Energy Audit Report (2022-23)

Hutatma Govindrao Pansare Shikshan Prasarak Mandal's

Pansare Mahavidyalaya, Arjapur

At Post : Arjapur Tq.Biloli Dist. Nanded 431711 (Maharashtra)





Energy Audit conducted by KEDAR KHAMITKAR & ASSOCIATES

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ENERGY EFFICIENCY IN BUILDINGS



Preface:

An energy audit is a study of a Building or facility to determine how and where energy is used and to identify methods for energy savings. There is now a universal recognition of the fact that new technologies and much greater use of some that already exist provide the most hopeful prospects for the future.

Data collection for energy audit of the Pansare Mahavidyalaya, Arjapur was conceded by EA Team on 23rd December 2023. This audit was over sighted to inquire about convenience to progress the energy competence of the campus. All data collected from each classroom, Library, every room. The work is completed by considering how many Tubes, Fan, Electronic instruments, etc. in each room. How much was participation of each component in total electricity consumption.



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Acknowledgement:

We express our sincere gratitude to the authorities of M/s Pansare Mahavidyalaya, Arjapur for entrusting and offering the opportunity of energy performance assessment assignment.

We are thankful to Principal & Office Staff for their positive support in undertaking the task of system mapping and energy efficiency assessment of all electrical system, utilities and other workshop equipment. The field studies would not have been completed on time without their interaction and guidance. We are grateful to their cooperation during field studies and providing necessary data for the study.



Energy Auditor, Certified by Bureau of Energy Efficiency, Ministry of Power, Gov. of India

- Empanelled Consultant MEDA (Govt. of Maharashtra)



Introduction:

During the last 51 years, H.G.P. Shikshan Prasarak Mandal's Pansare Mahavidyalaya, Arjapur has gone through several ups and downs and witnessed many changes in higher education process. The college was started in a small building in huge campus of 24 acres in 1972. The college has glorifying tradition to have principals like Shri Govind Gopchade, Shri P.M. Kumbhekar, Shri M.N. Sanghwai and Dr. M.G. Mehetre to Dr. Shrirame A.H. The teaching and non-teaching staff have been put their efforts and commit to their profession and contribute their best in the development of the college and welfare of the students in the rural area. At present the college is marching ahead under the leadership of Principal Dr. Shrirame A.H. The faculty members have the spirit of pursuing for the highest degree in research and the college has the research Centre for higher education. In spite of having no political patronage the college has been proving its significance in the region through its various activities, educational quality and accountability towards the society.





Pansare Mahavidyalaya, Arjapur At Post : Arjapur Tq.Biloli Dist. Nanded 431711

General:

Pansare Mahavidyalaya, Arjapur entrusted the work of conducting a detailed

Energy Audit of campus with the main objectives are as bellows:

To study the present pattern of energy consumption

To identify potential areas for energy optimization

To recommend energy conservation proposals with cost benefit analysis.

Scope of Work, Methodology and Approach:

Scope of work and methodology were as per the proposal .While undertaking data Collection, field trials and their analysis, due care was always taken to avoid abnormal situations so as to generate normal/representative pattern of energy consumption at the facility.

Approach to Energy Audit:

We focused our attention on energy management and optimization of energy efficiency of the systems, sub systems and equipment's. The key to such performance evaluation lies in the Sound knowledge of performance of equipment's and system as a whole.

Energy Audit:

The objective of Energy Audit is to balance the total energy inputs with its use and to identify the energy conservation opportunities in the stream. Energy Audit also gives focused Attention to energy cost and cost involved in achieving higher performance with technical and financial analysis. The best alternative is selected on financial analysis basis.

