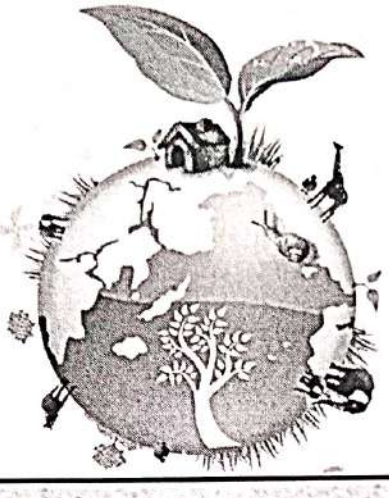
BJS
Bharatiya Jain Sanghatana

Bharatiya Jain Sanghatana's
Arts, Science & Commerce College

Bakori Phata, Pune-Nagar Highway, Wagholi, Pune - 412207

Run by Jain Minority Institute, Affiliated to SPPU, Pune., **ID No. PU/PN/ASC/113/1995**

NAAC Re-Accredited 'B' Grade



ENERGY AUDIT REPORT
Year-2022-23

Certificate

This is to certify that **Bharatiya Jain Sanghatana's Arts, Science and Commerce College, Wagholi, Pune** has conducted **an "Energy Audit"** in the **year 2022-23** to identify the present profile of electrical energy consumption, energy conservation, and saving opportunities for the environment protection. This energy audit is also aimed at assessing the impact of installing various renewable energy applications.

Place: Wagholi
Date: 05.12.2023

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B.J.S. Arts, Science & Commerce College, Wagholi, Pune-412207. ID No. PU/PN ASC/113/1995

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Preface

An energy audit is an inspection, survey and analysis of energy flows for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the output. When the object of study is an occupied building then reducing energy consumption while maintaining or improving human comfort, health and safety are of primary concern. Beyond simply identifying the sources of energy use, an energy audit seeks to prioritize the energy uses according to the greatest to least cost-effective opportunities for energy savings. Energy Audit is the key to a systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with its use, and serves to identify all the energy streams in a facility. It quantifies energy usage according to its discrete functions. Energy audit is an effective tool in defining and pursuing comprehensive energy management is to achieve and maintain optimum energy procurement and utilization, throughout the organization. Through this project we can prioritize the energy uses according to the greatest to least cost effective opportunities for energy savings in our college campus.

Acknowledgements

I take this opportunity to express our gratitude towards Hon. Founder President, **Shri. Shantilalji Muttha,** Bharatiya Jain Sanghatana, Pune and Chairman of College Development Committee, **Hon. Mr. Arun Nahar, Hon. Mr. Vilasji Rathod** and all Hon. Members of the College Development Committee of the college for their valuable guidance, continuous encouragement, and generous gift of time with constructive criticism & suggestions during the entire 'Energy Audit Report-2020-21.'

I also express our deep sense of gratitude towards **Hon.Mr. Suresh Salunke**, WERC, Project Administrator, **Principal Dr. S. D Gaikwad** and IQAC Coordinator **& IQAC coordinator Dr.Madhuri Deshmukh** who inspired and encouraged us throughout the work. We gratefully acknowledge the help provided by them on several occasions.

I acknowledge the energy audit expert **Dr J C More, Dr D N Patil and Mr. Rushi Mahesh B.** for their valuable guidance and assistance to data analysis in an energy audit. I am thankful to Mr.Chitalkar for his technical assistance in the data collection of **"Energy Audit Report-2022-23"**.

It is the right time to acknowledge the support given by IQAC members, the incharge of all faculty, Head who provided continuous help, inspiring resoluteness and sensible suggestion without any reservation whenever we approached throughout the investigation.

I am equally thankful to all our colleagues for their guidance during the Audit. I convey my sincere thanks to *Dr. Monika Jain* for proofreading and valuable suggestions.

Acknowledgements would be incomplete without mentioning the office superintend, Mr. S. V. Keskar and All non-teaching staff who helped in data collection.

Place: Wagholi
Date: 5.12.2023

Mr. Shivaji M. Sonawane
Chairman

B.J.S. Arts, Science & Commerce College Wagholi, Pune-412207. ID No. PU/PN/ASC/113/1995

CHAPTER NO-1

INTRODUCTION

1.1 Introduction

Energy crisis is one of major problem in exiting world where demand of energy is increasing rapidly. Energy is prime focus due to rapid growth and development of technology. Proper utilization of Energy is one of the major aspects of any developing country. Today the need of energy has increased greatly in order to meet the demand of ever increasing consumption of it. This energy crisis problem will be solved through Energy conservation and use of energy efficient equipment.

1.2 ABOUT INSTITUTE

BJS was established in the year 1985 since then Bharatiya Jain Sanghatana (BJS) has been in the forefront for addressing national concerns in the areas of Disaster Response, Social Development and Educational Initiatives. Having its head office in Pune, BJS is a non-political, non-profit, professionally managed Non-Governmental Organization (NGO) with a nationwide footprint working towards the benefit of all.

Over the years of its existence, BJS has practiced and perfected its approach and processes in the chosen areas of its work. It has rich and multi-dimensional experience of working at the grassroots as well as contributing to policy-level thought processes and decision making. BJS has worked with Central and many State governments and NGOs to implement many of its projects.

BJS works in progressional steps to achieve optimum and lasting impact - identifying issues, researching the needs, developing solutions based on practical experiences, implementing them sizable pilot projects to validate scalability, after analyzing the pilot results, and taking the modules countrywide roll-out and implementation.

The foundation of Bharatiya Jain Sanghatana is the Volunteers' Network that is built very meticulously since day one. BJS has a nation-wide network of volunteers actively carrying out BJS responsibilities with relentless commitment. This volunteers' network is the real strength of the organization. Having such a committed network till grass-root level serving for the social cause, BJS demonstrated the power of executing projects or many seemingly uphill tasks with speed and scale.

BJS has active volunteers' network in Maharashtra, Chhattisgarh, Madhya Pradesh, Tamil Nadu, Karnataka, Uttar Pradesh, Andhra Pradesh, Gujarat, Rajasthan, Punjab, and Haryana. At many locations across all these 11 states and at few dispersed locations in other parts of India, BJS implements Social Development programs through its specially trained volunteers.

BJS has participated in Disaster Response activities in all major disasters since 1993 major earthquake of Latur - Osmanabad in Maharashtra. There onwards, BJS worked in Jabalpur (Madhya Pradesh) earthquake – 1996, Gujarat earthquake – 2001, Akola (Maharashtra) floods – 2002, Andaman & Nicobar tsunami – 2005, Jammu & Kashmir earthquake – 2005, Bihar floods – 2008, and Maharashtra drought – 2013 & 2016.

BJS has been focused on educational rehabilitation of disaster affected children since 1993 earthquake. From Latur & Osmanabad, BJS rehabilitated 1200 students and took complete responsibility of their education from standard 5th till their graduation. BJS established a permanent facility - Wagholi Educational Rehabilitation Center (WERC) near Pune in 1997. WERC has been hosting tribal students from Melghat (Amravati) and Kosbad (Thane) of Maharashtra since 1996. Since November 2015, BJS took responsibility of rehabilitating children from suicide affected farmers' families of Maharashtra. In the academic year 2016-17, 287 tribal boys and 653 boys and girls of farmers' families were hosted at WERC for their education where all facility for their co-curricular development, sports and especially physical and mental health are provided with utmost care.

About BJS College

The BJS's College for Arts, Science and Commerce was established in 1995. B.J.S. College is a constituent Degree College affiliated to the University of Pune. It provides for the teaching of courses leading to B.A., B.Sc., B.Com., B.B.A.(CA)., B.C.A.(Sci.), M.Com. and M.Sc. degree from Savitribai Phule Pune University, Pune to give admission preferably to the students from earth quake affected area. No doubt, at present the college has 2371 students and 5000 sq. meter, four storied, airy, well equipped and well furnished, attractive building to carve the pillars of nation through higher education by inculcating basic values and making students of all-round personality.

Our Vision

"Exploring Youth Capabilities For Social Service"

Our Mission

"Persuation of Studies in Arts, Science & Commerce with vocational training based on the concept of earn-as- you learn principles and plethora of extracurricular activities to ensure all round growth"

- To provide a safe, friendly, accessible environment where all students can optimize their academic career cultural experience.
- To foster a comprehensive and enriching program of extracurricular activities required for developing global perspective
- To conduct community education programs that encourages learning at every stage of life.
- To participate in the social, cultural, environment and economic development of the communities served by the college.
- To provide Holistic education for self – reliance.
- To generate social consciousness by igniting young minds.

1.3 Objective of Energy Audit

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

1. Identifying the quality and cost of various energy inputs.
2. Assessing present pattern of energy consumption in different cost centers of operations.
3. Relating energy inputs and production output.
4. Identifying potential areas of thermal and electrical energy economy.
5. Highlighting wastage's in major areas.
6. Fixing of energy saving potential targets for individual cost centers.
7. Implementation of measures for energy conservation & realization of savings.
8. Identifying the quality and cost of various energy inputs.
9. Assessing present pattern of energy consumption in different cost centers of operations.
10. Relating energy inputs and production output.
11. Identifying potential areas of thermal and electrical energy economy.
12. Highlighting wastage's in major areas.
13. Fixing of energy saving potential targets for individual cost centers.
14. Implementation of measures for energy conservation & realization of savings.

The energy audit provides the vital information base for overall energy conser-vation programme covering essentially energy utilization analysis and evalua-tion of energy conservation measures.

- Energy Audit is the key to a systematic approach for decision making in the area of energy management.
- It enables breaking down the total energy consumption into all its components and helps in identifying the area where maximum savings can be achieved. It also establishes the base from which the extent of those savings can be measured.
- The primary objective of energy audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs

1.4 Need for Energy Audit

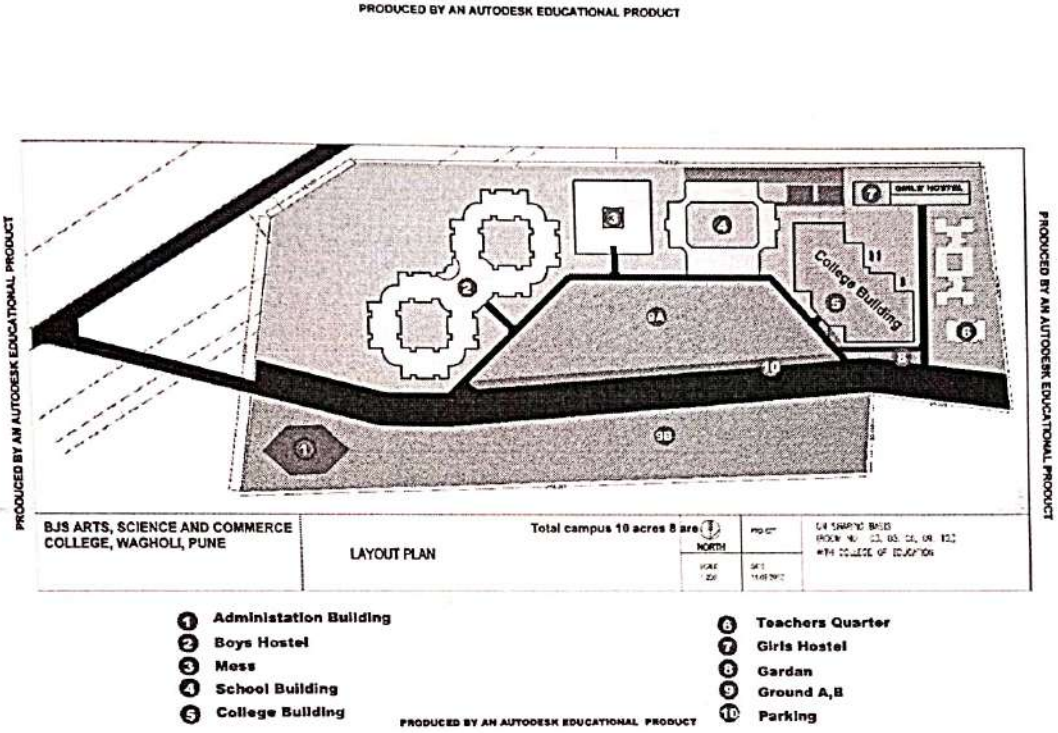
- The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs.
- To minimize the cost of energy
- To minimize the operational cost
- To minimize the cost for repair & reconstruction
- To increase the quality of environment that contribute to increased work productivity
- Preventive measure for energy wastage
- Maintenance and quality control programmes
- Helps to understand more about the ways energy and fuel are used in any industry.
- Help in identifying the areas where waste can occur & where scope for improvement exists.
- Positive orientation to cost reduction.
- Preventive maintenance & quality control programs
- Check the variation of energy cost.
- Reliability of energy supply
- Identify energy conservation techniques.
- Finding the feasible solution for energy wastage
- Energy auditing provide 'benchmark' for managing energy in the organization

1.5 Present Scenario of College campus

The college has three storied building on a piece of 10 acres of land. There is a beautiful garden in the front area. The college has 20 classrooms and 15 well equipped science laboratories and commerce

research lab. The college has two computer labs for BBA.CA & B. C. A. science. In addition to this Women's hostel, Gymkhana hall, Girls common room, Boys common room, BJS Gallery (Auditorium) for various function, well-furnished office, Principal's Room, Library with reading room, YCMOU center. Every head of department have separate cabin. The college has botanical garden and vermicomposting beds.

