

ST. PAUL'S COLLEGE KALAMASSERY

Re-accredited with 'A' Grade (Third Cycle) by NAAC

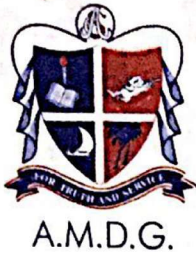
(Affiliated to Mahatma Gandhi University, Kottayam)

HMT Colony P.O., Kalamassery, Ernakulam, Kerala, India

ENERGY AUDIT REPORT (2019-20)



ENERGY AUDIT REPORT 2019-20



St. Albert's College (Autonomous)

An initiative of Educational and Charitable Trust of Archdiocese of Verapoly

Accredited by National Assessment and Accreditation Council (NAAC) at 'A' Grade, ISO 9001:2015 certified
Affiliated to Mahatma Gandhi University, Kottayam, Kerala

Energy Audit- St.Paul's College, kalamassery

Certificate

This is to certify that the energy audit report of St.Paul's College, Kalamassery is based on original data collected during the period of study. Further it is certified that the baseline data has been prepared by the Internal Energy Audit Team of St.Paul's College, Kalamassery and submitted to us. The content of the baseline data of the study has been personally verified by me for reliability and validity. The data used in the study are original in nature and have not been presented or published elsewhere.

Dr. Sajeesh T H

04-06-2020
Ernakulam

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INTRODUCTION

1. ENERGY AUDIT

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprint. Energy has become a key factor in deciding the product cost at micro level as well as in dictating the inflation and the debt burden at the macro level. Energy cost is a significant factor in economic activity at par with factors of production like capital, land and labor. The imperatives of an energy shortage situation call for energy conservation measures, which essentially mean using less energy for the same level of activity. Energy Audit attempts to balance the total energy inputs with its use and serves to identify all the energy streams in the systems and quantifies energy usages according to its discrete function.

Energy audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating and maintenance practices of the system. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply, decision on appropriate energy mix, decision on using improved energy conservation equipment, instrumentations and technology. Energy audit includes the supply of energy, use of energy and energy losses for all normal buildings.

The energy demand is increasing very fast with the development of society. The prices and demand of energy is increasing with time. So to control the price and demand a more effective and sustainable energy system becomes necessary. The aim of this Audit is to make an energy survey of the building, evaluating different sources of energy supply and losses in the building.

1.1 Objectives of Energy Audit

The Energy Audit provides the vital information base for the overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures.

It aims at: -

- Assessing the present pattern of energy consumption in different operations.
- Relating energy inputs and production output.
- Highlighting wastage in major areas.
- Identifying the quality and cost of various energy inputs.
- Implementation of measures for energy conservation & realization of savings.

1.2 Need for Energy Audit

In an organization like college, one of the top operating expenses is often found to be electricity charge. Energy audit constitutes a strategic area for cost reduction. A well done energy audit will always help owners to understand more about the ways energy is used in their organizations, and help to identify the areas where wastage of energy can occur and where scope for improvement exist. The energy audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programs which are vital for production and utility activities. Such an audit program will help to keep focus on variations that occur in the energy cost, variability and reliability of supply of energy, help decide on the appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation equipment etc.

In general, the energy audit is the translation of conservation ideas and hopes into reality, by lending technically feasible solutions with economic and other organizational considerations within a specified time frame. The primary objective of the energy audit is to determine the ways to reduce the energy consumption per unit of product output or to lower operating cost. The energy audit provides a benchmark, or a reference point, for managing and accessing the energy use across the organization and provided the basis for ensuring more effective use of energy.

AUDITING FOR ENERGY MANAGEMENT

An energy audit establishes the baseline for any improvements in an organization energy use. It provides a comprehensive and systematic method for targeting cost effective efficiency gains. An energy audit is a detailed inventory of the energy performances of the institution carried out by an auditor. There are many examples where clients have been able to make savings without requiring any significant capital investment. An Energy Audit, or Review, is an investigation of all facets of an organization historical and current energy use with the objective of identifying and quantifying areas of energy wastage within the organization activities. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation.

