	27.2
2.	Diesel	24,841 Litres	65.6			
3.	LPG	819 kg	2.5			
Total Emission			115.2	Total-Neutralized		27.2
Balance CO_2 to be Neutralized = 88.0 Tons/Annum.						

Dr. R. PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

Table-8: Environmental System: CO_2 Balance Sheet (for the year 2019-2020)

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	92,123 kWh	75.5	Trees	1,246 Nos	27.2
2.	Diesel	26,429 Litres	69.8			
3.	LPG	6,513 kg	19.5			
Total Emission			164.9	Total-Neutralized		27.2
Balance CO_2 to be Neutralized = 137.7 Tons/Annum.						

4.3: Calculation Table:

For Electricity = $\left[\text{kWh x } \frac{0.82 \text{ kg of CO2 emission}}{\text{kWh}}\right]$
For Diesel = $\left[\text{Diesel Consumption (Litre)x } \frac{2.64 \text{ kg of CO2 emission}}{\text{Litre of Fuel Consumption}}\right]$
For LPG = $\left[\text{LPG Consumption (kg)x } \frac{3.0 \text{ kg of CO2 emission}}{\text{kg of LPG Consumption}}\right]$
For Wood = [Wood Consumption (kg)x 1.9 kg of CO2 Emission]
A mature tree is able to absorb nearly CO_2 at a rate of 21.8 kg/annum; $\frac{(21.8\,x1{,}246)}{1{,}000} = 27.2\ \frac{\text{Tons}}{\text{Annum}}$

4.4: References:

[1] https://ecoscore.be/en/info/ecoscore/co2

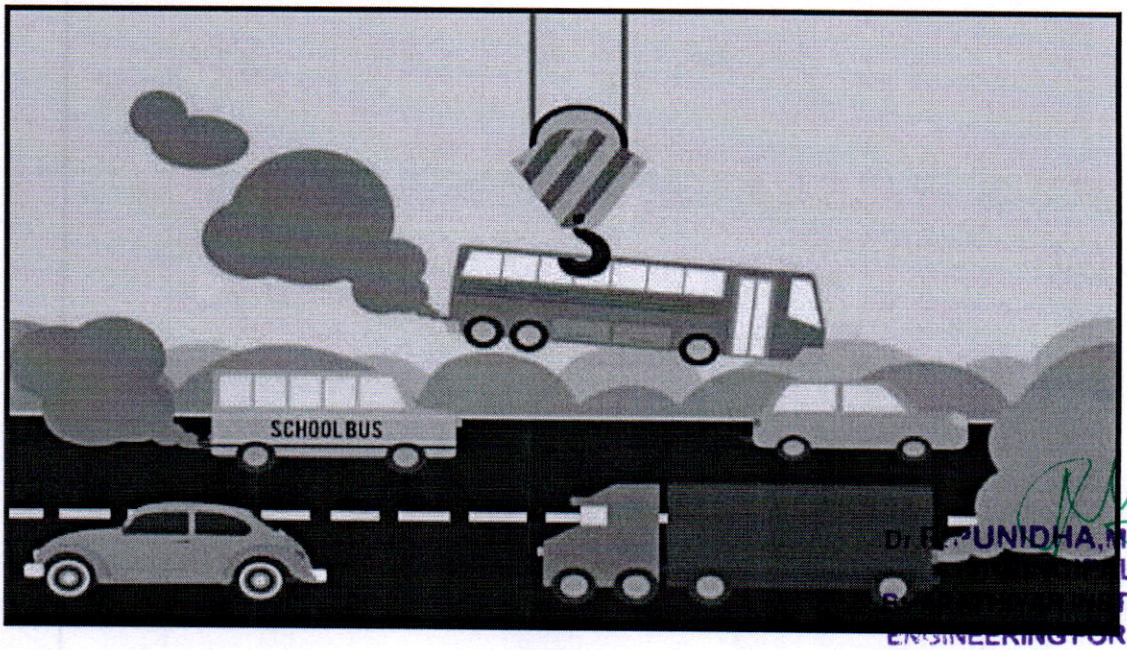
[3]http://www.tenmilliontrees.org/trees/#:~:text=A%20mature%20tree%20absorbs%20carbon,the%20average%20car's%20annual%20mileage

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-B: ENVIRONMENT AUDIT

5. TRANSPORT & REFRIGERANT GASES IN AC SYSTEM



5.1: 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-9.

Table-9: List of Transporting Vehicles available in the College

S. No.	Type of Vehicle	Type of Engine	Fuel used	No. of vehicles	Pollution certified (Y/N)
1	BUS	BS-II	Diesel	09	Yes

5.2: Air Conditioning System along with its Refrigerant:

Most of the unitary AC system has **R-22** as refrigerant which has **Global Warning Potential (GWP) of 1,810** and **Ozone Depletion Potential (ODP) is Medium.** Some of the newly installed AC system are having R-32 as refrigerant which has **Global Warning Potential (GWP) of 675** and **Ozone Depletion Potential (ODP) is Zero.**

Table-10: Availability of the Unitary AC system in the Entire College Campus

S. No.	Location	Capacity	Quantity	Total TR Capacity
1.	Main Block	1.5 TR	5	7.5 TR
2.	EEE Block	1.5 TR	3	4.5 TR
3.	S&H Block	1.5 TR	3	4.5 TR
4.	Mech Block	1.5 TR	1	1.5 TR
5.	Library Block	1.5 TR	2	3.0 TR
Total			**14 Nos**	**21.0 TR**

- The most common refrigerant in the past was a CFC, most commonly called as Freon. Freon was a brand name for a refrigerant "R-12" by DuPont. In the 1990s and 2000s, the CFCs were replaced with HCFCs (hydrochlorofluorocarbon) and the most common HCFC is "R-22". 50-60% of Air Conditioners in India still (in 2016) use HCFCs. However, HCFCs are just marginally better than CFCs as they contain chlorine, which is harmful for the environment. As per Indian Government's plan, HCFCs will be phased out from India by the year 2030.
- **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

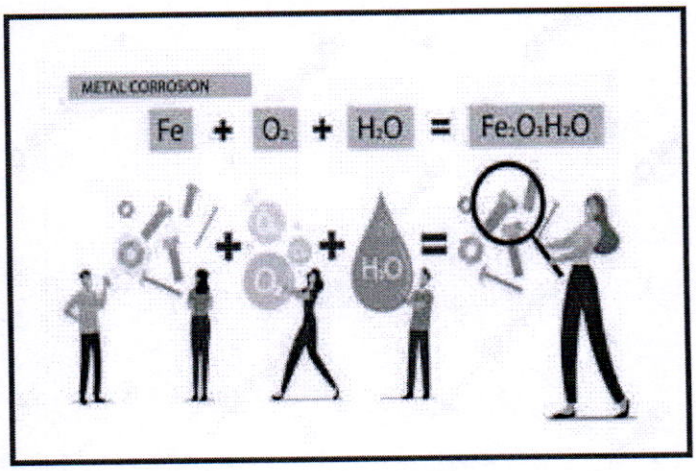
Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENVIRONMENT & GREEN AUDIT REPORT

ENVIRONMENT AUDIT REPORT

6. USAGE OF CHEMICALS, SALTS & ACIDS

(STORAGE, HANDLING & BEST OPERATING PRACTICES)



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

The science departments 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 preventaccidents
- 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

6.2: 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 STP
- Only trained teaching and non-teaching staffs are handling the chemicals and also, they are well trained to handle any abnormal situations
- Laboratories with chemicals are well ventilated with proper emergency exits. Adequate and correct sequence of fire extinguishers are placed near all the laboratories