Campus map



College Physical Infrastructure Detail

Sr. No.	Particular	Dimensions	Sq.m.	No.	Total Sq.m.
	Ground Floor				
01	Principal Office	7.6 × 6.6	50.16	01	50.16
	IQAC Office	7.6 × 3.3	25.08	01	25.08
02	College Office	7.6 × 10.6	80.56	01	75.24
03	Student Facility Centre / YCMOU	7.6 × 6.6	50.16	01	50.16
04	Development Officer	7.6 × 3.3	25.08	01	25.08
05	Examination / Research Centre	7.6 × 6.6	50.16	01	50.16

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	Toilet	7.6 × 3.3	25.08	01	25.08
06	Ladies Common Room	7.6 × 6.6	50.16	01	50.16
07	Library	9.07 × 7.6	96.04	01	96.04
08	Students Reading Room	7.6 × 6.6	81.56	05	405.00
09	Computer Lab	7.6 × 13.7	104.01	01	104.00
10	BJS Gallery	7.6 × 29.2	222	01	122.00
	First Floor				
11 to 15	Classrooms	7.6 × 10.6	81.00	05	405.00
16	Classroom	9.8 × 9.8	96.00	01	96.00
17	Computer Laboratory	7.6 × 10.6	81.00	01	81.00
18	Dark Room	7.6 × 10.6	81.00	01	81.00
19	English Department	7.6 × 3.3	25.08	01	25.08
20	Physics Laboratory	7.6 × 10.6	81.00	01	81.00
21	Marathi Department	7.6 × 3.3	25.08	01	25.08
22	Mathematics Department	7.6 × 6.6	25.08	01	25.08
23	Zoology Laboratory	7.6 × 14.1	107.00	01	107.00
	Second Floor				
24 to 28	Class Rooms	7.6 × 10.6	81.00	05	405.00
29	Classroom	9.8 × 9.8	96.00	01	96.00
30	Chemistry Laboratory 5	7.6 × 10.6	81.00	01	81.00
31	Hindi Department	7.6 × 3.3	25.08	01	25.08
32	Geography Department	7.6 × 3.3	25.08	01	25.08
33	Chemistry Laboratory 6	7.6 × 14-1	107.00	01	107.00
34	History Department	7.6 × 3.3	25.08	01	25.08
35	NSS/ Economics Department	7.6 × 3.3	25.08	01	25.08
36	Botany Laboratory	7.6 × 14.1	107.00	01	107.00
	Third Floor				
37 to 41	Class Rooms	7.6 × 10.6	81.00	05	405.00
42	Class Room	9.8 × 9.8	96.00	01	96.00
43	Chemistry Research Laboratory 1	7.6 × 10.6	81.00	01	81.00
44	Chemistry Laboratory 2	7.6 × 7.6	50.00	01	50.00
45	Chemistry Laboratory 3	7.6 × 14.1	107.00	01	107.00
46	Separation room Chemistry	7.6 × 3.3	25.08	01	25.08
47	Chemistry Store	7.6 × 3.3	25.08	01	25.08
48	Chemistry Laboratory 4	7.6 × 14.1	107.00	01	107.00
49	Physical Education	9.25X	38.08	01	38.08
50A	NSS	7.6 × 7.6	50.00	01	50.00
50B	NCC	7.6 × 7.6	50.00	01	50.00
51	Indoor Hall	19.6X12.3	241.08	01	241.08

CHAPTER NO-2

Energy Audit Methodology and Scope

2.1 What is Energy Audit?

Energy today 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 calls for energy conservation measure, 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 usage's according to its discrete function. Energy Audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating & 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's. Instrumentation's and technology.

2.2 Energy Audit Methodologies

A. Data Collection

Data collection is very important step in energy audit. Data collection includes,

1. Relevant data like electricity bills for the year 2014-15.

2. List of lighting load, fan, computer and air conditioner for each department.

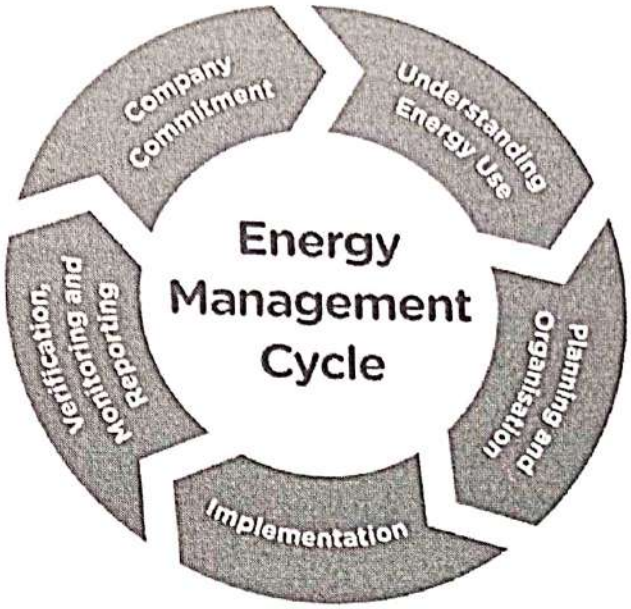
3. Voltage, Current and Power are measured at each feeder.

B. Data Analysis

Data analysis is next important step after data collection. The areas for implementation and energy conservation opportunities are identified.

C. Action Taken

Action taken involved the implementation strategies based on measurement of actual energy consumption. In this methodology different areas of energy consumption are identified.



Methodology

Board guidelines indicating the methodology for such an energy audit is given below. Possible stages for interaction/conference are also indicated.

Phase-I

1. Collections of data on operational parameters, energy consumption both normal and electrical, coal and power quality etc., through a questionnaire.
2. Study the existing plant capacities and their performance to assess plant operations.
3. Study of the specific energy consumption (both thermal and electrical) department-wise and plant as a whole.
4. Study of the power sources, distribution system and drive controls, load factor and efficiency of large motors (above 10 kW), process automations, plant illuminations etc.
5. Collection of requisite data and analysis and identification of specific areas with potential for conservation of thermal and electrical energy.
6. Field measurements of operational parameters and carrying out heat and mass balance.
7. Study of limitations, if any, in the optimal use of thermal and electrical energy.
8. Formulation of specific recommendations along with broad system concept for conservation of thermal and electrical energy.
9. Preparation of capital cost estimates and establishing techno-economic feasibility for recommended measures.

10. No investment and/or marginal investment by doing system improvements and optimization of operations.
11. Major investment due to incorporation of modern energy intensive equipment and upgradation of existing equipment.
12. Formulating tentative time schedule for implementation of the recommendation.
13. Undertaking broad cost benefit analysis in terms of savings in energy consumption per unit of production and pay-back period.

Phase-II

Follow-up with the industry on periodic basis to ascertain the level of implementation of recommendation and assist, if require, in implementation of the measures to achieve energy user efficiency.

2.3 Types of Energy Audit

A. Preliminary Energy Audit

The Preliminary Energy Audit focuses on the major energy suppliers and demands usually accounting for approximately 70% of total energy. It is essentially a preliminary data gathering and analysis effort. It uses only available data and is completed with limited diagnostic instruments. The PEA is conducted in a very short time frame i.e. 1-3 days during which the energy auditor relies on his experience together with all the relevant written, oral visual information that can lead to a quick diagnosis of the plant energy situation. The PEA focuses on the identification of obvious sources of energy wastage's. The typical out put of a PEA is a set of recommendations and immediate low cost action that can be taken up by the department head.

B. Detailed Energy Audit

The detailed audit goes beyond quantitative estimates of costs and savings. It includes engineering recommendations and well-defined project, giving due priorities. Approximately 95% of all energy is accounted for during the detailed audit. The detailed energy audit is conducted after the preliminary energy audit. Sophisticated instrumentation including flow meter, flue gas analyzer and scanner are use of compute energy efficiency.

Scope of work for detailed Energy Audit

1. Review of Electricity Bills, Contract Demand and Power Factor: For the last one year, in which possibility will be explored for further reduction of contract demand and improvement of power factor
2. Electrical System Network : Which would include detailed study of all the Transformer operations of various Ratings / Capacities, their operational pattern, Loading, No Load Losses, Power Factor Measurement on the Main Power Distribution Boards and scope for improvement if any. The study would also cover possible improvements in energy metering systems for better control and monitoring.
3. Study of Motors and Pumps Loading : Study of motors (above 10 kW) in terms of measurement of voltage (V), Current (I), Power (kW) and power factor and thereby suggesting measures for energy saving like reduction in size of motors or installation of energy saving device in the existing motors. Study of Pumps and their flow, thereby suggesting measures for energy saving like reduction in size of Motors and Pumps or installation of energy saving device in the existing motors / optimization of pumps.
4. Study of Air conditioning plant : w.r.t measurement of Specific Energy consumption i.e kW/TR of refrigeration, study of Refrigerant Compressors, Chilling Units, etc. Further, various measures would be suggested to improve its performance.
5. Cooling Tower: This would include detailed study of the operational performance of the cooling towers through measurements of temperature differential, air/water flow rate, to enable evaluate specific performance parameters like approach, effectiveness etc.
6. Performance Evaluation of Boilers: This includes detailed study of boiler efficiency, Thermal insulation survey and flue gas analysis./li>
7. Performance Evaluation of Turbines: This includes detailed study of Turbine efficiency, Waste heat recovery.
8. Performance Evaluation of Air Compressor: This includes detailed study of Air compressor system for finding its performance and specific energy consumption
9. Evaluation of Condenser performance: This includes detailed study of condenser performance and opportunities for waste heat recovery/li>
10. Performance Evaluation of Burners / Furnace : This includes detailed study on performance of Furnace / Burner, thermal insulation survey for finding its efficiency
11. Windows / Split Air Conditioners: Performance shall be evaluated as regards, their input power vis-a-vis TR capacity and performance will be compared to improve to the best in the category

12. Illumination: Study of the illumination system, LUX level in various areas, area lighting etc. and suggest measures for improvements and energy conservation opportunity wherever feasible.
13. DG Set: Study the operations of DG sets to evaluate their average cost of Power Generation, Specific Energy Generation and subsequently identify areas wherein energy savings could be achieved after analysing the operational practices etc. of the DG sets.
14. The entire recommendations would be backed up with techno-economic calculations including the estimated investments required for implementation of the suggested measures and simple payback period. Measurement would be made using appropriate instrumentation support for time lapse and continuous recording of the operational parameters.
15. Completion Period: We usually start the field data collection at site with in one and half months' time, from the date of receipt of work order and the draft energy audit report is submitted thereafter in 1 month time. Finalization of energy audit report is normally completed within 3 months. (After completion of the audit study, the findings and recommendations are discussed with the technical head and the final report with recommendations is submitted.

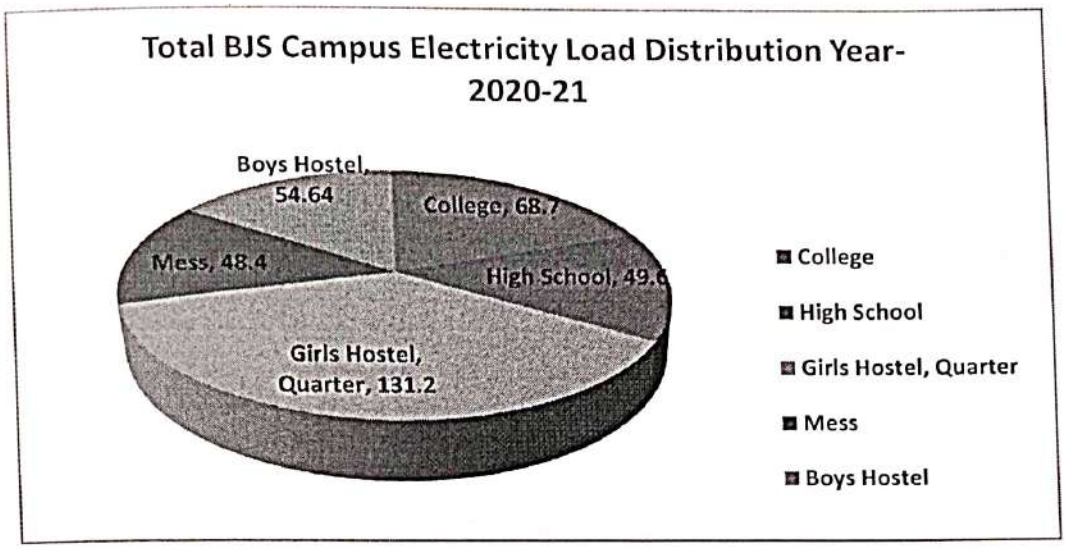
2.3 Energy Audit Instrument:

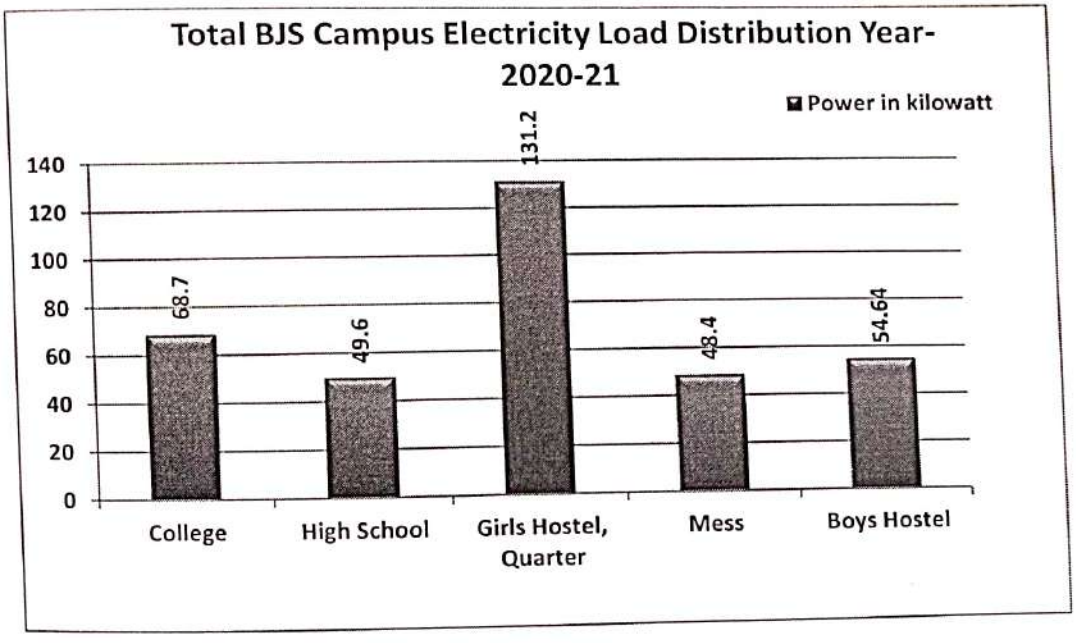
No.	Name of the Instrument	Intended Use
1	Digital Multimeter	Used for measurement of voltage. Current and resistance
2	Luxmeter	Used for measurement of illumination level.
3	Luxmeter	Used for measurement of illumination level.
4	pH meter	Used for on the spot analysis of effective acidity or alkalinity of a solution/water. Acidity /alkalinity water.
5	Temperature Indicators	Used for measuring temperatures of gases/air, liquids, slurries, semi solids, powders etc. Using different types of probes.
6	Infrared Thermometers	Used for measuring temperatures from a distance using infrared technology.