1. List ways that you use energy in your college. (Electricity, electric stove, kettle, microwave, LPG, firewood, Petrol, diesel and others).
2. Electricity bill amount for the last year
3. Amount paid for LPG cylinders for last one year
4. Weight of firewood used per month and amount of money spent? Also mention the amount spent for petrol/diesel/ others for generators?
5. Are there any energy saving methods employed in your college? If yes, please specify. If no, suggest some.
6. How much money does your college spend on energy such as electricity, gas, firewood, etc. in a month? (Record monthly for the year 2019).
7. How many CFL bulbs has your college installed? Mention use (Hours used/day for how many days in a month)
8. Energy used by each bulb per month (For example- 60 Watt bulb x 4hours x number of bulbs = kWh).
9. How many LED bulbs are used in your college? Mention the use (Hours used/day for how many days in a month).
10. Energy used by each bulb per month (kWh).

11. How many incandescent (tungsten) bulbs have your college installed? Mentions use (Hours used/day for how many days in a month).
12. Energy used by each bulb per month (kWh).
13. How many fans are installed in your college? Mention use (Hours used/day for how many days in a month).
14. Energy used by each fan per month (kWh)
15. How many air conditioners are installed in your college? Mention use (Hours used/day, for how many days in a month).
16. Energy used by each air conditioner per month (kWh).
17. How many electrical equipment including weighing balance are installed in your college? Mention the use (Hours used/day for how many days in a month).
18. Energy used by each electrical equipment per month (kWh).
19. How many computers are there in your college? Mention the use (Hours used/day for how many days in a month).
20. Energy used by each computer per month (kWh).
21. How many photocopiers are installed by your college? Mention use (Hours used/day for how many days in a month).
22. How many cooling apparatus are installed in your college? Mention use (Hours used/day for how many days in a month).
23. Energy used by each cooling apparatus per month (kWh) Mention use (Hours used/day for how many days in a month).
24. Energy used by each photocopier per month(kWh) Mention the use (Hours used/day for how many days in a month) how many inverters your college installed? Mentions use (Hours used/day for how many days in a month).
25. Energy used by each inverter per month(kWh).
26. How many electrical equipment are used in different labs of your college? Mention the use (Hours used/day for how many days in a month).
27. Energy used by each equipment per month(kWh).
28. Number of TV in your college and hostels?

29. Energy used by each TV per month(kWh).
30. Any other item that uses energy (Please write the energy used per month) Mention the use (Hours used/day for how many days in a month).
31. Are any alternative energy sources/nonconventional energy sources employed / installed in your college? (Photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.
32. Do you run “switch off” drills at college?
33. Are your computers and other equipment put on power-saving mode?
34. Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby mode most of the time? If yes, how many hours?
35. What are the energy conservation methods adapted by your college?
36. How many boards are displayed for saving energy awareness?
37. How much ash is collected after burning firewood per day in the canteen?
38. Write a note on the methods/practices/adaptations by which you can reduce the energy use in your college campus in future.

CALCULATION OF ENERGY FOR ELECTRICAL APPLIANCES

APPLIANCE	POWER USED IN (WATTS)	NO.OF APPLIANCES	USAGE PER DAY (HOURS)	AVERAGE kWh PER DAY (WATT X HOURS X NUMBERS /1000)	AVERAGE kWh PER MONTH (WATT X HOURS X NUMBERS /1000)X NO.OF DAYS
Incandescent bulb	60W				
CFL	18 W				
Microwave	1000W				
Stove	3000W				
Kettle	2500W				

ENERGY MANAGEMENT

FACULTY IN CHARGE

Mrs. JIXY JOSEPH
ASSISTANT PROFESSOR
DEPARTMENT OF PHYSICS

SL.NO.	STUDENT NAME	CLASS
1.	ABHIRAMI U	III B.Sc. PHYSICS
2.	ANNA ROSE NELSON	III B.Sc. PHYSICS
3.	FATHIMA THASLI	III B.Sc. PHYSICS
4.	JAYALAKSHMI PRAKASH	III B.Sc. PHYSICS
5.	SIYA KURIYAN	III B.Sc. PHYSICS
6.	SNEHA PEOUS P	III B.Sc. PHYSICS
7.	KARUNYA JAYAKUMAR	I M.Sc. PHYSICS
8.	NAVYA SABU	I M.Sc. PHYSICS
9.	KESIY BABU	I M.Sc. PHYSICS
10.	APARNA P J	I M.Sc. PHYSICS
11.	AGATHA CYRIAC	I M.Sc. PHYSICS
12.	NEETHU N MENON	I M.Sc. PHYSICS
13.	IVIN GEORGE	I M.Sc. PHYSICS
14.	ATHULYA S J	I M.Sc. PHYSICS