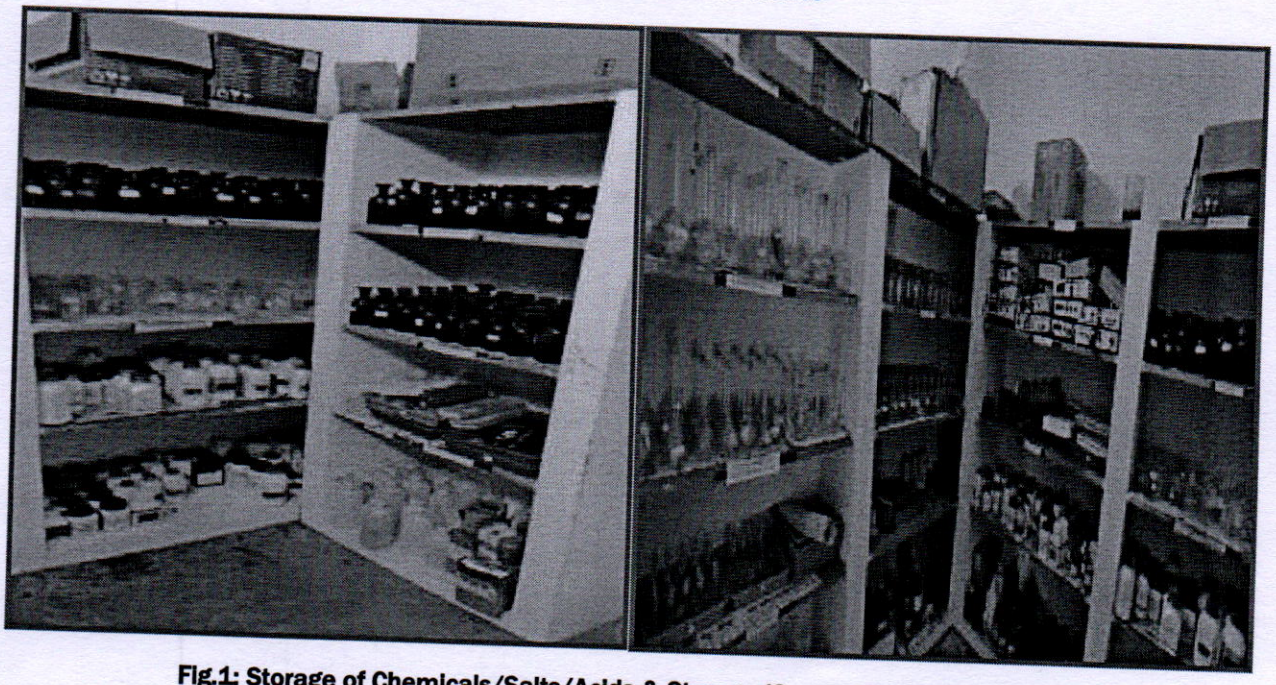


Fig.1: Storage of Chemicals/Salts/Acids & Storage (General Engineering Laboratory)

Dr. R. PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

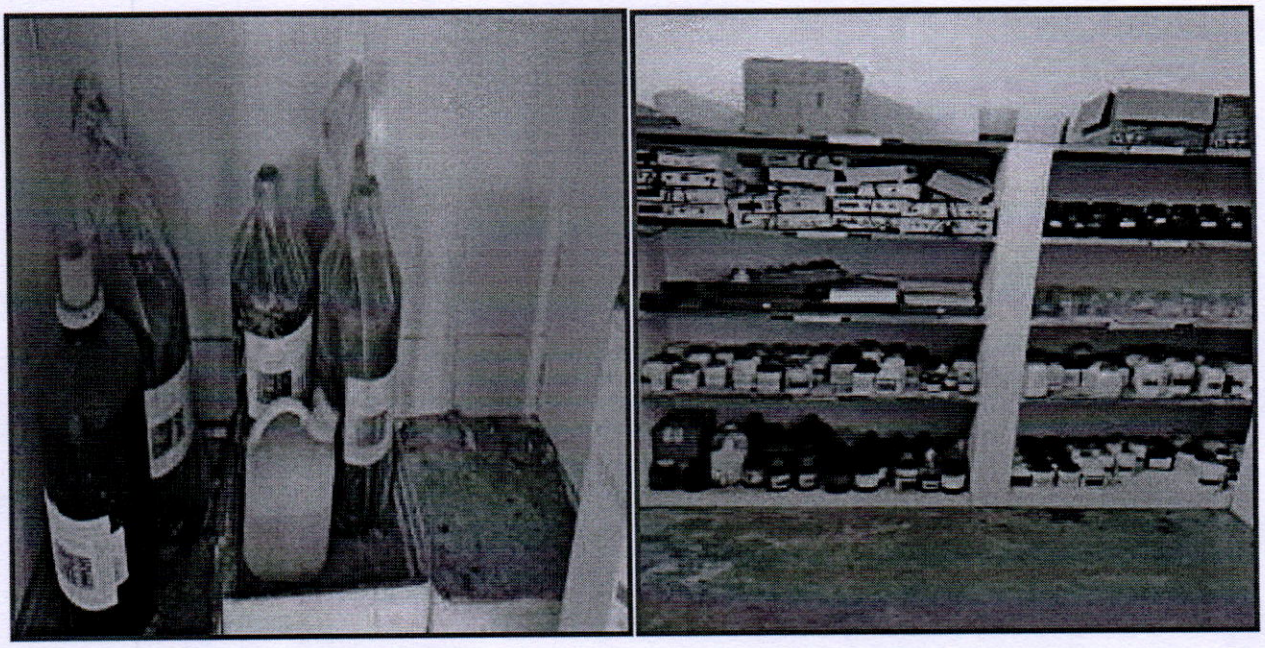


Fig.2: Storage of Chemicals/Salts/Acids & Storage – Sand Bed for Concentric Chemicals

6.3: 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

6.4: 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-11 shows the cleaning agents used to clean the above-mentioned area;

Table-11: Cleaning Agents used for Floor and Vessel Cleaning

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

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
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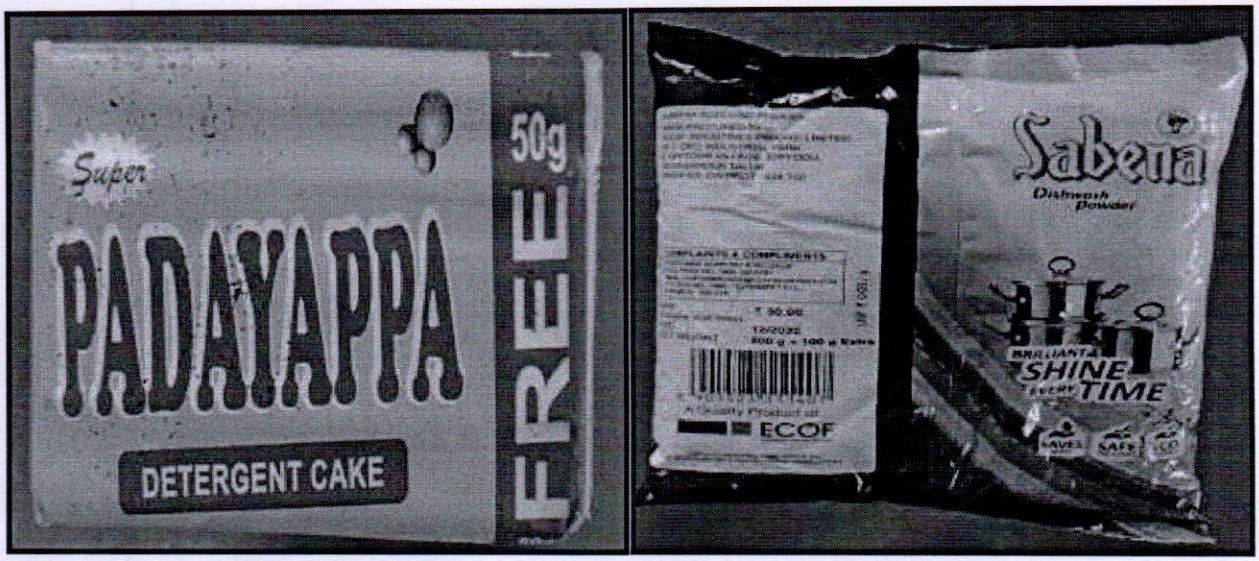