Chapter No-3

Energy Use Profile

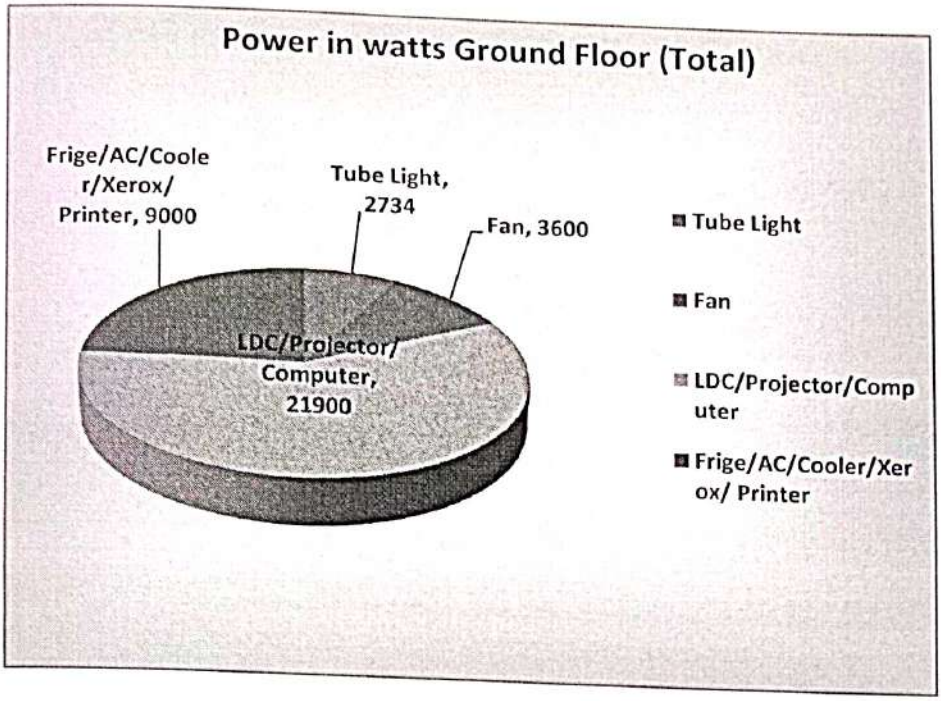
BJS ASC College Building Energy Load and Consumption Details Year-2020-21

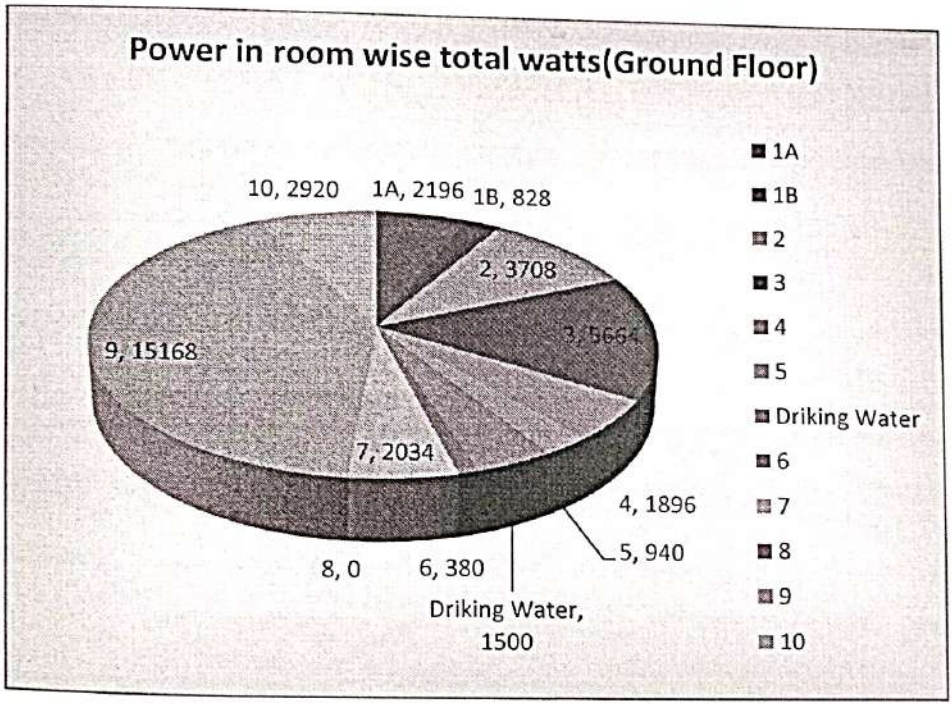


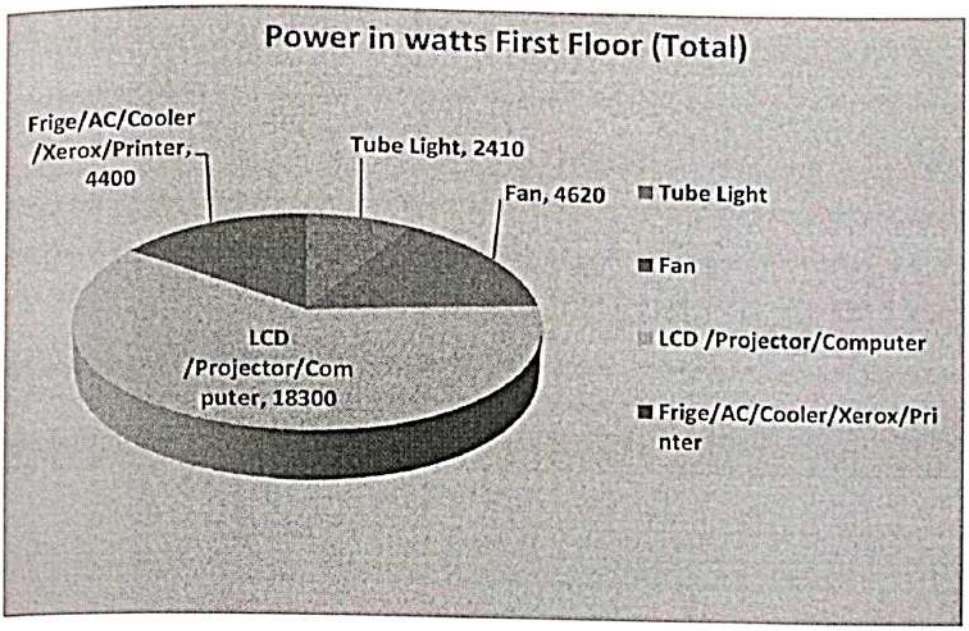


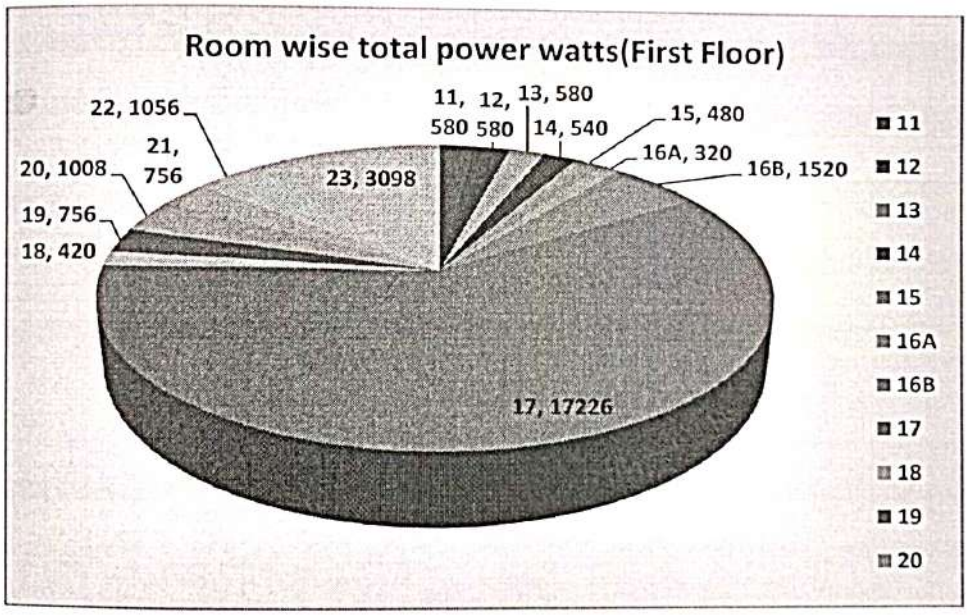
BJS ASC College Energy Audit of Building 2020-2021 (Ground floor)

Room No.	Total Tube Light	Power Watts	Total Fan	Power in Watts	Total LCD /Projector/Computer	Power in Watts	Other Frige/AC/Cooler/Xerox/ Printer Electrical Instruments	Others	Total Power (Watts)
1A	6 X 36	216	3 x 60	180	2Lx 300	300	1 x 1500	1500	2196
1B	3 x 36	108	2 x 60	120	1L x 300, 1C x 300	600			828
2	6 x 18	108	10 x 60	600	8C x 300	2400	2 X 300	600	3708
3	8 x 18	144	2 x 60	120	8C X 300	2400	2x X 1500	3000	5664
4	2 X 18	36	1 X60	60	1C X 300	300	1A x 1500	1500	1896
5	4 X 40	160	3 x 60	180	1C X 300	300	1P X300	300	940
Driking Water							1 Cool X 1500	1500	1500
6	5 X 40	200	3 X 60	180					380
7	13 X 18	234	10 x 60	600	1L x 300, 3C x 300	1200			2034
8									0
9	16 X 18	288	8 X60	480	1P X300, 45C X300	13800	2 P X 300	600	15168
10	31 X 18	1240	18 X 60	1080	1P X 300, 1C x300	600			2920