15.	MANOJ M	I M.Sc. PHYSICS
16.	JANNATH SAFRINA H	I M.Sc. PHYSICS
17.	PAVITHA M	I M.Sc. PHYSICS
18.	NIGHIL JIJU	I M.Sc. PHYSICS
19.	APARNA V	I M.Sc. PHYSICS

UTILIZATION OF ENERGY IN THE COLLEGE

- ❖ Electricity charges- Rs.50000/month
- ❖ Number of gas cylinders used – 170/year
- ❖ Cost of Gas cylinders used Rs. 98600/year (Rs.580/cylinders)
- ❖ Monthly amount paid for electricity and gas – Rs. 65000
- ❖ Cost of generator fuel – Rs.15000/month
- ❖ Energy generated by the biogas plant equivalent to 1.5 LPG cylinders

NUMBER OF EQUIPMENTS IN THE COLLEGE

- ❖ No. of CFL bulbs – 132
- ❖ No. of LED bulbs -315
- ❖ No. of Tube lights – 159
- ❖ No. of Fan – 261
- ❖ No. of Air Conditioners – 8
- ❖ No. of Computers – 115
- ❖ No. of Water pumps- 1
- ❖ No. of Photocopier – 6
- ❖ No. of Printers – 29
- ❖ No. of Water purifiers – 7
- ❖ No. of Projectors – 25
- ❖ No. of Television –4
- ❖ No of Inverters/UPS – 34
- ❖ No. of CCTV Cameras- 75
- ❖ No. of Fridge - 3
- ❖ No. of Freezers - 1
- ❖ No. of Grinders – 1

ENERGY USAGE OF TUBE LIGHTS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF TUBE LIGHTS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME (HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
CHEMISTRY	10	40	0.04	3	26.4
ENGLISH	10	40	0.04	3	26.4
ECONOMICS	10	55	0.055	3	36.3
MATHEMATICS	12	55	0.055	3	43.56
BVOC	14	40	0.04	3	36.96
BBA	9	40	0.04	3	23.76
COMMERCE	13	55	0.055	3	47.19
COMPUTER SCIENCE	9	40	0.04	3	23.76
PHYSICS	15	40	0.04	4	52.8
AUDITORIUM	10	40	0.04	3	26.4
PRINCIPAL'S ROOM	4	40	0.04	4	16
NCC ROOM	1	40	0.04	2	1.2
NSS ROOM	4	40	0.04	2	4.8
HOSTEL	20	40	0.04	4	96
WATCHMAN'S ROOM	1	40	0.04	8	9.6
TOILET	12	40	0.04	5	21.12
OTHERS	5	40	0.04	3	13.2
TOTAL	159				505.45

ENERGY USAGE OF CFL LAMPS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF CFL LIGHTS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
DIGITAL LIBRARY	105	15	0.015	3	103.95
DIGITAL LIBRARY (DOUBLE TUBE SET)	3	22	0.022	3	4.95
SEMINAR HALL	16	22	0.022	3	23.232
OTHERS	8	15	0.015	6	15.84
TOTAL	132				147.972

ENERGY USAGE OF LED BULBS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF BULBS/TUBE LIGHTS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
OFFICE	1	18	0.018	8	3.6
CANTEEN	3	18	0.018	1	2.7
HOSTEL	24	18	0.018	5	64.8
BA ENGLISH	1	18	0.018	2	0.792
OFFICE	10	9	0.009	4	9.0
CONFERENCE ROOM	10	9	0.009	2	3.96
AUDITORIUM	15	12	0.012	3	11.88
CHEMISTRY	25	20	0.020	3	33

AUDITORIUM	20	20	0.020	3	26.4
PHYSICS	15	20	0.020	4	26.4
DIGITAL LIBRARY	30	20	0.020	3	39.6
CANTEEN	10	20	0.020	2	8.8
HOSTEL	10	20	0.020	4	20
DIGITAL LIBRARY	15	20	0.020	3	19.8
HOSTEL	5	20	0.020	4	12
CAMPUS (SPOTLIGHT)	10	10	0.010	5	15
ACOUSTIC THEATRE	52	6	0.006	2	3.12
ACOUSTIC THEATRE	51	3	0.003	2	1.53
OTHERS	8	12	0.012	3	6.336
TOTAL	315				308.718