Fig.3: Cleaning & Refreshing Agents used for Vessel & Floor Cleaning

6.5: 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 are multi-purpose cleaners
- 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 shows the sample eco-friendly Green Pro certified cleaning agents

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

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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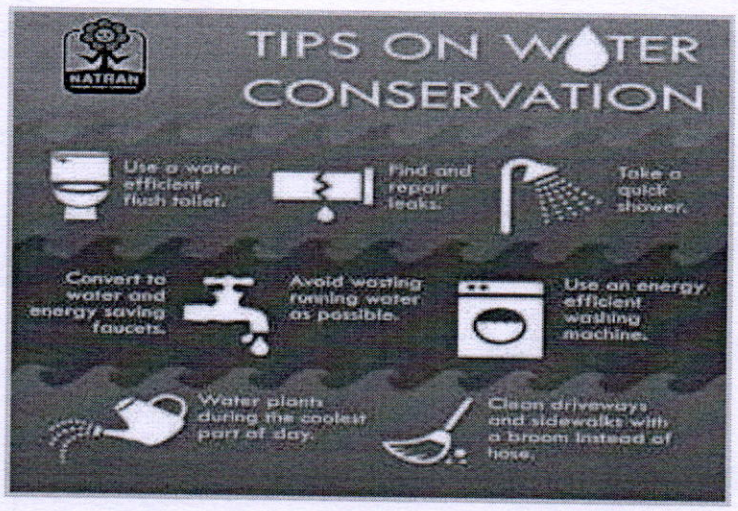
GREEN AUDIT REPORT

7. WATER UTILIZATION, WASTE WATER MANAGEMENT



Dr.R.PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

7.1: Source of Water, Storage and Distribution:

Table-12 shows the source of water, location of storage along with their application.

Table-12: Source of Water, Location of Storage and Application

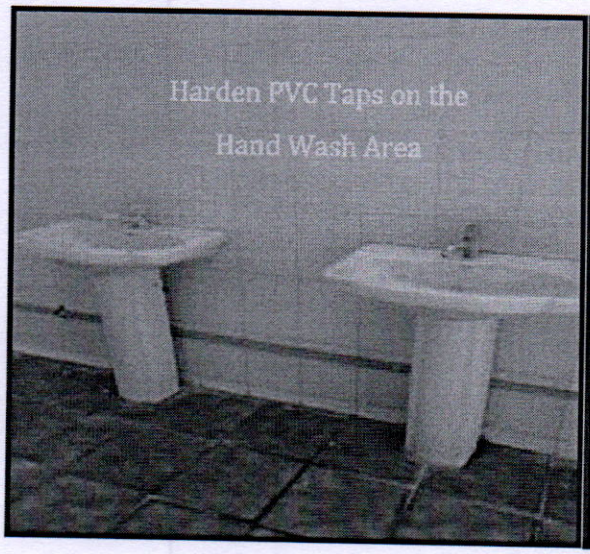
Type of Water	Source	Application
Drinking Water	• Bore water – **1 No** • Near A-Block (750 ft)	Drinking & Cooking (through RO)
		Utensil Cleaning, Bathing & Cloth Washing
Rain Water	Collected from i) buildings run off and ii) road run-offs	Used to increase the ground water level
Grey Water from RO Plant	Final treated water from RO plant	Gardening application

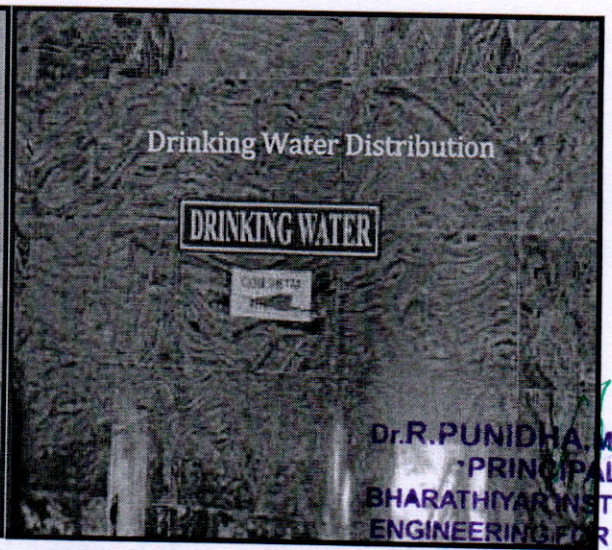
7.2: Treated Water for Drinking Application:

- **1 No** of borewell are available in the college campus connected with 7.5 HP pump running for nearly 5 hours/day.
- The college management is keen on providing uninterrupted, safe and healthy drinking water to all; throughout the year.
- The college has one RO plant of **1,500 LPH** capacity to treat bore water and ensure best quality of potable water. The RO water is then stored in a HPDE tank of **3,000 Litre capacity.**
- For one litre of water input; only 25 % is the RO water & the remaining 75 % is grey water. This water is then used for gardening application.
- All the overhead tanks storing the drinking water are cleaned at regular intervals and the water management team has been maintaining a cleaning schedule
- In A-Block nearly **10,000 litre capacity** cement tanks + C- Block **25,000 litre** cement tanks are placed
- These tanks are cleaned every month during the monthly maintenance schedule. These tanks are cleaned for every three months once.

7.3: Water Control Taps & Water Distribution for General Application:

In the college, the Openable taps (Both PVC + Metal) are employed for all water distribution and utilization application and hence the user can utilize only the required quantity of water.