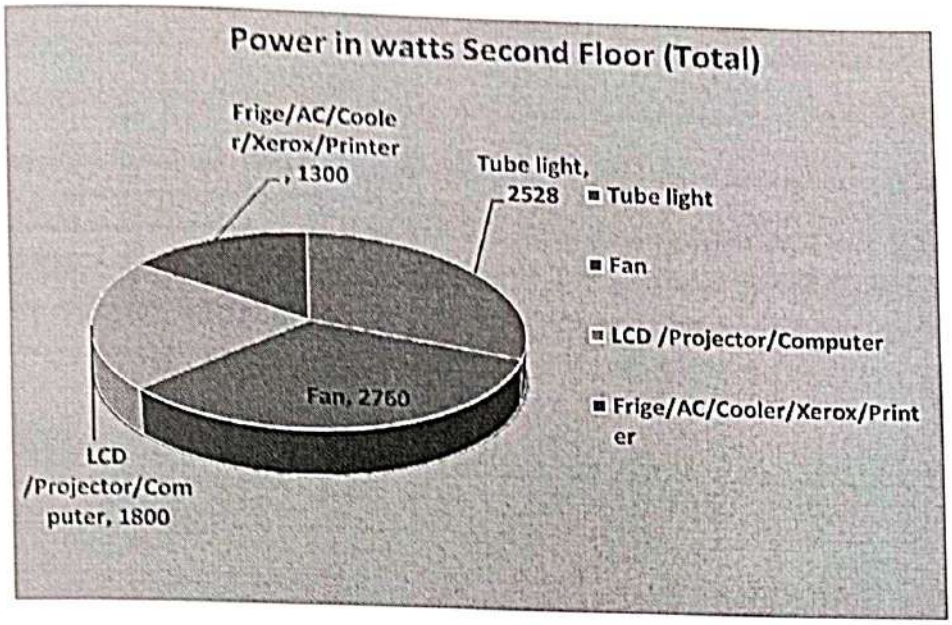


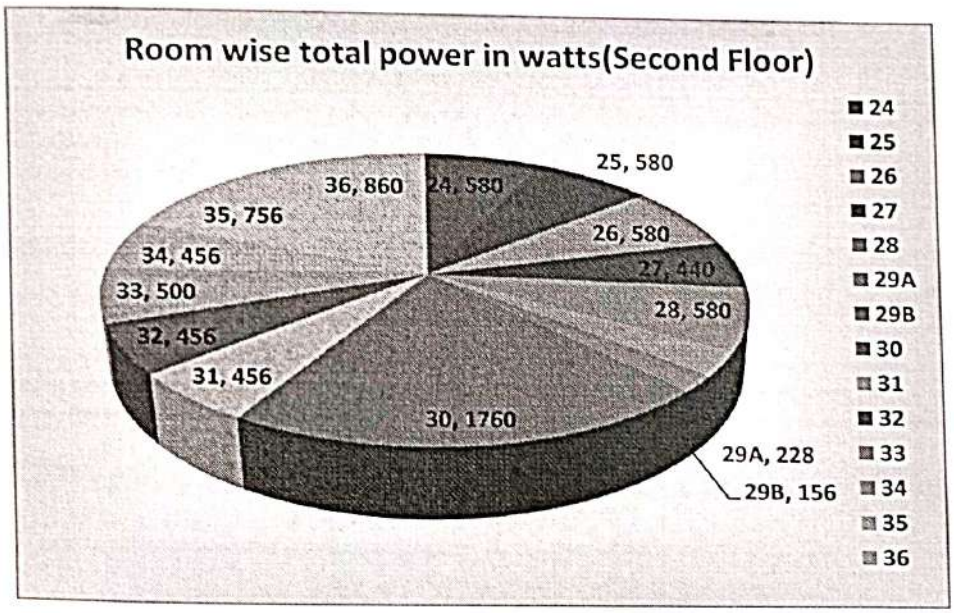






BJS ASC College Energy Audit of Building 2020-2021 (Second floor)									
Room No.	Total Tube Light	Power Watts	Total Fan	Power in Watts	Total LCD /Projector/Computer	Power in Watts	Other Frige/AC/Cooler/Xerox/Printer Electrical Instruments	Others	Total Power (Watts)
24	7 X 40	280	5 x 60	300					580
25	7 x 40	280	5 x 60	300					580
26	7 x 40	280	5 x 60	300					580
27	5 X 40	200	4 x 60	240					440
28	7 X 40	280	5 X 60	300					580
29A	6 X 18	108	2 X 60	120					228
29B	2 X 18	36	2 x 60	120					156
30	7 X 40	280	3 X 60	180	1C X 300	300	2 Oven x 500	1000	1760
31	2 X18	36	2 X 60	120	1C X 300	300			456
32	2 X18	36	2 X 60	120	1C X 300	300			456
33	8 X 40	320	3 X 60	180					500
34	2 X 18	36	2 X 60	120	1C X 300	300			456
35	2 X 18	36	2 X 60	120	1C X 300	300	1P X300	300	756
36	8 X 40	320	4 x 60	240	1C X 300	300			860

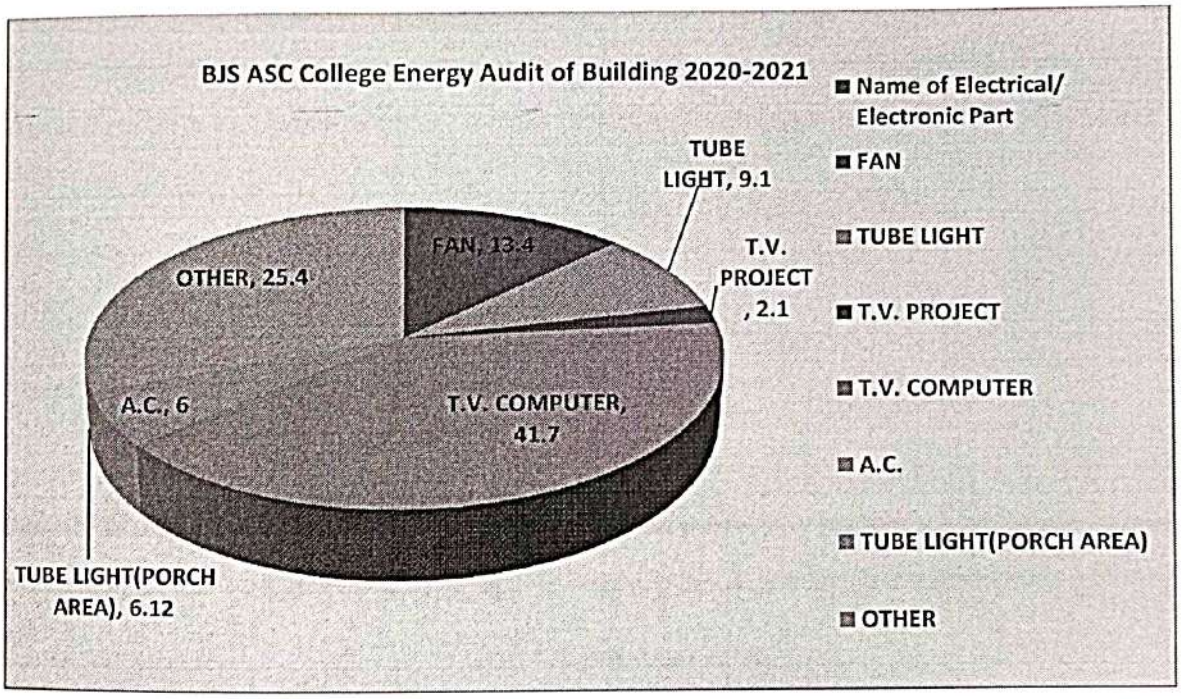




BJS ASC College Energy Audit of Building 2020-2021 (Third floor)

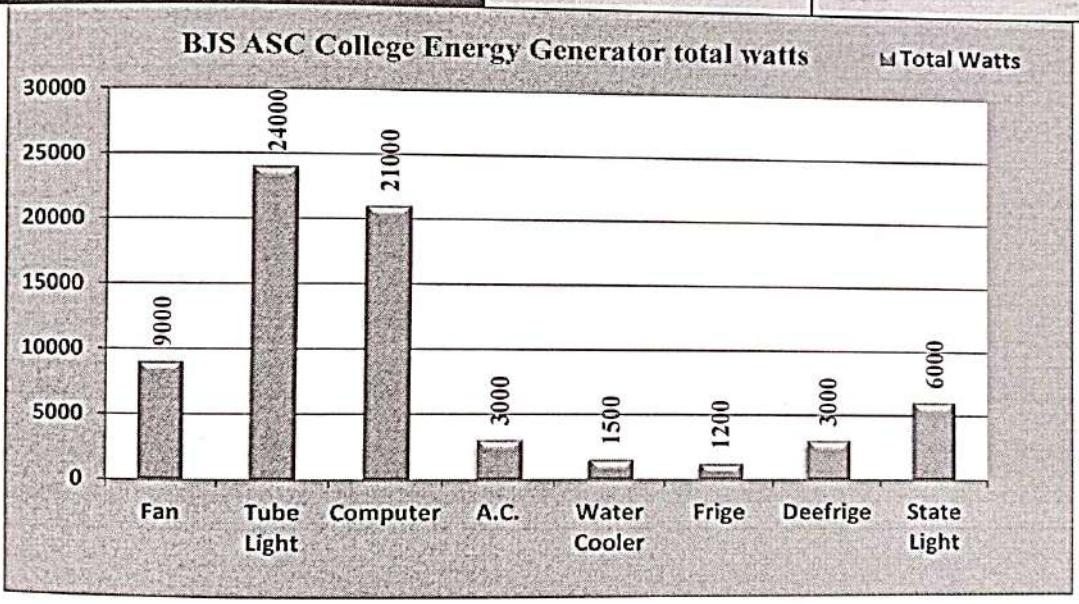
Room No.	Total Tube Light	Power Watts	Total Fan	Power in Watts	Total LCD /Projector/ Computer	Power in Watts	Other Frige/AC/Cooler/Xerox/Printer Electrical Instruments	Others	Total Power (Watts)
37	7 X 18	126	5 x 60	300					426
38	7 x 40	280	5 x 60	300					580
39	7 x 40	280	5 x 60	300					580
40	7 X 18	126	4 x 60	240					366
41	5 X 18	90	5 X 60	300					390
42A	7 X 18	126	2 X 60	120					246
42B	3 X 18	54	2 x 60	120					174
43	7 X 18	126	3 X 60	180	5C X 300	1500	5 Oven x 1000, 3 Frige x500	6500	8306
44	6 X 40	240	2 X 60	120					360
45	8 X 18	144	4 X 60	240					384
46	2 X 18	36	2 x 60	120	1C X 300	300			456
47	3 X18	54	2 X60	120					174
48	8 X 40	240	8 X 60	240	1C X 300	300			780
49 OG	4 X18	72	4 X 60	240					312
50 NG	9 X100	900	10 X 60	600	1C X 300	300			1800
51 A-NSS	4 X 18	72	2 X 60	120					192
51 B-NCC	4 X 18	72	2 X 60	120					192
52 Boxing Ring	4 X 450	1800							1800

Sr. No.	Name of Electric/Electronic part	Total Number	Total Power Watts	Total Power (KW)
1	FAN	224	13440	13.4
2	TUBE LIGHT	325	9150	9.1
3	T.V. PROJECT	7	2100	2.1
4	T.V. COMPUTER	139	41700	41.7
5	A.C.	4	6000	6
6	TUBE LIGHT (PORCH AREA)	153	6120	61.2
7	**OTHER**			25.4
	1)FIRGE	6	9000	
	2)OVEN	8	8000	
	3) PRINTER	13	3900	
	4) XEROX	2	3000	
	5) COOLER	1	1500	
			25400	

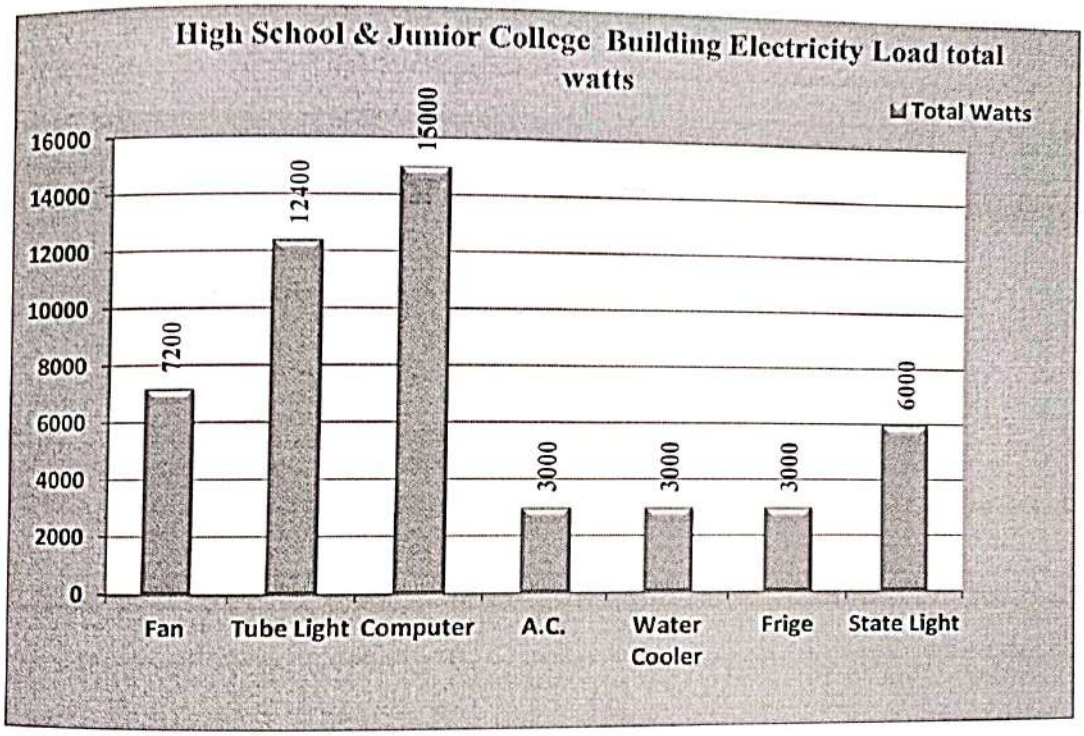


Building wise Electricity Load Details

BJS ASC College Building Total Electricity Load Distribution Year- 2020-2021			
Sr. No.	Name of Electrical Instruments	Use of Power	Total Watts
1	Fan	150 x 60	9000
2	Tube Light	600 x 40	24000
3	Computer	70 x 300	21000
4	A.C.	2 x 1500	3000
5	Water Cooler	5 x 300	1500
6	Frige	4 x 300	1200
7	Deefrige	1 x 3000	3000
8	State Light		6000
Total			68700
Total Kilowatts		68700/1000	68.70 (kilowatts)

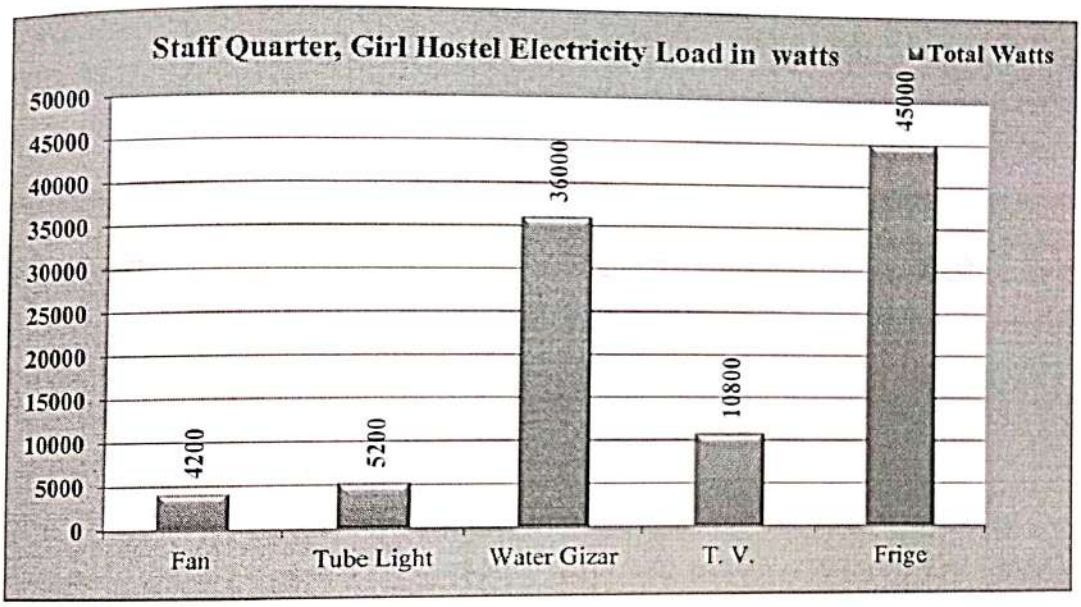


High School & Junior College Building Total Electricity Load Distribution Year- 2020-2021			
Sr. No.	Name of Electrical Instruments	Use of Power	Total Watts
1	Fan	120 x 60	7200
2	Tube Light	310 x 40	12400
3	Computer	50 x 300	15000
4	A.C.	2 x 1500	3000
5	Water Cooler	2 x 1500	3000
6	Frige	2 x 1500	3000
8	State Light		6000
	Total		**49600**
	Total Kilowatts	**49600/1000**	**49.60 (kilowatts)**



