

ENVIRONMENT AUDIT REPORT

2021-2022



HOLY CROSS COLLEGE (AUTONOMOUS)

NAGERCOIL

Tamilnadu 629004.

TJ Solutions


**4/101, Raja Sir Muthiah Nagar,
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Madurai-625 016.**

ACKNOWLEDGEMENT

We at Tj Solutions, Madurai are thankful to the Principal for giving us the opportunity to carry out Environment audit of HOLY CROSS COLLEGE Nagercoil - 629004, Tamilnadu, India. Tj Solutions team is also thankful to all other supporting Officers / Staffs of the above institute for their wholehearted support, hospitality and the courtesy extended to the Audit team during the course of the visit.

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Summary of Environment Audit

Environment audit of HOLY CROSS COLLEGE and its HOSTEL was carried by TJ solutions. Audit team has gone through the data related to Water and Electrical Energy, Waste generation , Waste Management, Waste Recycling and Reuse, Green Belt Development of the Institution both inside and outside the campus. The team also carried out the study of Renewable energy utilization, Pollution abatement measures, Rainwater harvesting, Water and Energy Conservation measures taken to reduce the pollution, noise level, Green house emission and maintain Ambient Air quality

During the visit it is observed that cleanliness in the campus is well maintained through proper disposal of wastes, utilization of eco-friendly supplies and effective recycling program. The concept of eco-friendly culture is disseminated among the students through various seminars/workshops and community-oriented programs. The Institution strictly follows reduce, reuse and recycle method to limit energy usage and replace non-renewable energy sources with renewable energy resources.

The environment audit report is a very powerful and valuable communications tool to use while working with various stakeholders who need to be convinced that systems and procedures in place are suited to cope with natural changes and modifications.

It is hoped that the results presented in the environment audit report will serve as a guide for educating the college community on the existing environment related practices and resource usage at the college as well as spawn new activities and innovative practices.

The audit outputs and recommendations are summarized as follows:

- Total water consumption for HOLY CROSS COLLEGE and Hostel – 89.7 KL/Day
- Electrical Energy consumption from TNEB GRID alone - 119229units
- Total Electrical Energy consumption -126366 units
- Renewable energy from Solar PV power plants- 9387 units
- Green House Gas Emission -210.6 t CO₂e

- Air pollution impact on Ambient Air quality is negligible since the quantity of fuel used for combustion in the institution is very less
- Noise levels inside the campus are within the prescribed limit.
- Waste water treatment plant can be constructed in future plans.
- Biogas plant and other degradable bio- waste are converted into bio-compost and bio-fertilizer.
- Rainwater collection system is covered for 146.37 sqft area
- Flow meters are to be provided for better water management
- Waste water management has to be improved to reduce the water consumption.
- Steps to be taken for maximizing the solar power harvesting.

We are happy to submit this detailed environment audit report to the
HOLY CROSS COLLEGE.


TJ Solutions

Madurai.



1. Introduction

Environmental Policy

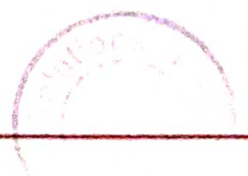
HOLY CROSS COLLEGE has well formulated Environmental Policy to guide all its activities.

The main objectives are as follows:

- ❖ To Reduce, Reuse, and Recycle the resources consumed by our institute
- ❖ To achieve sound environmental practices across our entire operation.
- ❖ To minimize our waste and reduce our water consumption wherever possible.
- ❖ To invite our stakeholders to participate in our efforts to protect the environment.
- ❖ To create awareness among our employees and training them to meet our objectives.
- ❖ To review our actions on environmental on a regular basis and compare our performance with our policies, objectives and targets.

The Institution vouchsafes:

- ❖ Identifying the environmental impacts and aspects of our operations and ensuring that we meet our compliance obligations.
- ❖ Establishing environment programs that are consistent with our commitment to the continual improvement of the environment management system.
- ❖ Compliance with applicable environmental policies and prevention of pollution by applying the best available practices



2. WATER

2.1 Water usage at Holy Cross College for Women

Total number of students studied during the academic year 2021-22- 2474

Teaching & non-Teaching staff in the institution during the academic year 2021-22 -205

Total number of stake holders: 2679

Number of college working days: 180

Sl. No	Place	Water usage Quantity Litres / Day
1	Laboratories	1,000
2	Drinking	2500
3	Garden	30,000
4	Rest room	10,000
5	Construction	3500
6	Canteen	4000
	Total	51,000