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Chapter: 1 Executive Summary

Sr.	Recommendation	Saving	Investment	Payback	Remarks
	Replacing 83 nos.				
	Inefficient Fan (75W)				
	with 5 star energy				
	saving Fan or BLDC	3500	Rs. 1.25		
1	fan (28W)	KWh/ Yr.	Lakhs	3.5 yrs.	Short Term
	Install Occupancy	1000	Rs. 45		Medium
2	Sensors	KWh/ Yr.	Thousand	4.5 Yrs.	Term
	Install Solar Power	9000	3.15		
3	Plant 7 KW	KWh/ Yr.	Lakh	3.5 yrs.	Long Term
	Awareness Project				
	Conduct Training				No
4	Program			Immediate	Investment



Specific Energy Consumption (SEC):

Specific Energy Consumption (SEC) is defined as energy usage per Square

meter of area. It is calculated total electrical kWh/total area of the campus.

By calculating SEC, we can crudely target the factors of energy efficiency or

inefficiency

Total Electricity Consumption 6596 kWh /Year

(For April 22- March 23)

Total Built-up Area = <u>9865.989</u> Sq. Meter

In this case the SEC is evaluated as

Electrical units consumed per square meter of area.

It is calculated as under for (Electricity): **<u>1.49</u>** kWh/Sq. Meter



Chapter: 2 Energy Audit Methodology

Energy Audit Study is divided into following steps

1. Historical data analysis:

The historical data analysis involves establishment of energy consumption pattern to the established base line data on energy consumption and its variation with change in production volumes.

2. Actual measurement and data analysis:

This step involves actual site measurement and field trials using various portable Measurement instruments. It also involves input to output analysis to establish actual operating Equipment efficiency and finding out losses in the system.

3. Identification and evaluation of Energy Conservation Opportunities:

This step involves evaluation of energy conservation opportunities identified during the energy audit. It gives potential of energy saving and investment required to implement the Proposed modifications with payback period.



Chapter : 3 Study of Electrical System

Sources of Energy:

Pansare Mahavidyalaya, Arjapur receives Electricity from MSEDCL & Diesel Generator





Table No 3.1: Meter Details:	Consumer No.	555370161692
Details of Electricity Demand	Tariff	073 / LT-X B I 0-20KW Pub Ser oth
Sanctioned Load	02	KW

Table No 3.2: Meter Details:	Consumer No.	555370162800
Details of Electricity Demand	Tariff	090 / LT I Res 1-Phase
Sanctioned Load	26	KW

Table No 3.3: Meter Details:	Consumer No.	555370222071
Details of Electricity Demand	Tariff	090 / LT I Res 1-Phase
Sanctioned Load	08	KW

Details of Connected Load

Follow	wing	are	the	majo	or cor	nsumers	of	electricity	in t	the i	facilit	ty:

Sr.	Appliance Name	Qty.	watt	Total Wattage
1	Computers	32	200	6400
2	Laptop	2	70	140
3	Air Conditioners	2	1100	2200
4	Celling Fans	83	75	6225
6	LED Tubes	82	18	1494
7	LED Bulb	60	10	600
8	Projector	3	280	840
9	Xerox Machine	1	1200	1200
10	All in one Printer	5	250	1250
11	Miscellaneous			2500

Connected Load Graphical View:



Maximum Computer System: <u>6.4</u> KW Minimum load Laptop: <u>0.140</u> KW



Chapter: 4 Historical Data Analysis:

Electric	tity Bill	(for Ap	oril 22-]	March 2	23)						
MAR-	FEB-	JAN-	DEC-	NOV-	OCT-	SEP-	AUG-	JUL-	JUN-	MAY-	APR-
23	23	23	22	22	22	22	22	22	22	22	22
169	171	194	142	172	304	263	213	198	88	152	160



MAR-	FEB-	JAN-	DEC-	NOV-	OCT-	SEP-	AUG-	JUL-	JUN-	MAY-	APR-
23	23	23	22	22	22	22	22	22	22	22	22
138	135	125	134	145	158	175	168	130	180	123	170



MAR-	FEB-	JAN-	DEC-	NOV-	OCT-	SEP-	AUG-	JUL-	JUN-	MAY-	APR-
23	23	23	22	22	22	22	22	22	22	22	22
151	172	185	170	179	209	184	201	340	345	276	177



Observations:

Total Annual Electric Consumption is 6596 KWh/Year

Suggestions:

Install solar power plant of 7 KW capacity



Chapter : 5 Performance Evaluation a) Existing Fan system :

Total number of fans used in the campus = 83 Nos.