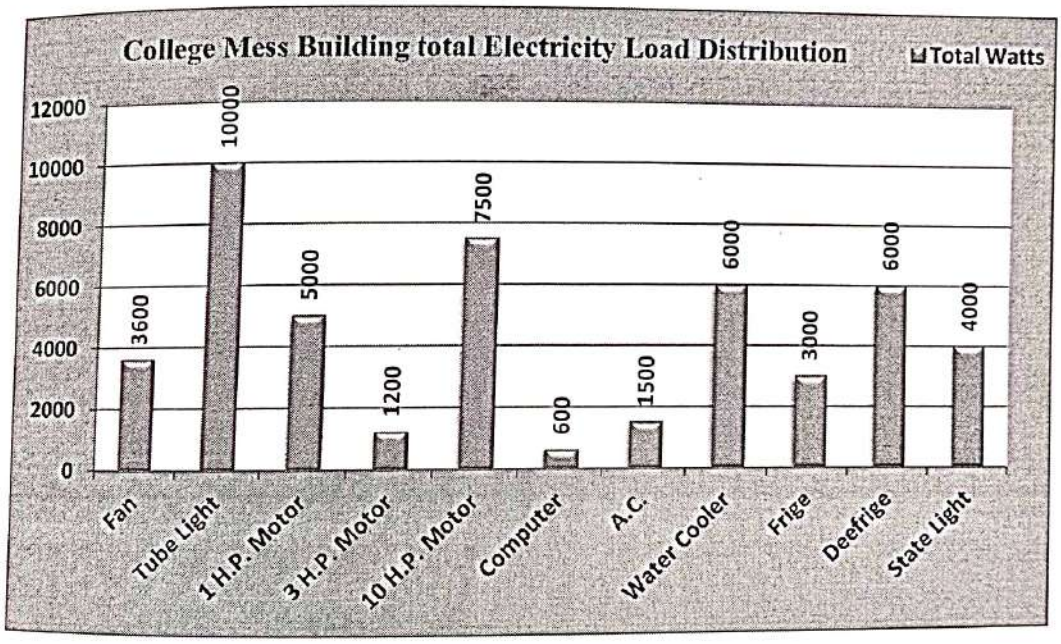
Staff Quarter, Girl Hostel Building Total Electricity Load Distribution Year- 2020-21

Sr. No.	Name of Electrical Instruments	Use of Power	Total Watts
1	Fan	70 x 60	4200
2	Tube Light	130 x 40	5200
3	Water Gizar	36 x 1000	36000
4	T. V.	36 x 300	10800
6	Frige	36 x 300	45000
Total			**101200**
Total Kilowatts		**101200/1000**	**101.20 (kilowatts)**
	Girls Hostel		**30 (KiloWatts)**
	Total		**131.20 (Kilowatts)**



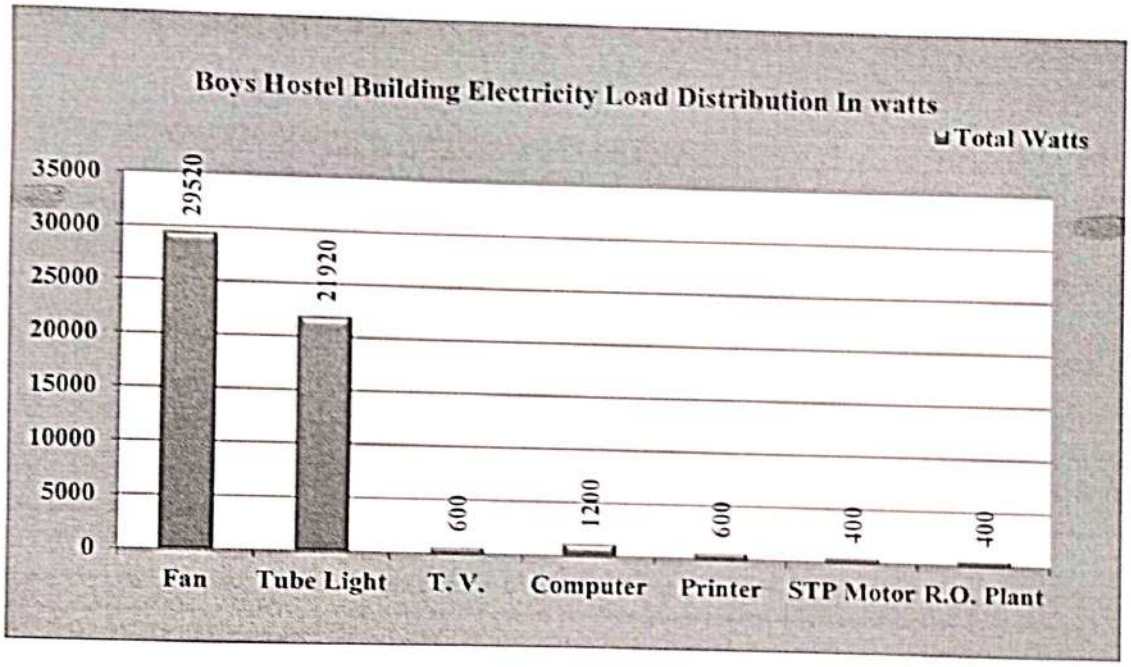
College Mess Building Total Electricity Load Distribution Year-2020-21

Sr. No.	Name of Electrical Instruments	Use of Power	Total Watts
1	Fan	60 x 60	3600
2	Tube Light	250 x 40	10000
3	1 H.P. Motor	05 x 1000	5000
4	3 H.P. Motor	3 x 400	1200
5	10 H.P. Motor	01 x 7500	7500
6	Computer	02 x 300	600
7	A.C.	1 x 1500	1500
8	Water Cooler	4 x 1500	6000
9	Frige	2 x 1500	3000
10	Deefrige	2 x 3000	6000
11	State Light		4000
Total			**48400**
Total Kilowatts		**48400/1000**	**48.4 (Kilowatts)**



College Boys Hostel Building Total Electricity Load Distribution Year- 2020-21

Sr. No.	Name of Electrical Instruments	Use of Power	Total Watts
1	Fan	492 x 60	29520
2	Tube Light	548 x 40	21920
3	T. V.	02 x 300	600
4	Computer	04 x 300	1200
5	Printer	02 x 300	600
6	STP Motor	01 x 400	400
7	R.O. Plant	01 x 400	400
Total			54640
Total Kilowatts		48400/1000	54.64 (Kilowatts)



Chapter No-4

Installation of Solar Power Plant

Bharatiya Jain Sanghatana Educational Rehabilition Center, Wagholi Pune has installed **119.68 KWP** Solar Rooftop power generation systems on **19.12.2017** from Kalapa Power Pvt.Ltd.

Effect of Solar Power plant is shown in following table-

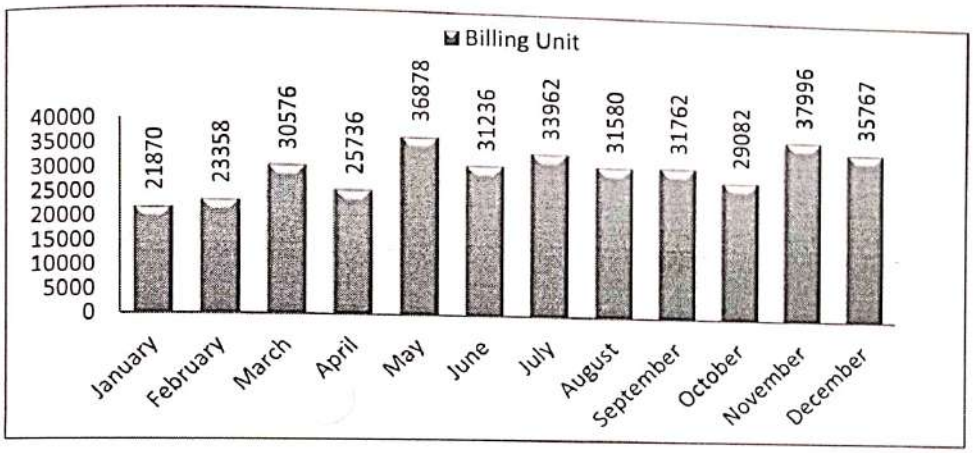
Sr.No.	Month	Year-2016	Year-2017	Year-2018	Year-2019	Year-2020	Year-2021
1	January	39,652	44,294	24,693	21,870	22,552	2,592
2	February	41,614	46,398	31,785	23,358	20,439	2,190
3	March	48,860	55,666	39,846	30,576	20,439	2,732
4	April	42,216	42,156	33,459	25,736	2,974	4,818
5	May	46,218	45,940	41,595	36,878	2,970	5,286
6	June	41,582	36,330	30,735	31,236	2,289	4,916
7	July	48,678	41,344	33,681	33,962	3,140	3,203
8	August	49,934	45,182	32,607	31,580	3,701	2,035
9	September	46,956	45,524	31,662	31,762	3,453	1,968
10	October	47,058	31,014	42,690	29,082	4,829	2,224
11	November	36,988	35,552	22,494	24,500	2,940	2,080
12	December	44,808	44,294	26,838	24,500	2,664	2,369
	Total	**5,34,564**	**5,13,694**	**3,92,085**	**3,45,040**	**92,390**	**36,413**

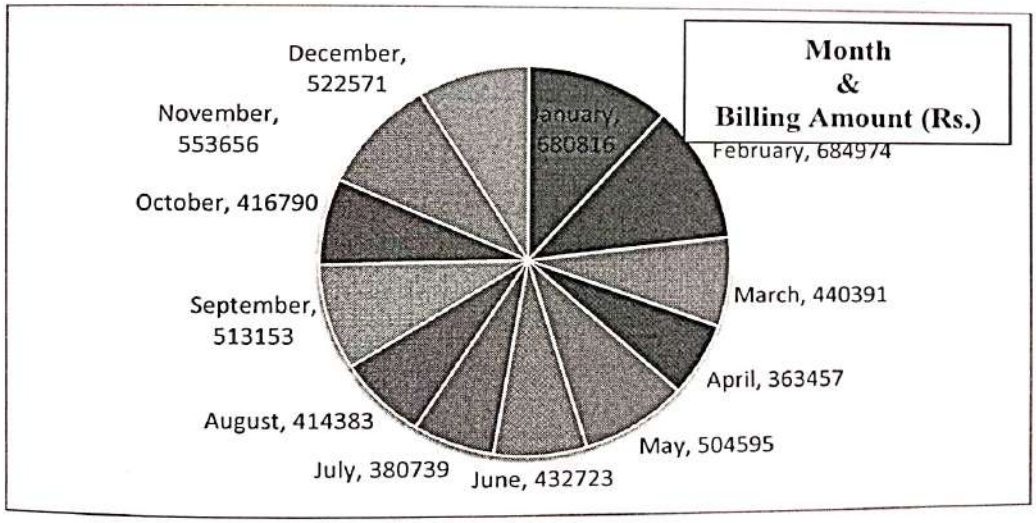
Conclusion-

1. The above data analysis concludes that average **30%** total energy save due to solar power plant.
2. Due to installed **119.68 KWP** Solar Rooftop power generation systems on 19.12.2017 every years nearly **20 lakh** save by institute.
3. As per Maharashtra State Electricity Distribution Statement total demand power Bharatiya Jain Sanghatana Educational Rehabilitation Center is **122 KW.**
4. In the year 2017-18 Sewage Treatment Plants (One lakh liter capacity), Bore well, Reverse Osmosis Plant (2000LPH capacity), two computer laboratory (School & College-90 Computer) and Waste recycling machine newly installed in campus.
5. From data table in the month of May and October of every year use of energy is maximum.