Dr.R.PUNIDHA, M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

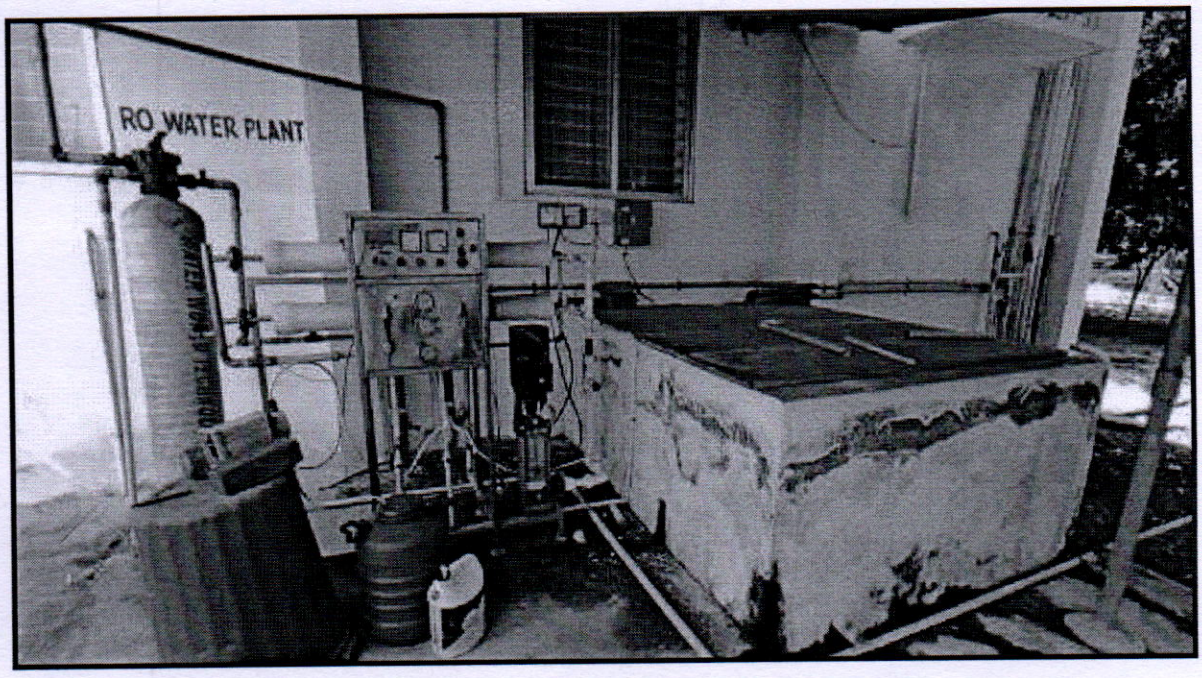
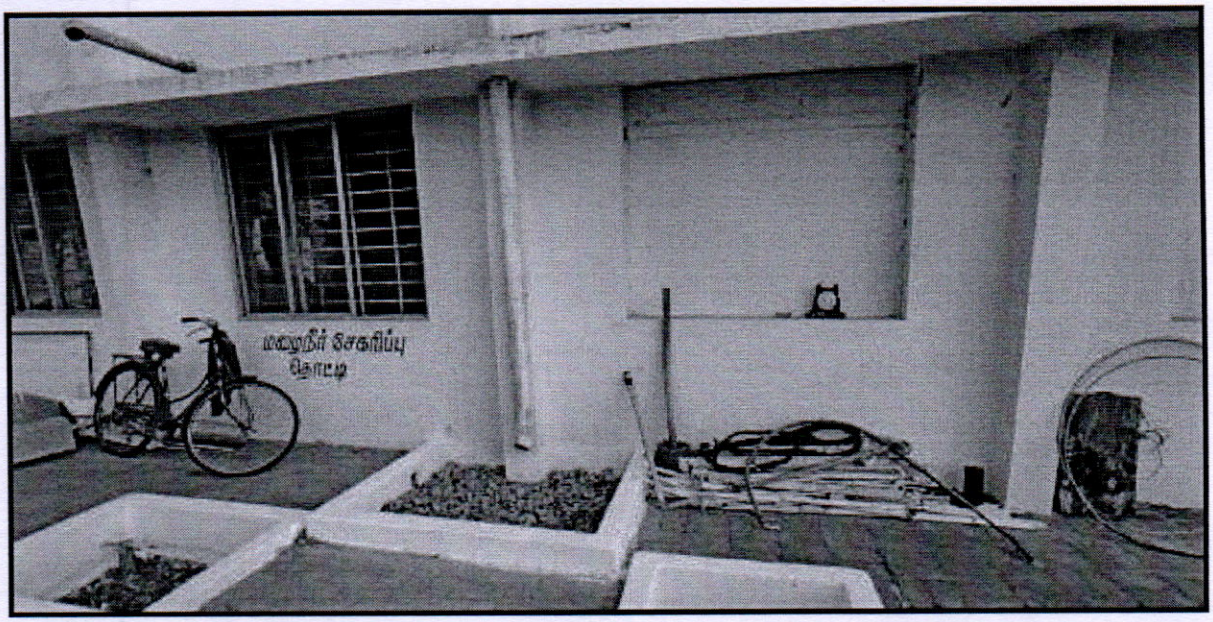


Fig.5: Different Types of Taps used in Water Distribution Network & RO Plant

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

- The audit team appreciates the effects taken by the management of **BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN for** harvesting the rain water almost in all buildings.
- Nearly **105 os of RWH pits** are erected and in operation to capture the building run-off rains in the entire college (Almost all high-rise building has one RWH with adequate capacity)
- 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.



Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
OF VIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

Fig.6: Rain Water Harvesting Pits & Common Pond

7.5: 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 mast be conducted (in future) before installing an RWH and after RWH.

