



**St. Joseph's College of Arts & Science (Autonomous)**  
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# REPORT OF ENERGY AUDIT

*Submitted to*

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
Cuddalore - 607001,  
Tamil Nadu, India.**

**Date of Audit: 21/09/2024 (Saturday)**



**Submitted by**

***Dr. Helen Roselene  
CQI-IRCA Certified  
EMS ISO 14001:2015  
Lead Auditor***

# ENERGY AUDIT

## 1. Preamble

An assessment of energy consumption, energy sources used, energy management, lighting devices used and other appliances used by the campus community is an important aspect of sustainability of the community. Hence this is a relevant aspect of the assessment.

Energy Audit As per the Energy Conservation Act, 2001, Energy Audit is defined as

**“The verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption”.**

The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs. Energy Audit provides a “Bench-mark” (Reference point) for managing energy in the building and also provides the basis for planning a more effective use of energy throughout the Campus. The audit is conducted to identify, quantify, describe and prioritize framework of energy sustainability in compliance with the applicable regulations, policies and standards.

The main objectives of carrying out Energy Audit are:

- To find out the ways to reduce the energy consumption.
- To find and implement the solutions that is feasible and acceptable.
- To create awareness among stake holders about the real concerns of energy management.
- To initiate the use of alternative or non-conventional energy sources to achieve energy conservation.
- To make the institution campus to be self-sustained in energy utilization.

## 2. Energy Audit Observations

### 2.1 Renewable energy

Energy which can be used from renewable sources such as solar, wind, water, biomass, and geothermal is Renewable energy. India has an outstanding solar energy potential because of high solar insolation. Solar panels are used which converts the solar energy available from the sunlight into electricity thereby forming a renewable energy. Solar panels are also known as Photovoltaic panels which helps in the conversion of light energy through the photon particles in the sun's light which is then converted to electricity.

Solar voltaic system has been fitted in the college for use of renewable energy. There are two solar power plants within the college campus. The power generated from the above panels is being diverted for the illumination of the street lights inside the premises.



**Google Map Showing the Roof Top Solar Panels That's Installed**



**Street Lights Power Generated By Solar Energy**



### Power Saved Through These Panels are Tabulated Below

S. No.	Power consumption in Watts/Hr	No. of lights(LED)	Usage(Hrs) / day	Total (Watts)/Hr
1.	24	6	12	144
2.	30	2(Post Light)	24	30
3.	22	1	12	22
Total Watts/Hr				196
Total Watts/Day				2352
Total Watts/Year				858480 Watts/858.48KW



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**Inverters in the Campus**

### Electric Appliance Used in the Campus

S.NO	Electrical Appliances/Instruments	Number	Total power(W)	kW
1.	TUBE LIGHT	15	92	0.9
2.	LEDBULB	152	406	4.0
3.	LEDTUBE	134	-	-
4.	PROJECTOR	9	-	-
5.	SPEAKERS	49	-	-
6.	SPEAKERWITHHORN	6	-	-
7.	FAN	233	-	-
8.	COMPUTER	393	-	-
9.	PRINTERS	10	-	-
10.	SCANNER	4	-	-
11.	UPS	5	-	-
12.	A/C (ordinary)	13	345	3.5
13.	INVERTERA/C	19	409	4.1
14.	REFRIGERATOR	4	209.7	2.1
15.	OVEN	7	230	2.3
16.	CENTRIFUGE	6	-	-
17.	AUTOCLAVE	12	-	-
18.	LAMINARFLOW	5	-	-
19.	EXHAUSTFAN	13	-	-
20.	INCUBATOR	8	-	-
21.	SANITARY NAPKIN INCINERATOR	2	-	-
Average Total Consumption in K.Watts				16.9

Architectural design for administrative building and class rooms are based upon use of natural lighting and ventilation, to save extra power for bulbs and fans.

For example, all the classrooms are provided with good number of windows.

Florescent bulbs are replaced with LED bulbs and LED tubes gradually (30 LED bulbswere added this year)

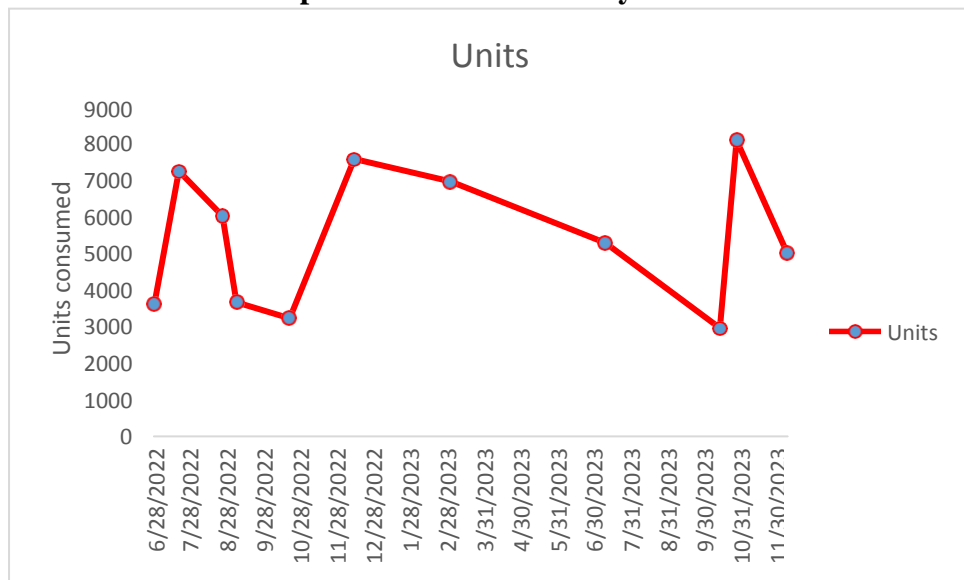
An automatic cut-off system with sensors is used in the street light present in the campus.