Year 2019

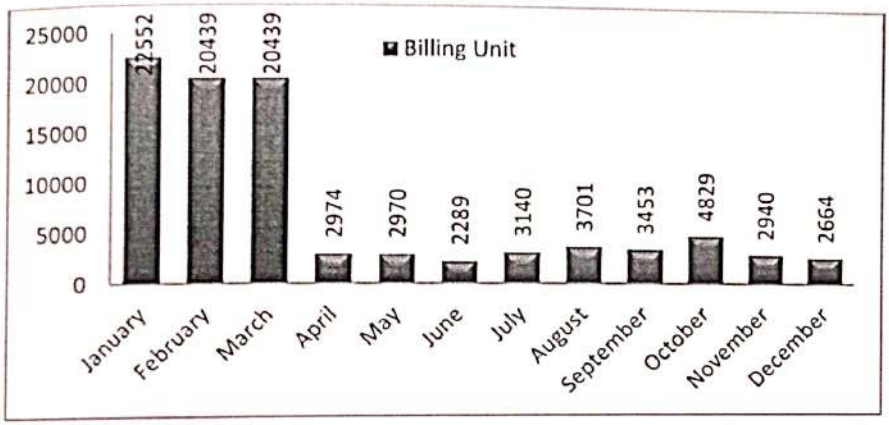
Sr. No.	Month	Units	Bill Demand (KVA)	Light Bill (Rs.)
1	January	21870	122	6,80,816
2	February	23358	122	6,84,974
3	March	30576	122	4,40,391
4	April	25736	92	3,63,457
5	May	36878	93	5,04,595
6	June	31236	92	4,32,723
7	July	33962	92	3,80,739
8	August	31580	92	4,14,383
9	September	31762	92	5,13,153
10	October	29082	100	4,16,790
11	November	37996	102	5,53,656
12	December	35767	86	5,22,571

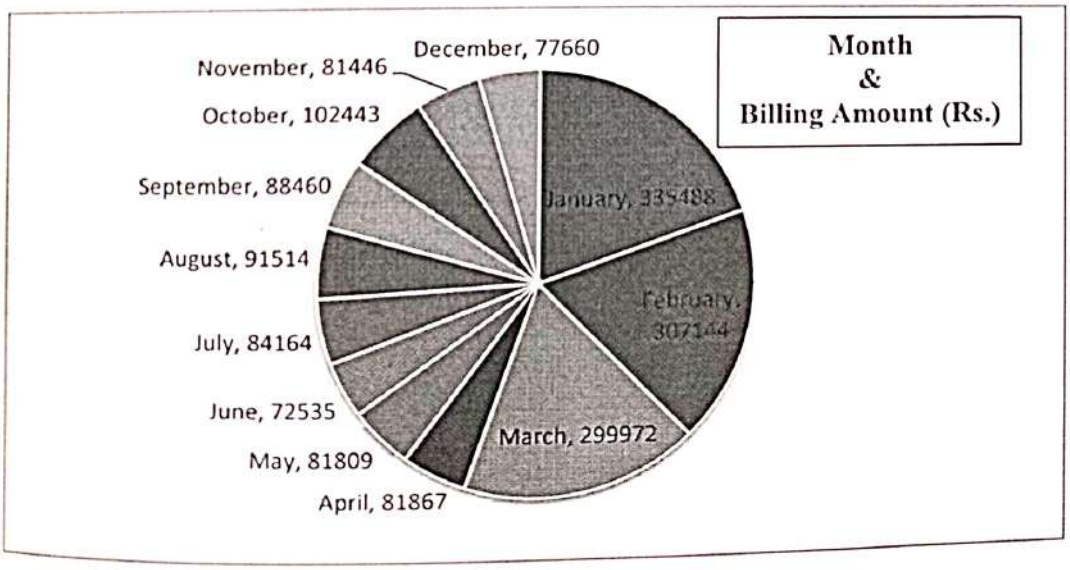




Year 2020

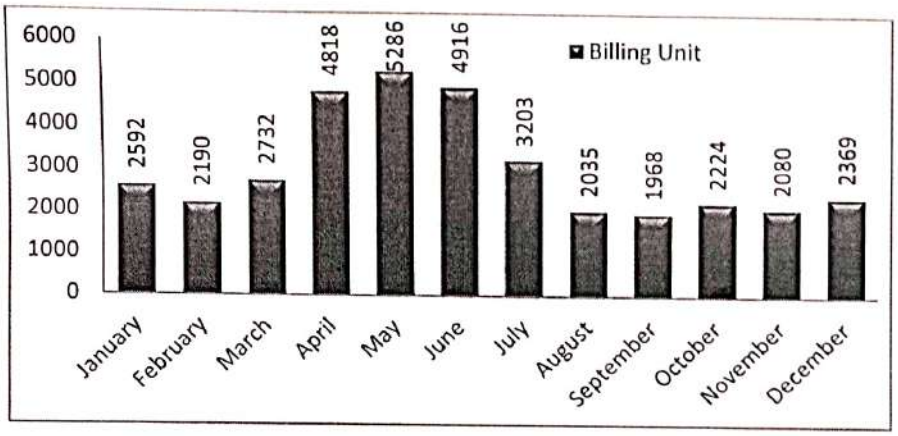
Sr. No.	Month	Units	Bill Demand (KVA)	Light Bill (Rs.)
1	January	22552	81	335488
2	February	20439	75	307144
3	March	20439	75	299972
4	April	2974	83	81867
5	May	2970	83	81809
6	June	2289	83	72535
7	July	3140	83	84164
8	August	3701	83	91514
9	September	3453	83	88460
10	October	4829	83	102443
11	November	2940	83	81446
12	December	2664	83	77660

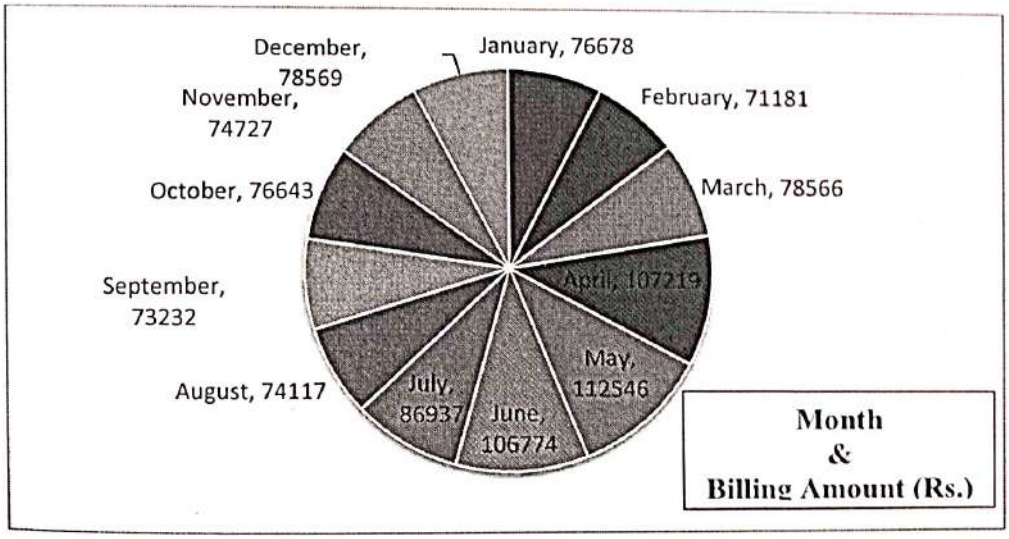




Year 2021

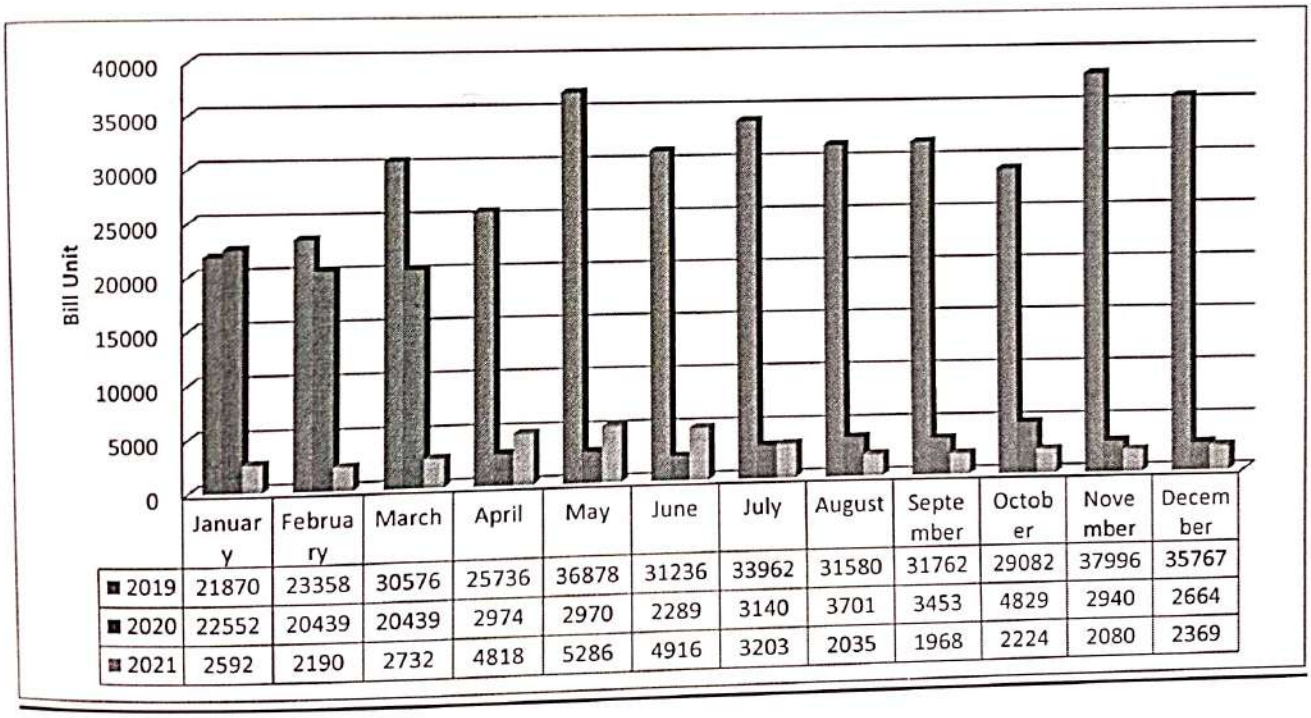
Sr. No.	Month	Units	Bill Demand (KVA)	Light Bill (Rs.)
1	January	2592	83	76678
2	February	2190	83	71181
3	March	2732	83	78566
4	April	4818	90	107219
5	May	5286	90	112546
6	June	4916	90	106774
7	July	3203	90	86937
8	August	2035	90	74117
9	September	1968	90	73232
10	October	2224	90	76643
11	November	2080	90	74727
12	December	2369	90	78569