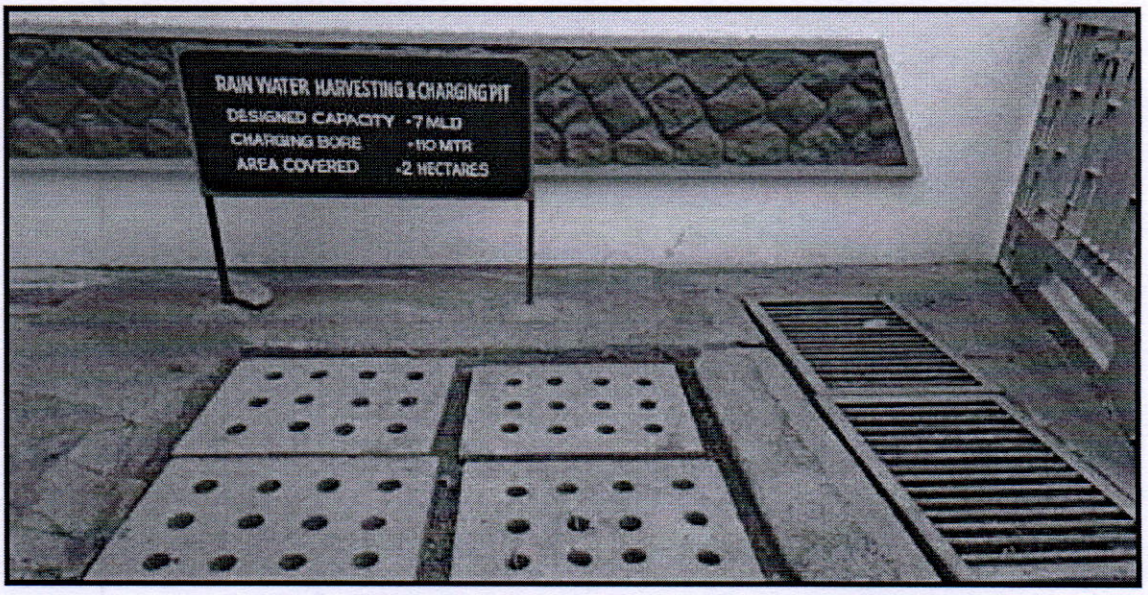


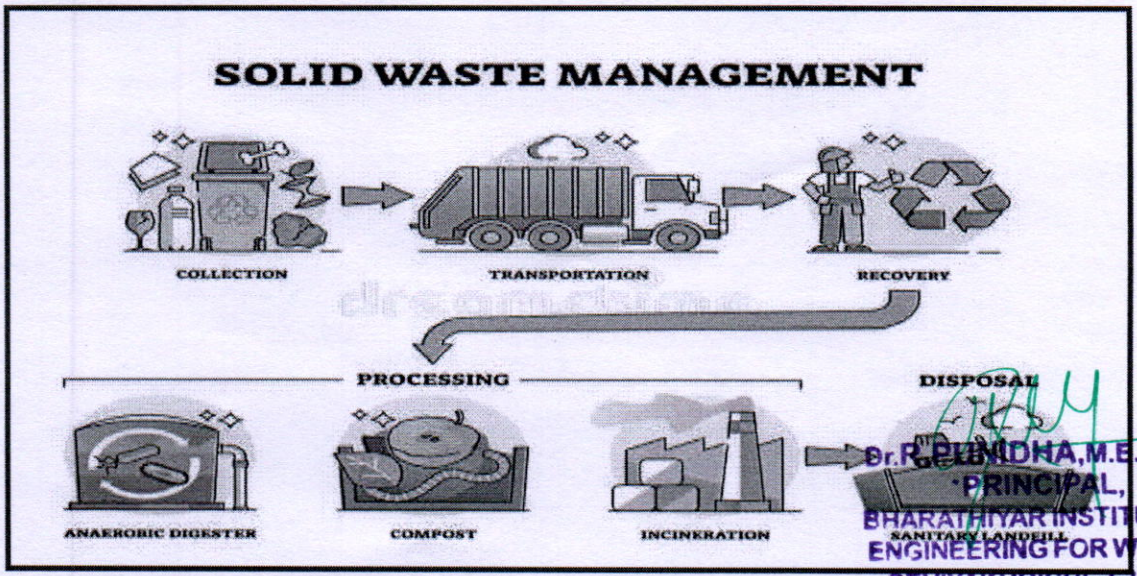
Fig.7: Sample Photo: RWH with Name Board Representation

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

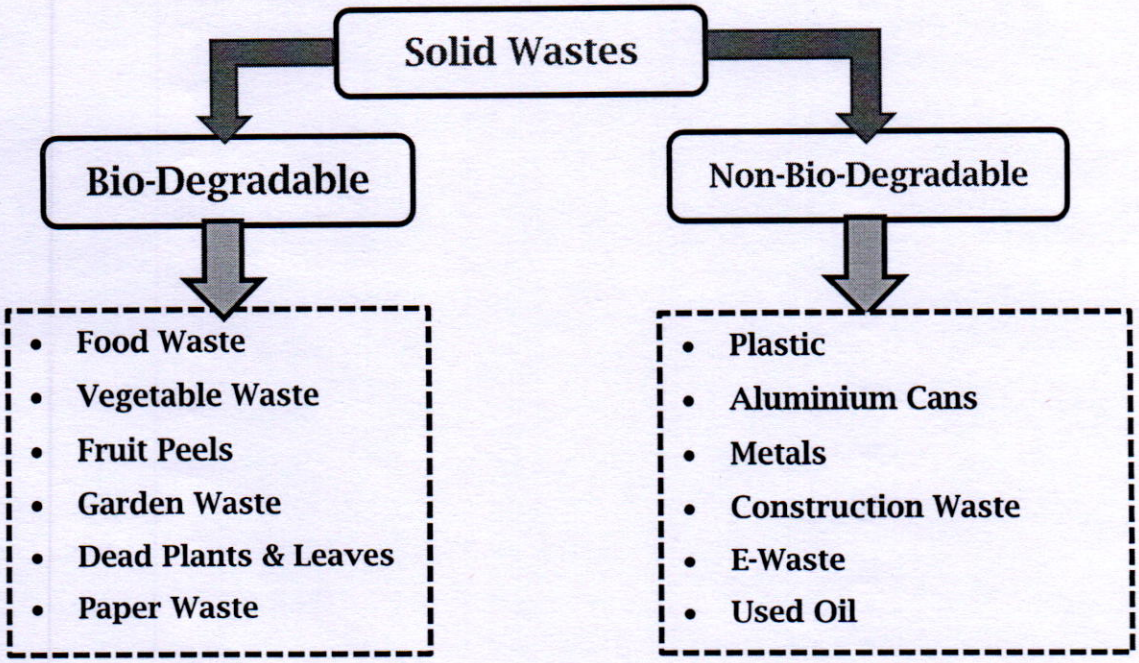
PART-B: ENVIRONMENT AUDIT REPORT

8. WASTE HANDLING & MANAGEMENT



8.1: Solid Waste Management System:

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



8.2: Process of Waste Management:

The college management practised some methods to treat the waste generated and Table-13 shows the process of treating the solid waste generated inside the college campus.

Table-13: Process of Waste Management

S. No.	Waste Type	Waste Treatment
Bio-Degradable Waste Management		
1.	Food and Vegetable Waste	• Collected and given to nearby farming
2.	Garden Wastes and Plant Leaves	• Daily collected and dumped in a yard • Taken back safely to nearby site for composite
3.	Paper Waste	• Collected and stored in a separate place • Sold to third party for recycling
Non-Bio-Degradable Waste Management		
4.	Plastics	• 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 third party
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

8.3: Standards Followed for Waste Handling & Management:

1. Bio-Medical Waste Management Rules – 2016
2. Solid Waste Management Rules – 2016
3. E-Waste Management Rules – 2016

8.4: List of Approved E Waste:

E-Waste – Electrical	E-Waste – IT & Communication
• Motors and Starters	• Copier/Printers & Fax Machines
• Fans, Lamps and Luminaries	• Power Stripes & Power Supplies
• Electrical Drives	• UPS/Servo Stabilizers/Inverters
• Heater Coils	• Batteries
• Broken/Fired Cables	• Wi-fi-Modems, Routers, Toggle
• Air Conditioning System	• Network Cables, Switches, Hubs
• Power Distribution Panels	• Phone, Intercom & PBX
• Electronic Music Instruments	• Audio & Video Equipment's/Remote Controls, Projectors
• Electronic GYM Equipments	• Printed Circuit Boards
• Electronic Attendance System	• Barcode/QR scanners
• Analog & Digital Measuring Instruments	

8.5: 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 singing 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)

P.S. PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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