Awareness about Energy conservation and prevention of Energy wastage is done by keeping boards like “**save electricity**”, “**switch off computers when not in use**”, etc.

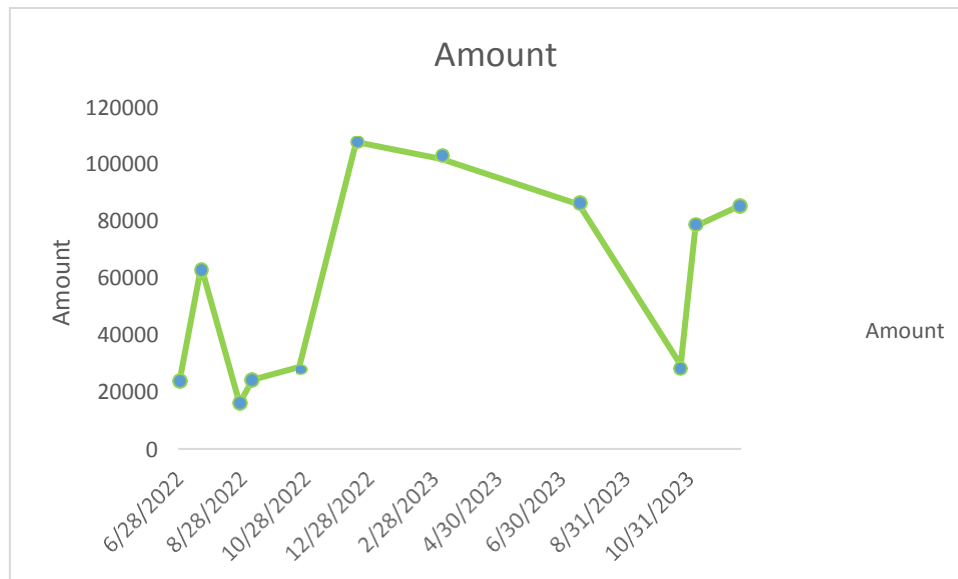
## Automatic Cut-off System



## Sample of Electric Bill Analysed



The average amount of power consumed is 5433 it seen that in October the amount spent is less, this could be attributed to vacation, February and March it could be attributed the high consumption of AC and fan due to extreme heat.



The average amount of amount spent is 58578.82, it seen that in October the amount spent is less, this could be attributed to vacation, February and March it could be attributed the high consumption of AC and fan due to extreme heat.

### 3. Recommendations for Energy Conservation

Energy saving measures has to be taken up by the stakeholders. The following Energy Conservation (ECON) measures tabulated in this given Table are suggested for the campus.

#### ➤ Energy Conservation Measure

S. No.	Energy Conservation Measure	Remarks / outcomes	Cost Analysis	Estimated Energy Savings
1.	Switch OFF lights when not in use.	At least during day time of the summer and winter season when it is a sunny day the lights the lights can be switched OFF.	No cost involved. Stake holders to be motivated to switch OFF lights when not in use.	12.8 kWh/day
2.	Computers rearrangement	Computers are placed closely to the walls. This adds up heat and reduces the life time of the systems.	Rearrange such that sufficient gap is available for ventilation for the computers.	7.2 kWh/day

By implementing this two measures, approximately 20 kWh/day of energy consumed can be reduced. Overall, per annum, 4000 kWh of energy can be reduced. This leads to a savings of Rs. 18,500/- per annum (approximately).





**Solar Panels Used For Harnessing Solar Energy**

#### **4. Research action taken up in harnessing biogas**

**Bio-Gas Plant:** There is one bio-gas tank in Zoology lab which is the alternate source of LPG energy by which the number of LPG gas cylinder usage has been reduced.