ENERGY USAGE OF WATER PURIFIERS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF PURIFIERS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
HOSTEL	1	25	0.025	4	3.0
ENGLISH	1	25	0.025	2	1.1
COMPUTER SCIENCE	1	25	0.025	2	1.1
BVOC	1	25	0.025	2	1.1
ECONOMICS	1	25	0.025	2	1.1
PHYSICS	1	25	0.025	2	1.1

CHEMISTRY	1	25	0.025	2	1.1
TOTAL	7				9.6

ENERGY USAGE OF FANS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF FANS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
CHEMISTRY	20	60	0.06	6	158.4
ENGLISH	10	60	0.06	6	79.2
ECONOMICS	8	80	0.08	6	84.48
MATHEMATICS	12	80	0.08	6	126.72
BVOC	11	60	0.06	6	87.12
BBA	7	60	0.06	6	55.44
COMMERCE	10	80	0.08	6	105.6
COMPUTER SCIENCE	7	60	0.06	6	55.44
PHYSICS	30	80	0.08	6	259.2
AUDITORIUM	30	60	0.06	3	81
CANTEEN	7	60	0.06	2	21
DIGITAL LIBRARY	57	60	0.06	2	68.4
OFFICE ROOM	10	60	0.06	8	120
PRINCIPAL'S ROOM	2	60	0.06	8	24
NCC ROOM	1	60	0.06	2	1.8
NSS ROOM	3	60	0.06	2	5.4
HOSTEL	28	60	0.06	10	504

SEMINAR HALL	8	80	0.08	3	38.4
TOTAL	261				1875.6

ENERGY USAGE OF COMPUTERS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF COMPUTERS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME (HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
COMPUTER SCIENCE LAB	11	150	0.15	3	108.9
ENGLISH	1	150	0.15	2	6.6
CHEMISTRY	7	150	0.15	2	46.2
PHYSICS	8	200	0.2	4	105.6
ECONOMICS	2	200	0.2	2	17.6
MATHEMATICS	2	150	0.15	2	13.2
DIGITAL LIBRARY	37	150	0.15	2	166.5
COMPUTER SCIENCE	1	150	0.15	2	6.6
BBA	1	150	0.15	2	6.6
COMMERCE	3	200	0.2	2	26.4
OFFICE	10	150	0.15	7	262.5
PRINCIPAL'S ROOM	2	150	0.15	7	52.5
B COM LAB	24	150	0.15	3	237.60
PHYSICAL EDUCATION	1	150	0.15	2	6.6
HINDI	1	150	0.15	2	6.6

MALAYALAM	1	150	0.15	2	6.6
OTHERS	3	150	0.15	3	45
TOTAL	115				1121.6

ENERGY USAGE OF PRINTERS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF PRINTERS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
ENGLISH	2	50	0.05	1	2.2
CHEMISTRY	1	50	0.05	1	1.1
ECONOMICS	3	50	0.050	1	3.3
COMMERCE	2	250	0.250	1	11
PHYSICS	1	250	0.250	1	5.5
OFFICE	8	250	0.250	1	50
DIGITAL LIBRARY	3	250	0.250	1	7.5
COMPUTER SCIENCE	1	50	0.05	1	1.1
BBA	1	50	0.05	1	1.1
IQAC	1	250	0.25	1	5.5
HINDI	1	50	0.05	1	1.1
MALAYALAM	1	50	0.05	1	1.1
PHYSICAL EDUCATION	1	50	0.05	1	1.1
OTHERS	3	50	0.05	1	3.3
TOTAL	29				94.9

ENERGY USAGE OF PROJECTORS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF PROJECTORS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
ENGLISH	1	300	0.3	1	6.6
CHEMISTRY	1	300	0.3	1	6.6
ECONOMICS	1	300	0.300	2	13.2
COMMERCE	1	300	0.300	2	13.2
PHYSICS	1	300	0.300	1	6.6
ACOUSTIC THEATRE	1	300	0.300	2	6
DIGITAL LIBRARY	3	600	0.600	1	18
SEMINAR HALL	1	300	0.300	2	9
OTHERS	15	300	0.300	1	90
TOTAL	25				169.2

ENERGY USAGE OF UPS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF UPS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
ECONOMICS	2	160	0.160	2	14.08