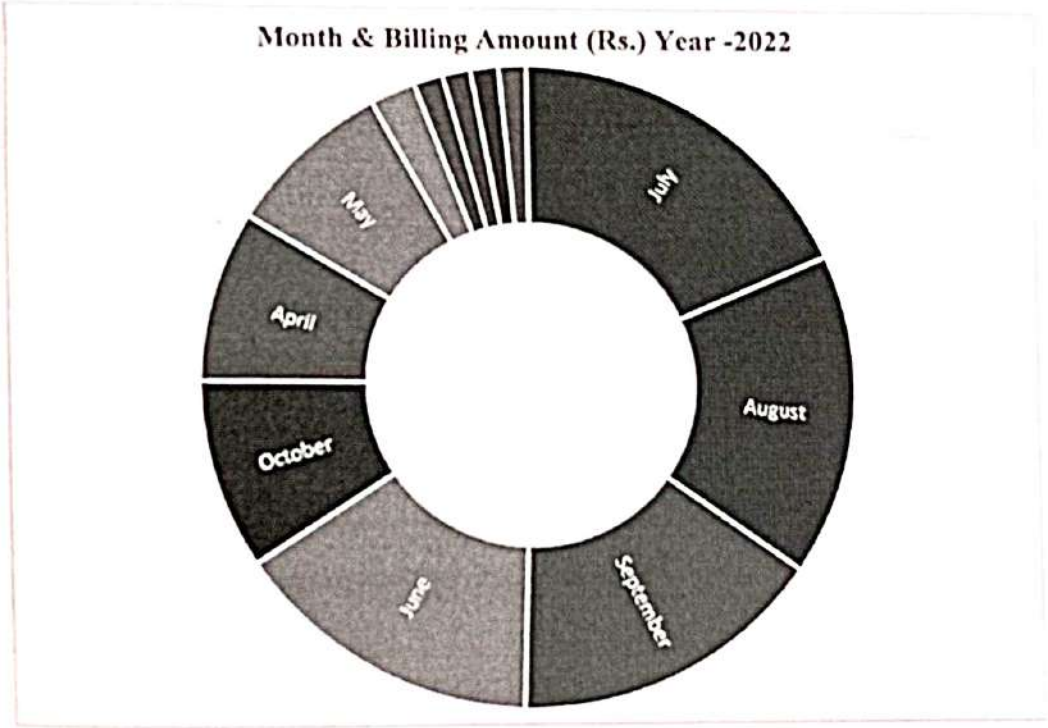
Summary

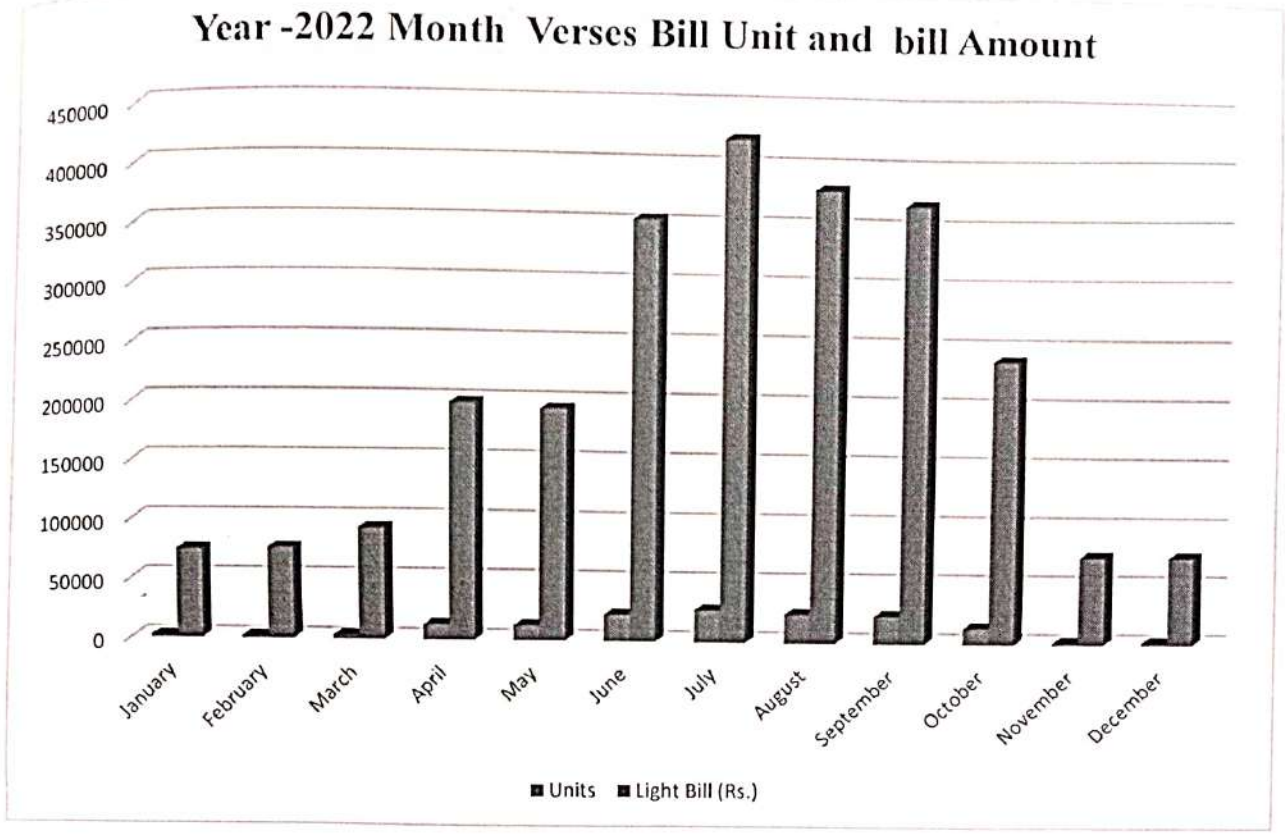
Sr. No.	Month	Units			Light Bill (Rs.)		
		2019	2020	2021	2019	2020	2021
1	January	21870	22552	2592	680816	335488	76678
2	February	23358	20439	2190	684974	307144	71181
3	March	30576	20439	2732	440391	299972	78566
4	April	25736	2974	4818	363457	81867	107219
5	May	36878	2970	5286	504595	81809	112546
6	June	31236	2289	4916	432723	72535	106774
7	July	33962	3140	3203	380739	84164	86937
8	August	31580	3701	2035	414383	91514	74117
9	September	31762	3453	1968	513153	88460	73232
10	October	29082	4829	2224	416790	102443	76643
11	November	37996	2940	2080	553656	81446	74727
12	December	35767	2664	2369	522571	77660	78569
	Total	369803	92390	36413	5908248	1704502	1017189



Year 2022

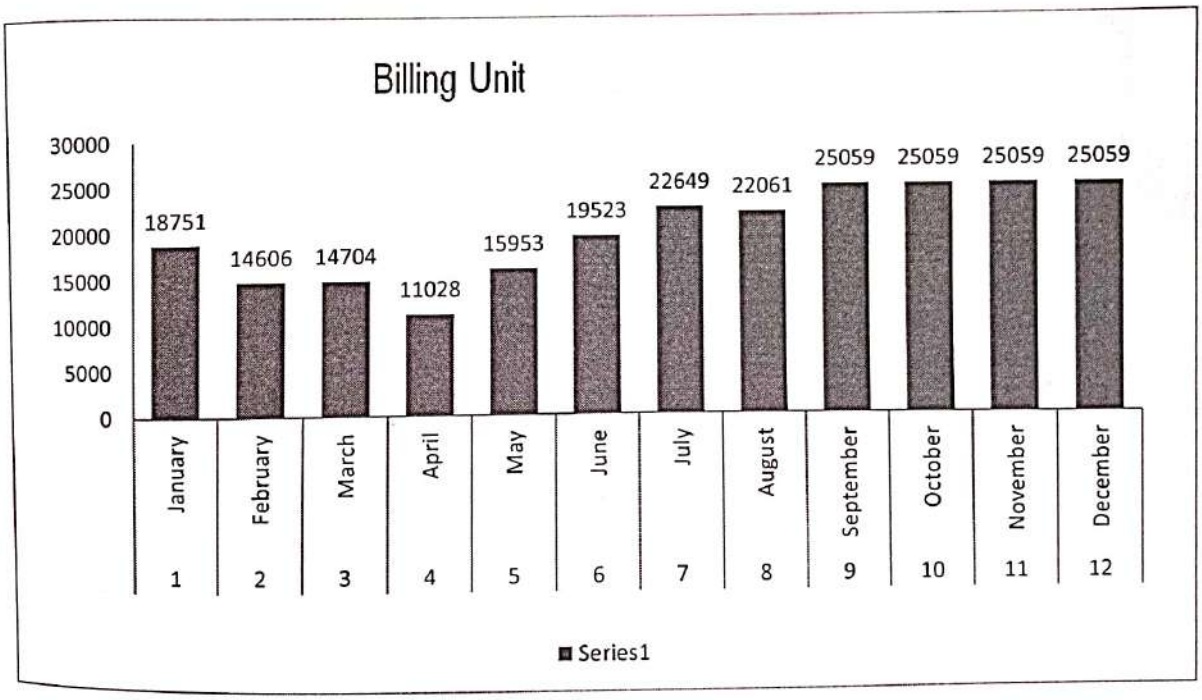
Sr. No.	Month	Units	Bill Demand (KVA)	Light Bill (Rs.)
1	January	2065	90	74525
2	February	2178	90	76034
3	March	3424	90	93475
4	April	12872	98	198975
5	May	12582	98	195187
6	June	22746	98	355156
7	July	27566	98	423100
8	August	24660	98	382156
9	September	23710	98	369923
10	October	14122	98	239909
11	November	2080	90	74727
12	December	2080	90	74727

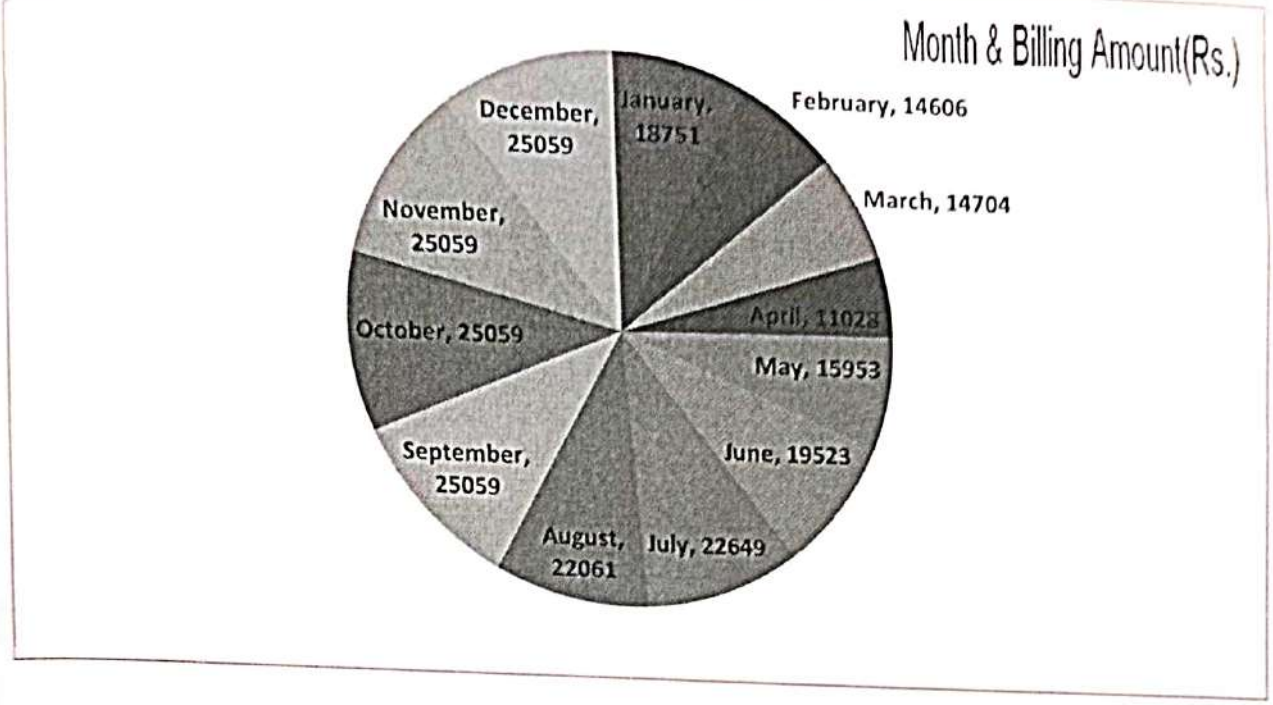




Year- 2023

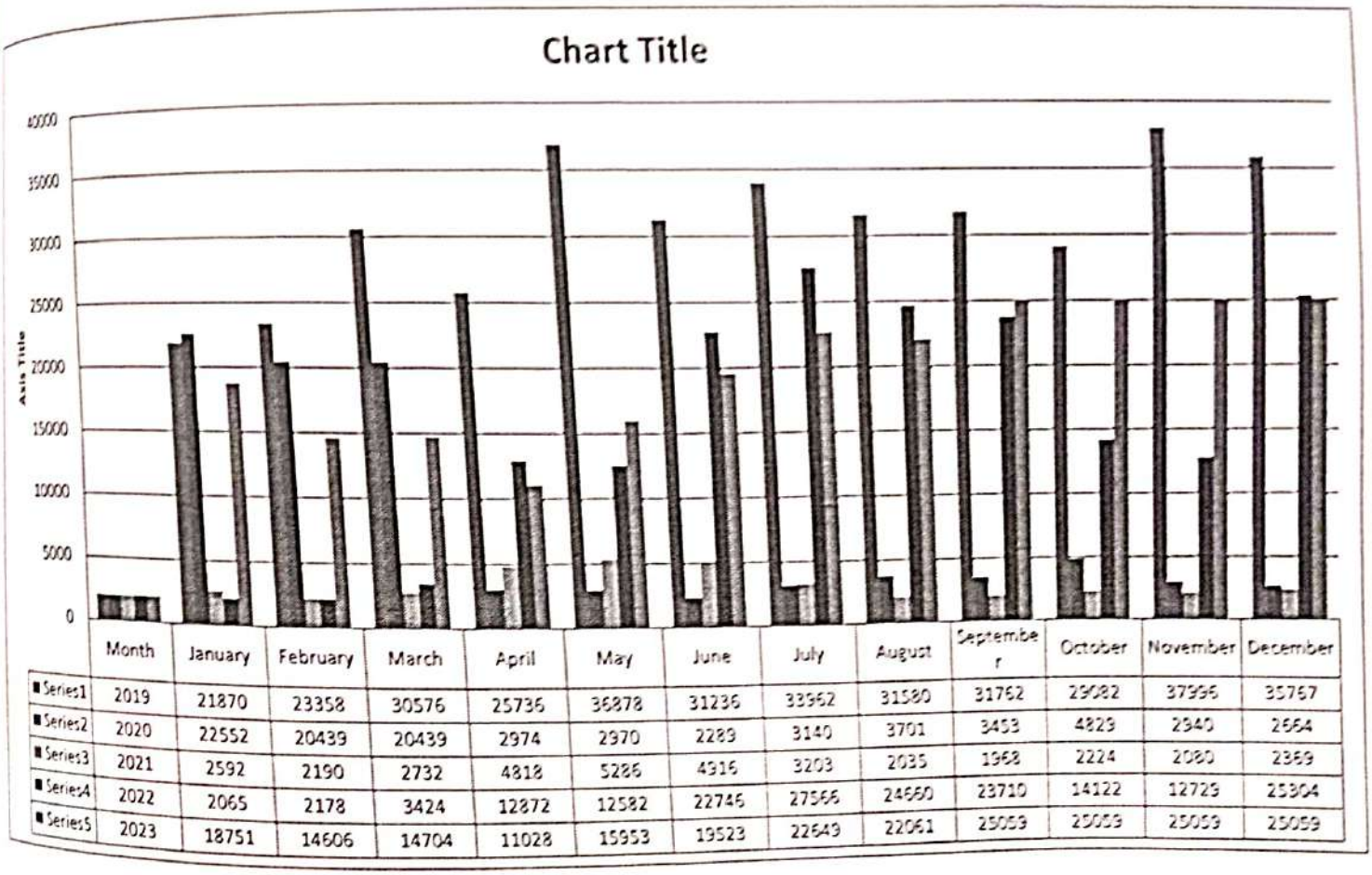
Sr.No	Month	Units	Bill Demand (KVA)	Light Bill(Rs.)
1	January	18751	98	302015
2	February	14606	98	246182
3	March	14704	98	246586
4	April	11028	105	202477
5	May	15953	105	263517
6	June	19523	105	307161
7	July	22649	105	347355
8	August	22061	105	338632
9	September	25059	105	384346
10	October	25059	105	384346
11	November	25059	105	384346
12	December	25059	105	384346