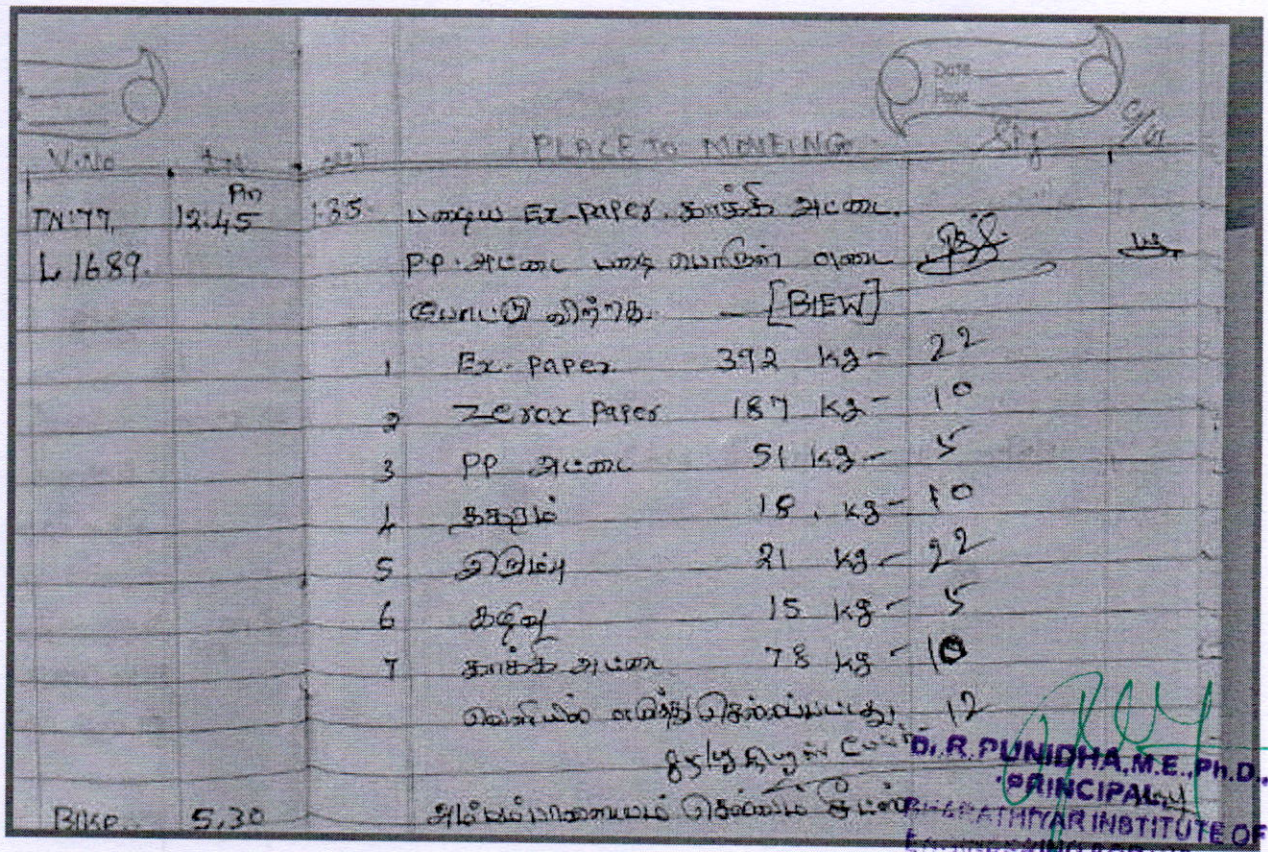
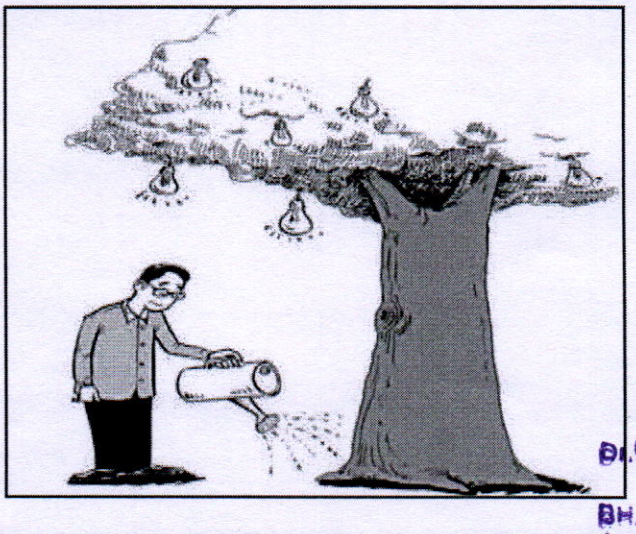


Fig.9: Effective Waste Disposal

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

PART-C: GREEN AUDIT REPORT

7. ASSESSMENT ON MATURE TREES & BIO-DIVERSITY

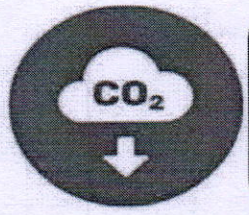


9.1: Campus Greenery:

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 ***1,246 with nearly 25 varieties of trees.*** Apart from the mature trees; preserving the ecology; the entire college campus is planted with various flowering shrubs and bushes. Table-14 shows the list of mature trees available inside the college + hostel campus.

Table-14: List of Mature Trees Available in the College Campus

S. No.	Description	Quantity
1.	Matured Trees + Flowering Shrubs	1,246
Total		1,246



No. of Mature Trees, Flowering shrubs & Bushes available in the campus is **1,246** which contributes for a reduction of **27.2 Tons of CO_2 Emission/Annum**

9.4: One Student – One Tree:

This is an Initiative of AICTE to increase the green coverage inside the campus and committed to reduce the Urban Heat Island Effect (UHIE), through NSS volunteers (or any other Green club); One Student: One Tree scheme. Through this scheme, college may plan to plant nearly 2,000 trees in future, make the entire campus with complete green cover and maintain a excellent bio-diversity.

9.3: 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.

9.5: Bio-Diversity in the Campus:

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

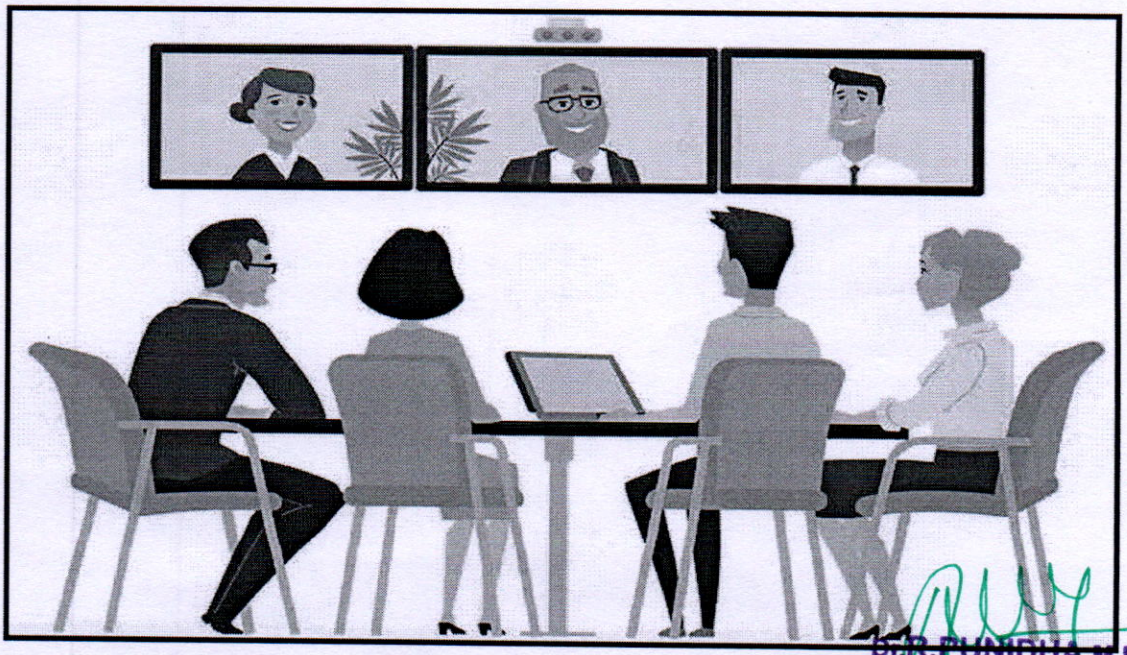
9.6: Recommendations to maintain Bio-Diversity:

- **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.