COMMERCE	3	160	0.160	2	21.12
PHYSICS	8	160	0.160	4	84.48
MATHEMATICS	1	160	0.160	2	7.04
OFFICE	1	1000	1	7	175
DIGITAL LIBRARY 10KVA	1	8000	8	2	240
COMPUTER SCIENCE	1	50	0.05	4	3.3
BBA	1	50	0.05	2	4.4
HINDI	1	50	0.05	2	2.2
MALAYALAM	1	50	0.05	2	2.2
PHYSICAL EDUCATION	1	50	0.05	2	2.2
COMPUTER SCIENCE LAB	1	3000	3	3	198
ENGLISH	1	160	0.160	4	14.08
CHEMISTRY	7	160	0.160	4	49.28
B COM LAB	1	3000	3	3	198
OTHERS	3	160	0.160	3	36
TOTAL	34				1051.38

ENERGY USAGE OF TV IN THE COLLEGE

DEPARTMENT/AREA	NO. OF TV	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
PRINCIPAL'S ROOM	1	250	0.25	7	43.75

HOSTEL	1	160	0.16	1	4.8
OTHERS	1	250	0.25	1	5.5
CANTEEN	1	250	0.25	1	6.25
TOTAL	4				60.3

ENERGY USAGE OF AIR CONDITIONERS IN THE COLLEGE

DEPARTMENT/AREA	NO. OF AIR CONDITIONERS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
ACOUSTIC THEATRE	2	2000	2.00	2	40
ACOUSTIC THEATRE	3	1200	1.20	2	36
CONFERENCE ROOM	1	1500	1.50	2	60
DIGITAL LIBRARY	1	1200	1.200	4	96
OTHERS	1	1200	1.20	2	48
TOTAL	8				280

ELECTRICAL EQUIPMENTS AND THEIR ENERGY CONSUMPTION

DEPARTMENT/ AREA	EQUIPMENTS	NO. OF EQUIPMENTS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
PHYSICS LAB	CRO	5	90	.090	4	39.6
	RF OSCILLATOR	1	10	.010	2	0.44
	SIGNAL GENERATOR	4	25	.025	4	8.8
	FOUR PROBES SETUP	1	25	.025	2	1.1
	HALL EFFECT	2	500	0.500	2	44
	TRANSFORMER	10	5	.005	4	4.4
	INVERTER	2	500	0.500	3	66
	MERCURY LAMP	1	400	0.400	3	26.4
	SODIUM VAPOUR LAMP	1	162	0.162	2	7.128
	BATTERY ELIMINATOR	10	4	0.004	2	1.76
CHEMISTRY LAB	EXHAUST FAN	9	40	0.04	5	39.6
	CENTRIFUGE	4	40	0.04	1	3.52
	WEIGHING MACHINE	2	110	0.11	1	4.84
	FLASK SHAKER	1	40	0.04	1	0.88
	WATER BATH	1	1500	1.5	1	33
	BURNER	13	300	0.3	1	85.8

	MAGNETIC STIRRER	1	720	0.72	1	15.84
	INFRARED BULB	3	100	0.1	1	6.6
	ION EXCHANGE	1	360	0.36	5	39.5
	HOT AIR OVEN	3	2000	2	2	264
	OVEN	1	1000	1	2	44
	FRIDGE	1	150	0.15	24	79.2
	DEEP FREEZER	1	365	0.365	24	192.7.2
	HEAT MANTLE	2	100	0.1	1	4.4
	STEAM GENERATOR	1	1000	1	2	44
	MICRO OVEN	1	900	0.9	2	39.6
	MUFFLE FURNACE	1	1520	1.52	2	66.88
	MELTING POINT APPARATUS	1	100	0.1	1	2.2
	ELECTRONIC BALANCE	1	2	0.002	1	0.044
	MOTOR	1	7460	7.46	4	895.2
CANTEEN	MIXER GRINDER	1	750	0.75	1	18.75
	EXHAUST FAN	1	40	0.04	7	7
	COFFEE MAKER	1	1100	1.1	2	55
	FRIDGE	1	150	0.150	24	108
OFFICE	TABLE FAN	1	80	0.080	3	6.0
	FRIDGE	1	150	0.150	24	108
	SCANNER	2	20	0.02	1	0.88

DIGITAL LIBRARY	SERVER	2	1000	1	7	252
	HIGH SPEED SCANNER	1	150	0.15	1	3.3
	PHOTOSTAT MACHINE	6	1000	1.0	2	132
SEMINAR HALL	INTERACTIVE BOARD	1	250	0.25	2	10
	AMPLIFIERS	3	250	0.25	1	16.5
	SPEAKERS	2	150	0.150	1	6.6
COLLEGE CAMPUS	BRIGHT LIGHT	1	90	0.090	5	4.5
	CAMERA	75	4	0.004	24	216
	TOTAL	185				2813.262