Water usage in the College- 51 KL / Day

Water usage per day per stakeholder in the college -22.4 litres

Waste water generation in the college - 18 KL/day



2.2 Water usage at Hostel

Number of students and staff residing in the hostel during the academic year 2021 -22:
- 315

Number of day's hostel was occupied with the students and staffs- 220

Sl. No	Place	Water usage Quantity Litres / Day
1	Cooking	1000
2	Drinking	700
3	Garden	5000
4	Toilet ,Bath room and clothes washing	30,000
5	Vessel Cleaning	2000
	Total	38,700

Water usage at Hostel - 38.7 KL / Day

Water consumption per day per stakeholder in the hostel - 122 litres

Waste water generation in the Hostel - 35.2 KL /day

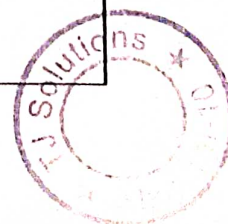


3. Electrical Energy

3.1 TNEB Grid Electrical Energy Consumption: 2021-2022

TNEB ENERGY CONSUMPTION -COLLEGE					
Sl. No	SERVICE NO	TARIFF	Units Consumed	Bill Amount -Rs	Average Unit cost-Rs
1	7123014167	LM2B1	46850	341385	7.2
2	7123014181	LM2B1	41490	271646	6.5
3	7123014166	LM51	779	10821	13.8
4	7123014335	LM61	140	6712	47.9
5	7123014180	LM51	90	10760	119.5
6	7123014321	LM51	6420	79050	12.3
7	7123010534	LM51	3490	42620	12.2
	Total		99259		

TNEB ENERGY CONSUMPTION -HOSTEL					
Sl. No	SERVICE NO	TARIFF	Units Consumed	Bill Amount -Rs	Average Unit cost-Rs
1	7123014168	LM51	50	5225	104.5
2	7123014169	LM51	1780	20890	11.7
3	7123014170	LM51	9890	99905	10.1
4	7123014171	LM51	8250	78765	9.5
	Total		19970		



3.2 Diesel Generator Electrical Energy Consumption: 750 Units

Total electrical energy consumption

ELECTRICAL ENERGY CONSUMED	UNITS
Diesel Generator (Based on diesel consumption)	750
College and Hostel	119229
Total electrical energy	119979

3.3 Solar power Electric energy consumption:2021-2022

Sl. No	Solar Capacity KW	Solar Power Generation Units
1	5	6387



Total Electrical Energy consumption in the College & Hostel -1,26,366 units

Electrical Energy consumption per stakeholder per year - 47.16 units

4. FUEL CONSUMPTION

4.1 LPG

For cooking and LAB, LPG gas is used in the hostel, College and canteen

LP GAS usage in the year 2021-2022-

Hostel 132

College 10

Canteen 432

Total 574*19= 10906 Kg (1 Commercial cylinder= 19Kg)

5. Waste Generations and Management

Waste Generation

Liquid waste

Waste water generation in the college -18 KL /day

Waste water generation in the Hostel - 35.2 KL /day

Solid Waste

Food waste- 10 Kg /day

Plastic Waste-20 Kg

Paper waste- 5.3 Kg/ day

Waste Management

5.1 Liquid waste Management

- Laboratory waste water is being sent through public sewer drainage system after proper dilution as per Material Safety Data Sheet norms.
- Waste water generated from washing, urinals, bathrooms are sent through public sewer drainage system.

5.2 Solid waste Management

Each Class Room is provided with color coded bins with instructions to drop paper waste and non -bio degradable waste.

Bio-degradable Waste Management

- ❖ Separate dustbins are kept to collect the waste food and used plates.
- ❖ Bio-Degradable and non-biodegradable waste are collected in separate bins provided.
- ❖ Vegetable waste from Hostel & canteen are sent to bio composing unit.
- ❖ Withered dry leaves are collected and converted into Bio-manure.

Plastic Waste Management

- Sale of plastic files, folders and other plastic stationery items in the college store is banned.
- All the stake holders and the faculty are motivated to use stainless steel water bottles and lunch boxes.
- Plastic utensils in the stores, canteen and hostel kitchen are replaced with stainless steel plates, tumblers etc.
- Use of polythene bags is avoided.

Other Solid Waste Management

- Solid wastes generated from damaged furniture are sent to waste wood collectors.
- Glass wastes are disposed periodically through municipal waste collection system.
- Napkins are burnt in the incinerators

5.3 Used Battery Management

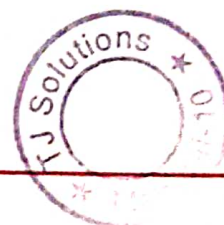
- Used batteries are disposed as waste to the local vendor

5.4 E-Waste Management

- E-waste is not properly collected and kept in E-waste collection point for disposal through authorized e-waste recycler.