D.K.PUNIDHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

10. AUDIT SUMMARY & CONCLUSION



SUMMARY OF THE AUDIT PROCESS:

In order to make the **BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN** 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 APFC & FC. Fine tune reactive power based on the load condition
- In a phased manner, ceiling fans must be changed from conventional fans into BLDC fans.
- Implement Energy Management System (EMS) to accurately measure & monitor energy flow
- Diesel flow meter must be fitted with each DG and calculate the UPL accurately
- Prepare suitable formats for all energy consumption and regularly follow the records. At regular intervals conduct internal audits to assess the effectiveness of the practice. Make proper corrections; if it deviates from the standard operating procedure
- Regularly conduct i) Illumination study, ii) Thermal comfort study, iii) Flue gas study on DG, and Boiler, iv) Water quality assessment (for all types of water utilized) and v) Indoor and ambient air quality study

II. Energy Conservation & Management – Thermal Energy:

- Regularly clean the stove burners and ensure that the flame should be in light bluish colour
- Try with radiant burner in dosa making machines and save energy. This provides more convenience 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:

- 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
- Retrofit aerator-based water taps for good water savings. For hand washing applications, all the pipes must be fitted with aerators
- In future; install Bio-Sewage Treatment Plant as it reduces the amount of energy required to operate the plant and environmentally friendly operation
- Captures almost 100 % rain water harvesting through i) Recharging pits and ii) Open well storage pits
- Properly follow scientific method for 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
- Energy required to process the water treatment must be calculated
- Overall cost of treated water by accounting i) consumables, ii) manpower iii) energy and iv) other conventional expenses
- Use the treated water at the maximum in whatever possible areas and try to minimize the fresh water intake (from any source)

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

- Set a policy and fix a target for usage of treated water; ensure that the plan is being executed without any deviation. Increase the % of usage of treated water year by year
- With the advent of smart technologies, it is possible to have centralized monitoring in real-time using Internet of Things (IoT), Geographic Information System (GIS) software, etc. as per **Jal Jeevan Mission,** Department of Drinking Water & Sanitation **Ministry of Jal Shakti**
- Awareness campus must be conducted to all the stakeholders at regular interval. Through this initiative; Painting, Photography, Slogan and Poster making contest are conducted to create consciousness among the students and faculties

IV. 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**

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 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 ASSOCHEM GEM rating)

COMPLETION OF THE REPORT

This report is prepared as a part of the Energy, Environment and Green Audit process conducted at **BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,** Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India by **RAM KALAM CENTRE FOR ENERGY CONSULTANCY AND TRAINING,** Coimbatore – 641 062.

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY, ENVIRONMENT & GREEN AUDIT REPORT

ANNEXURE:

AUTHORISED CERTIFICATES OF THE AUDITOR

Dr. PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

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.

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

TÜV NORD

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

CQI | IRCA CERTIFIED COURSE

CQI | IRCA APPROVED TRAINING PARTNER

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

IGBC

CII
Confederation of Indian Industry

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

GRIHA

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

PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

CII

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

IGBC

e-Learning

Issued by CII Sohrabji Godrej Green Business Centre

HSSERisk Academy

CERTIFICATE

OF APPRECIATION

ENDOWERING PEOPLE THROUGH KNOWLEDGE TRANSFER

THIS CERTIFICATE IS AWARDED TO

Sivarasu Rathinavelu

FOR SUCCESSFUL COMPETION 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 is 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

0100820211006

HSSE Risk
MANAGEMENT SERVICES
www.hsserisk.com

N. R. PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
ARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY AUDIT CERTIFICATE

This is to certify that, we have conducted a detailed *ENERGY AUDIT* in

M/s. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN

Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India.

AUDIT SUMMARY

Date of Audit	24 February 2023
Present Annual Energy Consumption	78,829 kWh + 4,349 kg
Proposed Annual Energy Savings	28,133 kWh + 544 kg LPG
% of Energy Savings	35.7 % Electrical + 12.5 % LPG
Present Annual Energy Cost	Rs. 11.2 Lakhs
Proposed Annual Financial Savings	Rs. 3.1 Lakhs
Expected Initial Investment	Rs. 3.6 Lakhs
Simple Payback Period	1.2 Years

Audit conducted and verified by

(Dr. S.R. SIVARASU)

Dr. S.R. SIVARASU, Ph.D.,
BEE Certified Energy Auditor (EA-27299)
Lead Auditor - ISO 14001: EMS
IGBC - AP, GRIHA - CP
Mobile: 80567 19372, 99420 29372
E-Mail: ramkalamcect@gmail.com

RAM KALAM CENTRE FOR ENERGY CONSULTANCY & TRAINING
No.8, VPK Garden, Mylampatti, Coimbatore – 641 062
GSTIN: 33AAZFR8890A1ZN

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENVIRONMENT AUDIT CERTIFICATE

This is to certify that, we have conducted a detailed ***ENVIRONMENT AUDIT*** in

M/s. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN

Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India on **24 FEBRUARY 2023**

AUDIT SUMMARY

I. Environmental System: CO_2 Balance Sheet (for the year 2022–2023):

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	78,829 kWh	64.6	Trees	1,246 Nos	27.2
2.	Diesel	28,727 Litres	75.8			
3.	LPG	4,349 kg	13.1			
Total Emission			153.5	Total Neutralized		27.2
Balance CO_2 to be Neutralized = 126.4 Tons/Annum.						

Systems Audited:

• Electricity Consumption	• Usage of Chemical, Salts & Acids
• Diesel Consumption (Transport + DG)	• Solid & E-Waste Handling & Management
• LPG Consumption (Cooking)	• RO Plant and Water Distribution System

Audit conducted and 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
IGBC - AP, GRIHA - CP
Mobile: 80567 19372, 99420 29372
E-Mail: ramkalamcect@gmail.com

RAM KALAM CENTRE FOR ENERGY CONSULTANCY & TRAINING
No.8, VPK Garden, Mylampatti, Coimbatore – 641 062
GSTIN: 33AAZFR8890A1ZN

Dr.R.PUNIDHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

GREEN AUDIT CERTIFICATE

This is to certify that, we have conducted a detailed *GREEN AUDIT* in

M/s. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN

Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India on 24 FEBRUARY 2023.

AUDIT SUMMARY

1. Assessment of Roof Top Solar PV Plant
2. Pollution certificates for all transport vehicles
3. Assessment of Mature trees, bushes & shrubs (nearly 1,246 No's)
4. Inspection of green coverage and natural water bodies
5. Inspection on Rain Water Harvesting (RWH)
6. Study on effective Solid Waste Management (SWM) system
7. E-waste – Collection, Segregation, Storage and Disposal
8. Effective handling of Old and Used Batteries (Buyback offer disposal)
9. Improvements for Indoor and Ambient Air Quality (IAQ & AAQ)
10. Maintaining excellent Bio-diversity & Ecology

Audit conducted and verified by

(Dr. S.R. SIVARASU)

Dr. S.R. SIVARASU, Ph.D.,
BEE Certified Energy Auditor (EA-27299)
Lead Auditor - ISO 14001: EMS
IGBC - AP, GRIHA - CP
Mobile: 80567 19372, 99420 29372
E-Mail: ramkalamcect@gmail.com

RAM KALAM CENTRE FOR ENERGY CONSULTANCY & TRAINING
No.8, VPK Garden, Mylampatti, Coimbatore – 641 062
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Dr.R.PUNIDHA.M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENERGY AUDIT CERTIFICATE

This is to certify that, we have conducted a detailed *ENERGY AUDIT* in

M/s. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN

Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India.