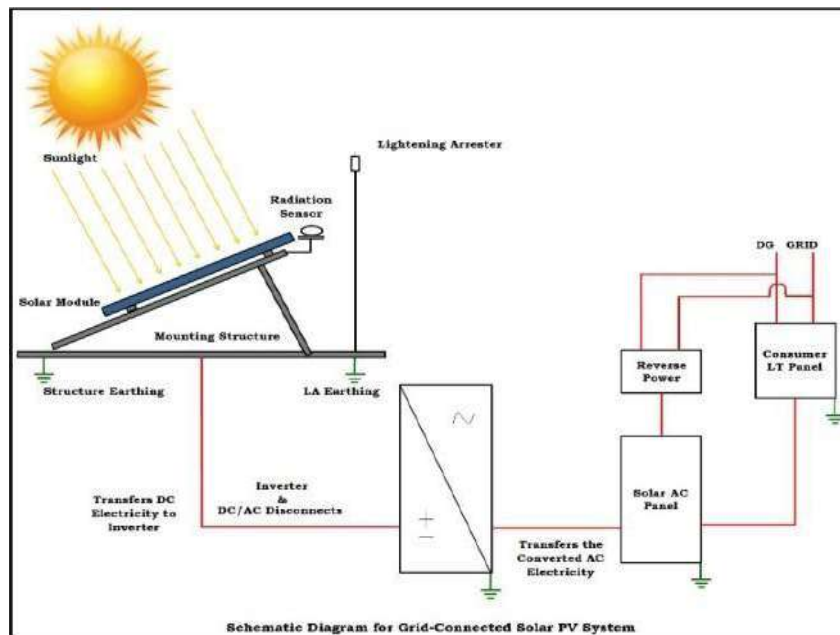
**Biogas Tank in Zoology Laboratory**

Biogas, a renewable fuel that is produced when organic matter such as food or animal waste. It is broken down by microorganisms in the absence of oxygen. This process is called anaerobic digestion. For this to take place, the waste material needs to be enclosed in an environment where there is no oxygen. Biogas Plant is a renewable energy source, obtained from organic waste consisting of approximately 55-65% methane, 30-40% carbon dioxide, and various impurities. Its applications span from cooking and heating to electricity generation, contributing to reduced carbon emissions. Biogas plants also help to eradicate the use of synthetic fertilizers. The by-product received from biogas plants is called digest ate which is rich in Nitrogen, Phosphorus, and Potassium. This digest ate works as an excellent fertilizer for crop growth, depleting the need for chemical fertilizers.

### **5. Best practices**

- The institution has made serious attempts to illuminate the corridors for the hostels using solar panels.
- The students have made conscious effort in generating biogas as a part of their Academic research
- The roof tops are painted white to bring about albedo effect thus cooling the building.
- The well ventilated rooms prevent the use of electricity.
- Awareness about Energy conservation and prevention of Energy wastage is done by keeping boards like “save electricity”, “switch off computers when not in use”, etc.

## 6. Recommendations



If the institution can go in for solar panels that could be connected to the main grid there will be a complete cost saving in electricity consumption as shown in above figure. The solar energy tariffs in Tamilnadu is INR 3.99 per kWh (25 years fixed) for solar system capacities up to 10 kW, INR 3.70 per kWh for solar system capacities from 11 to 100 kW, however the Prices ranges between Rs 9 to 11

## 7. Conclusion

The energy conservation initiatives taken up by the institution are significant. Energy efficient lighting schemes, awareness created among stakeholders and necessary power backups are being practiced by the institution. There are some best Practices followed on Energy Audit in the Organization like Transformers, Generators and UPS are protected properly with fencing and kept awareness boards on '**Dangers**' and '**Warnings**'. It is observed that the most of places, sign board of '**Switch ON**' and '**Switch OFF**' are kept towards saving energy measures to the stakeholders. Electrical wires, switch boxes and stabilizers are properly covered without any damage which will cause any problems to the staff and student members. Adaptations of drip and sprinkler irrigation in the campus to minimize the energy potential are well appreciated. Few recommendations, in addition, can further improve the energy savings of the Organization such as installing more solar panels that can be connected to main grid. This may lead to the prosperous future in context of Energy Efficiency Campus and thus sustainable environment and community development to the stakeholders in coming years to come.

## References

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UDYAM-KR-02-0063611

## NIMMA BHOOMI SOLUTIONS CERTIFICATION

This is to certify that the Energy audit was conducted at  
St. Joseph's College of Arts & Science (Autonomous),Cuddalore - 607001,  
Tamil Nadu, India, on 21.09.2024, Saturday.

I assure that the data collected and documented is authentic.

**Dr.Helen Roselene**

PhD, MPhil, M.Sc.  
PG diploma in pollution analysis  
CQI-IRCA Certified  
EMS ISO 14001:2015  
Lead Auditor



**QMS/6567/0824**

**EMS/658D/0824**

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Registered with MSME, Government of India-UDYAM-KR-02-0063611

**BUREAU VERITAS**  
Certification



## Certificate of Achievement

This is to certify that

*Helen Roselene Thomas*

has attended and successfully completed the course assessment and examination for the

***PR315: EMS ISO 14001:2015 Lead Auditor Training Course***

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Course No. 17912 certified by the CQI and IRCA. This course satisfies the training requirements for the CQI and IRCA EMS Auditor Certification Scheme.

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Held on: **July 22 – 26, 2019**

at: **Bengaluru, India**

Signed: \_\_\_\_\_

Date: **July 10, 2020**

**Anantha Prabhu**  
General Manager, Technical, SAR,  
ICC (Global Schemes) & Global Accreditation, Training

Certificate Serial No: **19/IN/1020306/4801**

Unique Delegate No: **195371**