5.5 Hazardous Waste Management

- Green Chemistry is followed in the lab.



6. Pollution abatement measures

6.1 Waste Reduction

- ❖ Micro scale laboratory is implemented in Chemistry Department to reduce the usage of chemicals.
- ❖ Students are instructed not to waste paper while writing examinations.
- ❖ In order to reduce the use of paper the following initiative were taken
 - Online Admission Process - Printing of applications reduced & submission of applications through admission portal.
 - Online voting system in Students Forum Election.
 - Printing in both sides of paper
 - Examination seating arrangements intimated to students through SMS
 - Online exams are conducted to reduce the paper usage.
 - All purchase orders are scanned and sent through mail instead of sending hard copies by courier.
 - Vendors are asked to forward their catalogues and pamphlets through mail.
 - Sending soft copies of the documents/letters, when hard copies are not necessary
 - Promoting paper pencils instead of wooden pencils.

6.2 Waste Reuse

- Reuse one sided paper
- Reuse Envelopes

6.3 Waste to wealth

Inside the campus

- Dry leaves are converted into bio fertilizer

6.4 Water Conservation initiatives

- Water purifiers are provided in hostel and college for safe drinking water.
- No showers in bathroom.
- Installed water efficient bathroom fittings.



6.5 Energy conservation

- The fans, lights, air-conditioners and other electronic and electrical equipment are switched off when not in use.
- Computers are switched to sleep mode or hibernate mode automatically when not in use.
- At the end of every practical session, Computer monitors and UPS are switched off.

7. Greenbelt Development

- The campus is lush green with gardens, lawns and plants wherever there is open space.
- The eco-friendly ambience of the campus is a noteworthy feature of Holy Cross College.
- Green belt is developed in 19870 sqft. Area.
- The list of trees and the arrival of new saplings are recorded every year.
- All the plant specimens are identified and documented.





Routine Green Practices

- The Green campus drive is an initiative of the College to protect the environment.
- The campus protects age old trees in addition to several new trees and plants planted.

7.1 Greenbelt development on the campus inside

Involvement of students in the Green activities

- Vermi compost and mushroom cultivation preparation is practiced by the student.
- Students are involved in tree sapling plantation, watering, donating saplings, potting weeding and other maintenance.
- Students are given training in environmental related issues in addition to awareness programs.



Renewable Energy

8.1 Solar PV Power Plants

Solar Power Plant Details		
Holy Cross College		
Name	Solar Panel Capacity	Grid Type
Holy Cross	5 kw	OFF GRID

8.2 Solar Water Heater

Solar water heater capacity of 200 LPD installed.

8.3 Renewable Energy Generation

Renewable Energy- Solar PV Power plants

Holy Cross College

Solar Power plant installed at college -5 KW.

Renewable Energy- Solar Thermal Water Heaters

Solar water heater installed capacity at the hostel - 200 LPD

Grid electrical energy (equivalent) saved due to Solar water heaters is 3000 units/year

Renewable Energy usage

Sl. No.	Renewable Energy	Electrical Energy/Equivalent Electrical Energy
1	Solar Photo Voltic	6387 units- Electrical Energy
2	Solar Thermal	3000 units- Equivalent Electrical Energy
	Total	9387 units



8. Rainwater Harvesting

The college has taken maximum steps to harvest rainwater inside the college campus.

- Total rainwater harvest area covered- 146.37 sqft



9. AMBIENT AIR

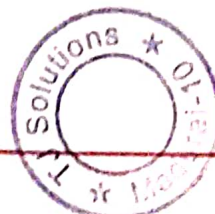
10.1 Green House Gas Emission

Holy Cross college provides convenient and flexible transport facilities for the students.

- Diesel consumption by college buses per year-20700 L
- Diesel consumption by DG sets in the college/hostel - 750 L
- Total Diesel Consumption- 21450 L
- Radius of Nagerkovil town-4 KM
- Average distance travelled by staff and students per day from home to College and back to home -43 KM
- No of four wheelers being used by students and staff -14
- No of two wheelers being used by students and staff -176
- College working days during the year 2021-2022: 180 days
- Average Fuel efficiency of four wheelers - 20 KM/ L
- Average Fuel efficiency of two wheelers -60 KM/ L
- Average Petrol consumption by four wheelers -1890 L
- Average Petrol consumption by two wheelers-7920 L
- Total Petrol consumption-9810 L
- Total LPG consumption(Hostel & canteen & College) per year- 10,906 Kg
- Total electrical power consumed from Grid- 1,19,229 units
- Green House Gas emission due to diesel 57271.5 Kg CO₂ e
- Green House Gas emission due to petrol 23151.6 Kg CO₂ e
- Green House Gas emission due to LPG 33045.18 Kg CO₂ e
- Green House Gas emission due to Grid power 97142.49 Kg CO₂ e
- Total GHG emission 210610.7 Kg CO₂ e
210.61 t CO₂ e