AUDIT SUMMARY

Date of Audit	05 JANUARY 2022
Present Annual Energy Consumption	79,682 kWh + 4,154 kg
Proposed Annual Energy Savings	28,133 kWh + 544 kg LPG
% of Energy Savings	35.3 % Electrical + 13.1 % LPG
Present Annual Energy Cost	Rs. 11.3 Lakhs
Proposed Annual Financial Savings	Rs. 3.1 Lakhs
Expected Initial Investment	Rs. 3.6 Lakhs
Simple Payback Period	1.2 Years

(Detailed Energy Conservation Proposals are presented in the Audit Report)

Audit conducted and verified by

(Dr. S.R. SIVARASU)

Dr. S.R. SIVARASU, Ph.D.,
BEE Certified Energy Auditor (EA-27299)
Lead Auditor - ISO 14001: EMS
IGBC - AP, GRIHA - CP
Mobile: 80567 19372, 99420 29372
E-Mail: ramkalamcect@gmail.com

RAM KALAM CENTRE FOR ENERGY CONSULTANCY & TRAINING,
No.8, VPK Garden, Mylampatti, Coimbatore – 641 062
GSTIN: 33AAZFR8890A1ZN

Dr.R.PUNIDHA, M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

ENVIRONMENT AUDIT CERTIFICATE

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M/s. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN

Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India on **05 JANUARY 2022**

AUDIT SUMMARY

I. Environmental System: CO_2 Balance Sheet (for the year 2021-2022):

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	79,682 kWh	65.3	Trees	1,246 Nos	27.2
2.	Diesel	24,603 Litres	65.0			
3.	LPG	4154 kg	12.5			
Total Emission			142.8	Total Neutralized		27.2
Balance CO_2 to be Neutralized = 115.6 Tons/Annum.						

II. Environmental System: CO_2 Balance Sheet (for the year 2020-2021):

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	57,457 kWh	47.1	Trees	1,246 Nos	27.2
2.	Diesel	24,841 Litres	65.6			
3.	LPG	819 kg	2.5			
Total Emission			115.2	Total Neutralized		27.2
Balance CO_2 to be Neutralized = 88.0 Tons/Annum.						

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No.8, VPK Garden, Mylampatti, Coimbatore – 641 062
GSTIN: 33AAZFR8890A1ZN

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112.
THALAIVASAL (TK), SALEM (DT).

III. Environmental System: CO_2 Balance Sheet (for the year 2019-2020):

S. No.	Annual Energy Consumption & CO_2 Emission			Annual CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons)	Description	Annual Usage	CO_2 Neutralized (Tons)
1.	Electricity	92,123 kWh	75.5	Trees	1,246 Nos	27.2
2.	Diesel	26,429 Litres	69.8			
3.	LPG	6,513 kg	19.5			
Total Emission			164.9	Total-Neutralized		27.2
Balance CO_2 to be Neutralized = 137.7 Tons/Annum.						

Systems Audited:

• Electricity Consumption	• Usage of Chemical, Salts & Acids
• Diesel Consumption (Transport + DG)	• Solid & E-Waste Handling & Management
• LPG Consumption (Cooking)	• RO Plant and Water Distribution System

Audit conducted and 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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Mobile: 80567 19372, 99420 29372
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RAM KALAM CENTRE FOR ENERGY CONSULTANCY & TRAINING
No.8, VPK Garden, Mylampatti, Coimbatore – 641 062
GSTIN: 33AAZFR8890A1ZN

D. [illegible] PUNIDHA, M.E., Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

GREEN AUDIT CERTIFICATE

This is to certify that, we have conducted a detailed *GREEN AUDIT* in

M/s. BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN

Deviyakurichi, Thalaivasal, Attur, Tamil Nadu 636 112, India on 05 JANUARY 2022.

AUDIT SUMMARY

1. Assessment of Mature trees, bushes & shrubs (nearly 1,246 No's)
2. Inspection of green coverage and natural water bodies
3. Pollution certificates for all transport vehicles
4. Inspection on Rain Water Harvesting (RWH) both from buildings and road run-off
5. Proposal for Rooftop Solar PV plant with grid interactive model
6. Study on effective Solid Waste Management (SWM) system
7. E-waste – Collection, Segregation, Storage and Disposal
8. Effective handling of Old and Used Batteries (Buyback offer disposal)
9. Improvements for Indoor and Ambient Air Quality (IAQ & AAQ)
10. Maintaining excellent Bio-diversity & Ecology

Audit conducted and 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
IGBC - AP, GRIHA - CP
Mobile: 80567 19372, 99420 29372
E-Mail: ramkalamcect@gmail.com

RAM KALAM CENTRE FOR ENERGY CONSULTANCY & TRAINING
No.8, VPK Garden, Mylampatti, Coimbatore – 641 062
GSTIN: 33AAZFR8890A1ZN

PUNITHA M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

GREEN AND CLEAN ENVIRONMENT POLICY

EFFECTIVE FROM: 05.07.2017

AIM

To improve the green coverage both inside and outside of the college campus by planting more native spices trees.

POLICY SCOPE

The policy is applicable for all the Teaching faculty, Non-teaching faculty, Administrative staff, Students and Parents.

POLICY DETAILS

The OBJECTIVES OF THE POLICY:

- Plantation of trees.
- Reduce the air and noise pollution inside the campus.
- Encourage the design and development of battery-operated vehicles.
- Plastic free campus.

PROCEDURES

- Request the Governing Council's endorsement of the policy's implementation.
- Elucidate to employees and students why a policy and action plan are necessary.
- Place banners in visible locations such as the "Green Campus," the "Parking Area," and so forth.
- Instruct the student about the negative effects of air pollution.
- Instruct the security to restrict automobile entry beyond the parking lot to prevent.
- Keep an eye on the gardener's tasks, such as maintaining the green scape, watering and feeding plants, pruning trees and shrubs, fertilizing and mowing lawns, weeding gardens, and keeping walkways and green spaces free of trash.
- Manage soil and liquid waste.
- Adopt Rain water harvest technique to recharge bore well and underground surface water.
- Conserve water and Energy.
- Implement the recommendations.

CONCLUSION

This policy plays an essential role in the creation of a healthier and more sustainable world. It is important to understand the effects of pollution on the environment, and to take action to reduce it. Our students, staffs work together to ensure a clean environment for future generations.

BHARATHIYAR INST. OF ENGG. FOR WOMEN
Deviyakurichi
636112

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

PRINCIPAL

ENERGY CONSERVATION POLICY

EFFECTIVE FROM: 05.07.2017

AIM

This policy outlines how our college can save energy and maximize the use of alternative energy sources. It provides guidance on how to reduce energy consumption, identify and prioritize energy conservation activities, and implement efficient and cost-effective strategies for reducing energy use.

POLICY SCOPE

The policy is applicable for all the Teaching staff, Non-teaching Staff, Administrative staff, Students and Parents.

POLICY DETAILS

This policy document provides guidance on how to conserve energy and maximize the use of alternative energy sources at our college. It describes strategies to reduce energy use and encourages staff and students to participate in energy conservation activities.

These include:

- Communicate the objectives of policy and action plan to staff and students.
- Transform the campus into a renewable energy campus.
- Install and utilize the renewable energy systems such as roof top solar photovoltaic panel for electricity generation.
- Educate students on fossil fuel pollution, depletion and need for energy conservation.
- Celebrate renewable energy day to create awareness among staff and students.
- Organize seminars to provide an opportunity to understand and analyze the technology, recent developments, scopes and feasibility of implementation.
- Encourage students to carry out renewable energy projects and motivate entrepreneurship in manufacturing the system.
- To convert the existing LED street lights into solar operated street lights.
- Students and staff members are informed through internal circulars, notifications and conducting the awareness programme about the importance of energy conservation.

CONCLUSION

The conclusion of an energy conservation policy is that everyone should take responsibility in conserving energy and work together towards a more sustainable future.

BHARATHIYAR INST. OF ENGG. FOR WOMEN
Deviyakurichi
636112

Dr.R.PUNIDHA,M.E.,Ph.D.,
PRINCIPAL,
BHARATHIYAR INSTITUTE OF
ENGINEERING FOR WOMEN,
DEVIYAKURICHI - 636 112,
THALAIVASAL (TK), SALEM (DT).

PRINCIPAL