ENERGY USAGE AT DIGITAL LIBRARY

DEPARTMENT/AREA	NO. OF PROJECTORS	POWER CONSUMED IN (WATTS)	POWER IN (kW)	WORKING TIME(HOUR PER DAY)	ENERGY USAGE PER MONTH (kWh)
LED SQUARE LIGHT	15	20	0.020	3	19.8
LED TUBE LIGHTS	30	20	0.020	3	39.6
AIR CONDITIONER	1	1200	1.200	4	96
CFL (DOUBLE TUBE SET)	3	22	0.022	3	4.95
HIGH SPEED SCANNER	1	150	0.15	1	3.3
COMPUTERS	37	150	0.15	2	166.5
FANS	57	60	0.06	2	68.4
CFL	105	15	0.015	3	103.95

SERVER	2	1000	1	7	252
UPS 10KVA	1	8000	8	2	240
PROJECTORS	3	600	0.600	1	18
PRINTERS	3	250	0.250	1	7.5
TOTAL					1020

TOTAL ENERGY CONSUMPTION IN THE COLLEGE

ENERGY CONSUMPTION PER MONTH	8437.982 kWh
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SOLAR PANEL

St. Paul's College is the first institution in Kerala with a Solar powered Digital Library.

- The Solar Plant installed in the college has a capacity of producing 7kW power.
- A Total of 21 panels have been installed with a capacity of 335 Watt.
- An average energy produced is around 30 Units per day.
- This energy is sufficient for the working of a digital library which consumes nearly 30 to 35 units per day. The extra energy is usually taken from KSEB electric line.



ENERGY BENEFIT MADE BY USING ALTERNATE SOURCES OF ENERGY

1.SOLAR ENERGY

RENEWABLE ENERGY GENERATED AND USED (kWh)	TOTAL POWER REQUIREMENT (kWh)	PERCENTAGE OF ENERGY USAGE BY SOLAR POWER
900	8437.982	10.67%

2.BIOGAS PLANT

ENERGY GENERATED BY BIOGAS PLANT EQUIVALENT OF GAS CYLINDERS	TOTAL USAGE OF GAS CYLINDERS PER MONTH	PERCENTAGE OF BIOGAS USAGE
1.5	14	10.70%

3.LED BULBS

TOTAL LIGHTING REQUIREMENTS	NUMBER OF LED BULBS USED	PERCENTAGE OF LIGHTING THROUGH LED BULBS
607	315	51.9%

MAJOR AUDIT FINDINGS

St. Paul's College, being a large college, with large built-up area and several well-equipped laboratories and a large library is functioning, consumes a large amount of electricity. On an average 280kWh of electricity is used per day which turns out to be about 102200kWh per year only to maintain its volumetric activities throughout the year. A small fraction, i.e., 10950kWh of this power requirement is met through the solar power plant installed in the College.

- Regular monitoring of equipment and immediate rectification of problems is required.
- Awareness programs for the stakeholders to save energy may also increase sustainability in the utilization of various energy source.
- Assessment of electrical load calculation is yet to be done by the college.
- Monthly use of electricity in the college is high.
- Objectives for reducing energy and fuel consumption are meager.
- Energy efficient electrical equipment especially fans and pump sets can be replaced against old ones.

CONCLUSION AND RECOMMENDATIONS

The buildings in the college compound have 7 different electricity connections. The total energy usage per month is nearly equal to 8500 kWh. After energy auditing, we suggest reducing the usage of electricity by

- Rewire the main block and make it standardize.
- Place a transformer, take all connections in one point to make it a HT connection.
- Place a solar with grid connection in the college.
- More energy efficient fans should be installed.
- Replace computers and TVs with LED monitors.
- In order to save energy, old and energy inefficient appliances should be replaced by efficient ones.
- Automatic power switches off systems may be introduced.
- The College should adopt an environmentally responsible purchasing policy: should purchase items, including computers, fridges, air conditioners, laboratory equipment's etc., with highest energy star rating.

AUDITING MEMBERS

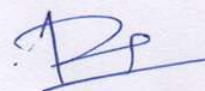
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ST. PAUL'S COLLEGE

KALAMASSERY

Re-accredited with 'A' Grade (Third Cycle) by NAAC
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