- Number of fans to be replace = 83 Nos.
- The Total Current Consumption =6000 kWh
- The Expected fan Consumption =2500 kWh
- Total KWh saved per year = 3500 kWh

Suggestions: Replace existing Inefficient Fan System (75W) with Five Star

BLDC (28W)



b) Improve Power Quality Supply

Power Quality is a combination of Voltage profile, Frequency profile, Harmonics contain and reliability of power supply.

Unbalanced Voltage: Voltage unbalances will cause **extra power loss, reduce system efficiency, reduce motor life cycle**, etc. Also some abnormal functioning and maintenance conditions also cause voltage imbalance and result in negative impacts on equipment and systems. An unbalance of **1%** is acceptable as it doesn't affect the cable. But above 1% it increases linearly and at 4% the de-rating is 20%. This implies that- 20% of the current flowing in the cable will be unproductive and thus the copper losses in the cable will increase by 25% at 4% unbalance.

Good power quality saves money and energy. Direct savings to consumers come from lower energy cost and reactive power tariffs. Indirect savings are gained by avoiding circumstances such as damage and premature aging of equipment.

Suggetion : Install 25KvaVoltage Stabilizer to Improve Power Quality.



c) Improve Effectiveness of Lighting System



Observations: Existing Tube lights are installed without reflectors.

Suggestions: Improve effectiveness of Lighting System

Increase Lighting Efficiency by using reflectors.

Light globes generally disperse light in all directions from the source. If a ceiling mounted light does not direct the light back down to the working plane, more fittings will be required to achieve the required lux levels. So the effectiveness of the reflectors (or minimizing losses due to poor reflectors) is important. Reflectors should be both reflective as well as carefully designed to disperse light effectively on the working plane at the design height of the fitting (e.g., light should not be concentrated in one area, providing too much light, whilst falling short of required levels in another area).

Silver Reflectors. This is the reflector that reflects the most light. **White Reflectors.** More flexible between indoor and outdoor use.

1. Gold Reflectors 2. Black Reflectors 3. White Reflectors

Proposed:-



Initiate Energy Conservation Awareness Project:

Displaying save energy signs reminds staff and visitors to be mindful of the energy the use on site and reduces costs quickly and easily. **"Save Energy for Benefit of Self & Nation"**

Energy Management

All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity.

1. There has to be Institute level student community that keeps track of the energy consumption Parameters of the various departments, class rooms, halls, areas, meters, etc.

2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.

3. Need to create energy efficiency/ renewable energy awareness among the college campus i.e. solar, wind, Biogas energy. College should take initiative to arrange seminars, lectures, paper presentation competition among students and staff for general awareness.



Display the stickers of save electricity

Save nature everywhere in the campus. So that all stakeholders encouraged to save the electricity.

 Most of the time, all the tube lights in a class room are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF.

 All computers to have power saving settings to turn off monitors and hard discs, say after10 minutes/30 minutes.



Chapter: 6 Conclusion

A total Investment of Rs. **5.20**/- (Five Lakh & Twenty thousand rupees) amount is estimated for the energy efficiency improvement & renewable Energy projects.

Energy Savings expected around 13500 KWH/year.

FIVE WAYS TO CONTROL CLIMATE CHANGE

GREEN YOUR COMMUTE	Explore new options to commute and reduce your carbon footprint. Choose to walk, share car, ride bicycle, or electric vehicle.
CONSERVE FUEL	Stop the reckless of fuel and use it more sensibly. Conserving fuel reduces pollution for a cleaner and greener environment.
GET AN ENERGY	Get an energy audit done to determine the overuse of energy.
PLANT TREES	Plant trees and support reforestation. This way CO, level will be decreased, as trees use sunlight to absorb carbon dioxide from the atmosphere through photosynthesis and store it as carbon in the form of wood.
REDUCE, REUSE & RECYCLE	Reduce paper use, reuse whatever you can and recycle waste materials into a valuable resource. Be an environmentally conscious consumer.