10.2 Green House Gas-Reduction

- Total Solar power generation 6387 units
- Total capacity of solar water heater installed 200 LPD
- Total paper waste 1000 kg
- Green House Gas reduction due to solar power plant 3.83 t CO₂ e
- Green House Gas reduction due to solar water heater 2.1 t CO₂ e
- Green House Gas Reduction due to paper waste 4.3 t CO₂ e
- Total Green House gas reduction 10.23 t CO₂ e
- Net Green House Gas emission (210.61-10.23) 200.38 t CO₂ e



10.3 Ambient Air Quality

Flue gas emission sources

- LPG combustion at hostel, canteen and labs
- Diesel generator at College and Hostel

Fuel consumption per year

- LPG - 10906 Kg
- Diesel at Hostel/college-20950 litres
- LPG consumption per day-60 Kg
- Diesel generators are not running on daily basis.

The quantity of flue gas emission and the impact on ambient air quality from the above combustion are negligible

Air Quality Monitoring

- To monitor the Ambient Air Quality, one Continuous Ambient Air Quality Monitoring Station (CAAQMS) is placed at TNPCB (Tamil Nadu Pollution Control Board) office Nagercoil
- The results are tabulated

Sl.no	District (location)	So2	No2	PM2.5	PM10	AQI Index
1	Nagercoil	9	22	21	40	43



10.4 Noise level

Noise level inside the campus

Sl. No	Location	Max value in dB	Average Value in dB
1	Near Office	68.1	58.2
2	Golden Jubilee Hall	62.9	57.6
3	Hostel	76.8	63.0
4	Near Auditorium	63.4	56.0
5	Near Main Entrance	79.1	65.2
6	Near Generator Room	66.0	59.2

- Diesel Generators (DG) sets do not run on a continuous basis. Only during power failure, DG sets are operated during the working hours of the College.
- Generally Power failure occurs for a very short time period.
- During planned shutdown hours, DGs run continuously based on the load
- Noise disturbance due to DG set is negligible.
- All buildings are far away from the National Highway. Noise disturbance from the national highway is not appreciable.



10. Audit Findings & Recommendations

Findings

- ❖ Total water consumption for Holy Cross College and Hostel is 89.7 KL/Day.
- ❖ Water usage per day per stakeholder in the college-22.4 litres.
- ❖ Water consumption per day per stakeholder in the hostel -122 litres
- ❖ Electrical Energy consumption from TNEB GRID alone is 119229 units.
- ❖ Total Electrical Energy consumption is 126366 units.
- ❖ Renewable energy from Solar PV power plants- 6387 units.
- ❖ Green House Gas Emission -210.6 t CO₂ e.
- ❖ Air pollution impact on Ambient Air quality is negligible since the quantity of fuel used for combustion in the institution is very less
- ❖ Noise levels inside the campus are well within the limit.
- ❖ Food waste and other degradable Bio- waste are converted into Bio compost and Bio fertilizer

- ❖ Rainwater collection system is covered in many areas.



Recommendations

- Flow meters are to be provided at source to know the water consumption and for better water management.
- Waste water management has to be improved to reduce the water consumption.
- Flow meter for biogas plant to be provided to know the exact quantity of biogas generation and to utilize the plant maximum.
- ETP(Chemistry Lab – waste water) plant may be constructed for further waste water treatment.
- More green building can be constructed.
- More capacity of solar power plant may be installed to reduce energy drawn from TNEB Grid
- Lightening Arrester must be installed in the college campus
- Sensor based switch to be fixed for street lights and required places
- E-Waste corner to be provided for collection of E-Waste materials
- Every six month E-Waste to be disposed as per E-Waste Management Rules
- Energy saving fans to be fixed for reduce the energy consumption
- Press type water tape to be fixed for water conservation
- Biogas plant for Hostel and canteen vegetables and food waste shall be planned in future
- Conduct exhibition for recyclable waste products
- Conduct more awareness programs on importance of energy saving for students
- UV light to be fixed at the outlet of RO unit for disinfection