Summary

Month	Units					Light Bill(Rs)				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
January	21870	22552	2592	2065	18751	680816	335488	76678	74525	302015
February	23358	20439	2190	2178	14606	684974	307144	71181	76034	246182
March	30576	20439	2732	3424	14704	440391	299972	78566	93474	246586
April	25736	2974	4818	12872	11028	363457	81867	107219	198934	202477
May	36878	2970	5286	12582	15953	504595	81809	112546	195187	263517
June	31236	2289	4916	22746	19523	432723	72535	106774	355155	307161
July	33962	3140	3203	27566	22649	380739	84164	86937	423100	347355
August	31580	3701	2035	24660	22061	414383	91514	74117	382156	338632
September	31762	3453	1968	23710	25059	513153	88460	73232	369922	384346
October	29082	4829	2224	14122	25059	416790	102443	76643	239908	384346
November	37996	2940	2080	12729	25059	553656	81446	74727	223085	384346
December	35767	2664	2369	25304	25059	522571	77660	78569	391858	384346
Total	369803	92390	36413	183958	239511	5908248	1704502	1017189	3023338	3791309



	Month	January	February	March	April	May	June	July	August	September	October	November	December
Series1	2019	21870	23358	30576	25736	36878	31236	33962	31580	31762	29082	37996	35767
Series2	2020	22552	20439	20439	2974	2970	2289	3140	3701	3403	4823	2340	2664
Series3	2021	2592	2190	2732	4818	5286	4916	3203	2035	1968	2224	2080	2369
Series4	2022	2065	2178	3424	12872	12582	22746	27566	24660	23710	14122	12723	25304
Series5	2023	18751	14606	14704	11028	15953	19523	22643	22061	25059	25059	25059	25059

Chapter No-5

Recommendations and Action Plans

Conservation Tips

LIGHTING SYSTEM

1. Use of CFL lamp in place of GLS lamp can save energy up to 70%.
2. Clean the lamps & fixtures regularly. Illumination levels fall by 20-30% due to the collection of dust.
3. Use of 18W LED instead of 40 W tubes light saves electricity by 40 to 50%.
4. Use of sodium vapour lamps for area lighting in place of Mercury vapour lamps saves electricity up to 40%.
5. Use of electronic ballast in place of conventional choke saves energy up to 20%.
6. One of the best energy-saving devices is the light switch. Turn off lights when not required.
7. Many automatic devices can help in saving energy used in lighting. Consider employing infrared sensors, motion sensors, automatic timers, dimmers and solar cells wherever applicable, to switch on/off lighting circuits.
8. As for as possible use task lighting, which focuses light where it's needed. A reading lamp, for example, lights only reading material rather than the whole room.
9. Dirty tube lights and bulbs reflect less light and can absorb 50 percent of the light; dust your tube lights and lamps regularly.
10. Fluorescent tube lights and CFLs convert electricity to visible light up to 5 times more efficiently than ordinary bulbs and thus save about 70% of electricity for the same lighting levels.
11. Ninety percent of the energy consumed by an ordinary bulb (incandescent lamp) is given off as heat rather than visible light.
12. Replace your electricity-guzzling ordinary bulbs (incandescent lamps) with more efficient types. Compact fluorescent lamps (CFLs) use up to 75 percent less electricity than incandescent lamps.
13. A 18-watt compact fluorescent bulb produces the same amount of light as a 60-watt incandescent bulb.

ROOM AIR CONDITIONERS

14. Use ceiling or table fan as first line of defense against summer heat. Ceiling fans, for instance, cost about 30 paise an hour to operate - much less than air conditioners (Rs.10.00 per hour).
15. Refrigerator motors and compressors generate heat, so allow enough space for continuous airflow around refrigerator. If the heat can't escape, the refrigerator's cooling system will work harder and use more energy.
16. A full refrigerator is a fine thing, but be sure to allow adequate air circulation inside.
17. Think about what you need before opening refrigerator door. You'll reduce the amount of time the door remains open.
18. Allow hot and warm foods to cool and cover them well before putting them in refrigerator. Refrigerator will use less energy and condensation will reduced.
19. Make sure that refrigerator's rubber door seals are clean and tight. They should hold a slip of paper snugly. If paper slips out easily, replace the door seals.
20. When dust builds up on refrigerator's condenser coils, the motor works harder and uses more electricity. Clean the coils regularly to make sure that air can circulate freely.

COMPUTERS

21. Turn off your home office equipment when not in use. A computer that runs 24 hours a day, for instance, uses - more power than an energy-efficient refrigerator.
22. If your computer must be left on, turn off the monitor; this device alone uses more than half the system's energy.
23. Setting computers, monitors, and copiers to use sleep-mode when not in use helps cut energy costs by approximately 40%.
24. Battery chargers, such as those for laptops, cell phones and digital cameras, draw power whenever they are plugged in and are very inefficient. Pull the plug and save.
25. Screen savers save computer screens, not energy. Start-ups and shutdowns do not use any extra energy, nor are they hard on your computer components. In fact, shutting computers down when you are finished using them actually reduces system wear - and saves energy.

FANS

26. Use smooth, well-rounded air inlet cones for fan air intakes. • Avoid poor flow distribution at the fan inlet.
27. Minimize fan inlet and outlet obstructions.
28. Clean screens, filters, and fan blades regularly.
29. Use aerofoil-shaped fan blades.
30. Minimize fan speed.
31. Use low-slip or flat belts.
32. Check belt tension regularly.
33. Eliminate variable pitch pulleys.
34. Use variable speed drives for large variable fan loads.

SCOPE

An energy audit includes the following actions, steps and processes:

1. Actual energy consumption.
2. Calculated energy consumption taking into account rated efficiency and power losses in all energy-utilizing equipment and power transmission system i.e. Conductor, cable, panels etc.
3. Identifying the equipment, operational aspects and characteristics of power supply causing inefficient functioning, wastage of energy, increase in hydraulic or power losses etc. and evaluating the increase in energy cost or wastage of energy.
4. Identifying solutions and actions necessary to correct the shortcomings and lacunas in (iv) and evaluating the cost of the solutions.
5. Carrying out economic analysis of costs involved in (iv) and (v) above and drawing conclusions about whether rectification is economical or otherwise.
6. Checking whether the operating point is near best efficiency point and whether any improvement is possible.
7. Verification of penalties if any, levied by power supply authorities e.g. penalty for poor power factor, the penalty for exceeding contract demand.

A broad review of the following points for future guidance or long-term measure:

1. All Interior walls should be painted using Enameled paint which would reflect light.
2. Good light ventilation and Air ventilation to classrooms may solve the problem of Energy Consumption.
3. Energy saving by replacing LCD desktops with LAPTOP illustrate the benefits in terms of portability, space-saving, the maintenance cost of desktop computers and the additional cost of peripherals. Also cost of damage and other electrical problems. Critical space management and cost involved can be removed. Wiring for LAN and labour cost can also be prevented.
4. Unnecessary power consumption by the negligence of user and system administrator for not switching off while leaving the office will have more vulnerability for damage due to short circuits and heavy voltage due to lightning.
5. It is recommended to replace fluorescent lamps by CFL and LED''S which are handy by construction and the possibility of breakage is less. Installation is easy and the labour charge required for the replacement of burnt tubes and defective choke lamps is a costly affair. The disposal of burnt tubes will disturb the habitat place of both human beings and animals. The release of krypton and argon gases is more dangerous, it may lead to ecological imbalance if it in mass destruction.
6. Switch off the photocopier machine at the main outlet itself when not in use or in other words the machine should not be kept in standby and sleep mode which consumes power.
7. Use a good lighting system will reduce the power burden as a whole.
8. Energy recycling, when Equipment is operating or the motor is running is the research area that young generations have to address.
9. Fans running without a capacitor or under-rated capacitor will draw more current therefore use of correctly rated capacitor will reduce the power consumption.
10. Recommended to use solar water cooler in place of conventional one.
11. Reschedule the time table to reduce the maximum demand.
12. Outside lightening of the campus should be placed bit higher.
13. Use pumps on the off peak time so that we can reduce the consumption cost. If the securities are available. Fill the tank by pumping once.
14. Recommended to replace the old refrigerator, freezers, grinders and mixers with the new energy efficient ones i.e. five stars rated equipments.

E-WASTE MANAGEMENT

E-Waste (Electronic waste) comprises of waste generated from used electronic devices and household and college electrical appliances which are not fit for their original intended use. E-waste is the future coming environmental problem will create hazards to our environment, it is non-degradable waste can pollute water, soil and air. With keeping this view we are aware about destructive materials mainly metal, insulating materials present in the e-waste like CD, scrap, mobile-like devices, computer waste like wiring, metals, and unused pen drive.

Aim and objective E-Waste management:

Aim

1. Disposal of unwanted electronic gadgets.
2. Proper methodology needs to be followed to control the pollution caused by e-waste products.

Objective

The major objective of e-waste management is to reduce, reuse, and recycle.

ITEMS AND THEIR TOXIC COMPONENTS:

SR. NO	ITEM	COMPONETS
1	Refrigerator	CFC/HC/Rubber
2	PC And Laptops	CRT, Fluorescent Lamp, Copper
3	Television	Metal, CRT, Plastic, BRF
4	Washing Machine	Rubber, Electric Wire, Metal and Motor
5	Computer Batteries	Cadmium
6	Capacitor And Transformer	PBC
7	Printed Circuit Board	Lead And Cadmium
8	Cathode Ray Tubes	Lead Oxide and Cd
9	Cable Insulation / Coating	PVC
10	Switches And Flat Screen Monitor	Mercury

Activity/Observations:

With keeping the view to minimize the pollution created through E-waste, we have carried out the scientific disposal of E-waste by two ways

1) Collection of E-waste in E-waste box
2) Reuse of the component of unused electronic devices.

Collection of E-waste:

We have installed an e-waste box in the computer laboratory, and our students and staff lay the unused electronic devices and component like CD, PD, memory card etc. in it and thus collected them. The reused and recycled E-waste is given to E-waste scrap purchasers for proper disposal of such E-waste.

This activity is run throughout the year by collecting E-waste in e- waste boxes. In 2020 Campaigned E-waste collection by students of Environment awareness studies as a project work along with mentioning the detail information of the E-waste its harmful effects generated. Out of this some was reused for preparation of best from waste activity. And some items were repaired. For the scientific disposal of the e-waste, it was given to the proper disposal agency.

DANGERS & CHALLENGES

- Rapidly increasing volume of e-waste
- Low level of awareness of the hazards of incorrect disposal
- Widespread e-waste recycling in the informal sector using rudimentary techniques leads to severe environmental damage and health hazards
- Recyclers recover precious metals and improperly dispose off the rest
- Absence of proper mechanism for Collection of e-waste material and its Disposal
- Inefficient recycling processes result in substantial loss of material value
- Effective recycling processes through technologically sound systems involve an initial investment
- Huge gap between generation & recycling of E-Waste
- Lack of producer responsibility for take back of products, at the end of its useful life.

Activity:

With keeping the view to minimising the pollution created through e-waste, we have carried out the scientific disposal of e-waste by two ways.

1) Collection of e-waste in e- waste box

2) Reuse of components of unused electronic devices

Collection of e-waste: We have installed an e-waste box at the corner of the computer laboratory, and our students, and staff put unused electronic devices and components like CD, pen drive, headphones, memory card, SIM Card and e- waste from computers and physics laboratory is also collected and few of it is reuse and remaining e-waste is given to the e- waste scrap purchaser for proper reuse and disposal of such e- waste.

SUGGESTIONS

- In order to have a proper management system for e-waste disposal the manufacturers should have a system of collection and channelization in place with proper regulatory mechanisms. Collection centres can be created so that e-waste material can be accumulated at one place.
- All Central & State govt. departments, PSUs and another bulk consumer should channel their e-waste disposal so as to safeguard and protect the environment.
- Government can provide incentives to set up E-waste processing units for quick disposal
- It is seen in the Government Dept. And PSUs that the reserve prices fixed for e-waste material is generally on the higher side. A pragmatic approach is required for the fixation of Reserve Price of such E-waste material.
- By giving incentives for setting up more units within the same state, movement of material can be avoided and the disposal can be ensured in an environmentally sound process. This will also ensure higher revenue to the state.

Energy Conservation Action Plan:

Following a detailed energy audit, the following energy conservation action plan is possible. These energy conservation opportunities are minimal-cost investments.

- The water management system must be functional. Reducing water consumption by addressing tap leaks and various other utilities. Installation of flow meters which will help in reducing water consumption.
- According to the survey of connected load in the campus, the sanctioned power demand is huge. It is suggested to reduce the maximum demand if possible.
- Rainwater harvesting is done to reduce pumping hours and ultimately save electricity.
- Simple tube and bulb monitors are beginning to be replaced with LEDs as they deteriorate.
- Sign boards are displayed at various prominent places in the building to create awareness among staff and students.
- Solar energy projects have been set up in the institute, mess and hostel area and street lights are going to be installed at the places.
- Replacement of old electric fans with energy-efficient fans is in progress.
- Small windmills can be placed in and around the institution as sufficient wind speed is available at the site of the institution.
- Power distribution must be renewed and all safety features must be considered. It is suggested to install fire extinguishing system in the distribution room

Chapter No-6

Result and Conclusions

An energy audit is an effective tool in identifying problems associated with the energy management program. A careful audit in any organization will lead to managing the energy system in the organization at a minimum energy cost. In the development process to cope with increasing energy demands, energy conservation and energy audit are two parallel paths.

The energy audit deals with the inspection, survey and analysis of energy flow for energy conservation in a building, process or system to reduce the energy consumption by the system without negatively affecting the output. We showed where the power consumption is more in the given system. It also included the reduction losses and improvement of power quality .we suggested the new models in place of old existing models and found the cost benefits for new installed application over the old application. **This report is only according to data analysis and observation. It is necessary to do energy audit from authentic bodies.**

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