Energy Audit Report of Lal Bahadur Shastri College of Arts, Science and Commerce, Satara

Submitted to

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By

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Preface

Data collection for energy audit of the Lal Bahadur Shastri College of Arts, Science and Commerce, satara Campus was conceded by team for the period of 1 Jan 2016 to 30 June 2017. This audit was over sighted to inquire about convenience to progress the energy competence of the campus. To drop of energy utilization whilst cultivate or humanizing comfort, health and safety were of prime anxiety. This audit required to recognize the mainly energy proficient appliances. Besides, several each day processes concerning common appliances have been provided which facilitate sinking the energy expenditure. The energy audit survey was completed by B.Sc. III Physics Student. All data collected from each classroom, laboratory, every room. The work is completed by considering, how much tubes, fan, A.Cs, electronic instruments, etc in each room. How much was participation of each component in total electricity consumption.

Acknowledgement

Head Department of Physics, Lal bahadur shastri college of arts science and commerce, Satara is very much thankful to principal Prof. R. V. Shejwal, IQAC cordinator, NAAC Think tank team for motivating us for energy audit.

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Introduction:

A nation is tiring to advanced in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such a interminable development energy management is essential [1-4]. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for eco-social aspect.

Energy requirement of India is growing and incomplete domestic fossil fuel treasury. The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India has the world's fifth biggest wind influence advertise and plans to include about 20GW of solar electricity. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, public lighting and other miscellaneous applications accounted for the rest. Energy conservation means reduction in energy consumption without making any sacrifice of quantity or quality. A successful energy management program begins with energy conservation; it will lead to adequate rating of equipments, using high efficiency equipment and change of habits which causes enormous wastages of energy [5-7]. By observing all these study, lack of electricity and huge electricity demands. It is necessary to plan to being self sufficient in electricity requirement.

In the present study, college electricity audit has been done. In this study considered practical laboratory, instrument, Fans, air conditioners, Computers etc are considered in this study. We have studied total budget of the college, total economic investment of college on the electricity and total generation electricity from the solar wind hybrid electricity generation unit. Also, we have studied total saving of electricity and money from solar wind generation and requirement of solar energy. Also, it is studied that exact contribution of bulb, fans, computer, instruments etc in the total requirement of electricity. We studied all these mentioned thinks by collecting exactly data form survey.

Experimental and data collection:

All required data is collected by B.Sc. III Physics students. In this data different teams are prepared and students make survey of the college. In this survey they names buiding A for new building and Building B for old building. In both building, in every room, how much fans, tubes, fans, computer, instrument AC, etc will these is measured. According to survey following data is collected.

A building ground floor							
Room	**Tube light**	**Fan**	**Computer**	**Printer**	**A.C.**	**Instrument**	**Watts**
Library (A)	24	18	10	2	-	-	
Library (B)	5	6	-	-	-	-	
Principal's office	5	3	2	2	1	-	
Office	16	8	9	8	-	Xerox Machine	**500**
Microbiology	7	7	1	-	-	Oven- **4** Refrigerator- **3** Bacteriological Incubator- **1**	**600** **900** **200**

Zoology	12	10	2	1	-	Oven-3 Refrigerator- **1**	**600** **300**
Total	69 x 40 **2760**	53x 100 **5300**	24x200 **4800**	13x200 **2600**	**5500**	-	**3100+** **20960**
A building first, second, third and fourth floor							
9	2	1	1	1	-	Speaker Amplifier	500
10	3	2	-	-	-	Acquaguard- 1	500
11	4	4	-	-	-	Projector-1	200
12	4	4	-	-	-	Projector-1	200
13	4	4	-	-	-	Projector-1	200
14	13	8	-	-	4	Projector-1 Speaker -4	200 200
15	2	2	1	-	-	-	-
16	4	4	-	-	-	Projector-1	200
17	-	-	-	-	-	-	-
18	-	1	2	2	-	-	-
19	3	3	-	-	-	Projector-1	200
20	-	-	-	-	-	-	-
21	3	2	4	-	-	-	-
22	4	4	-	-	-	Projector-1	200
23	4	4	-	-	-	Projector-1	200
24	12	4	-	-	-	Refrigerator Autoclave Oven	500 300 1500
25	4	4	2			-	400
26	4	2	17	-	-	-	-
27	5	2	-	-	-	Oven Incubator Laminar air flow	1750 1750 500
28	1	1	1	-	-	-	-
29	1	5	-	-	-	-	-
30	2	4	-	-	-	-	-
31	2	4	-	-	-	-	-
32	3	4	-	-	-	-	-
33	7	4	12	-	-	-	-
Total	136x40 =**5440**	77x100 =**7700**	40x200 =**8000**	3x200 =**600**	4x5500 =**22000**		**9500+** **43740**
						Grand total	**53240**

B building ground floor									
Room	**tube light**	**Fan**	**Computer**	**Table Lamp**	**Printer**	**A.C.**	**Instrument**	**quantity**	**watts**
Physics (B)	9	5	-	5	-	-	Reflecting galvanometer Ballistic Galvanometer	1 1 Total	180 150 **330**
Physics C (research lab)	3	-	-	-	-	1	Fast clean ultrasonic cleaning system Digital picometer Pressure cooker Magnetic stirrer Remi motor Muffle furnance Centriguge REM	1 1 1 3 1 1 1 Total	180 200 150 600 300 500 200 **2130**
Gymkhana	1	1	1	-	1	-	-	-	
NCC	5	3	1	-	-	-	-	-	
Chemistry (A)	4	1 exfan 1	-	-	-	-	Fume Hood	1	**500**
Chemistry (B)	9	4 exfan 3	1	-	1	-	Digital Potentiometer Conductivity meter Microwave Oven Microcontroller pH meter Spectrophotometer Dropping Mercury unit UV Spectrophotometer Photoflurometer Heating Furnace Digital Nephelo Turbidity meter Mercury Lamp Flame Photometer Magnetic Stirrer Melting point	4 4 1 5 1 1 1 1 4 1 1 1 1 1 1 1 2 1 1 1 1 1 1 Total	1600 1600 500 1000 50w 50 80 100 800 120 120 500 100 100 200 200 400 180 750w 550w 200 600 600 =**1040**

							apparatus Digital Polarometer Digital colorimeter Polaroscan Water Bath Mixture Muffle Furnace Hot Air oven Deep Freezer		**0**
Chemistry (C)	4	2 exfan 4	-	-	-	-	Heavy Furnace Digital Weight Balance Serological Water Bath	2 Total	500 200 500 **1200**
Chemistry (D)	6	2 exfan 3	-	-	-	-	Hot Air Oven High Vaccum Pump	1 1 Total	500 200 **700**
Chemistry Depart.	3	1	1	-	-	-	Refrigerator	1	**600**
Total Watts	52x40 = 2080	34x100 = 3400	7x200 =1400	5x60=300	2x200 = 400	5500		**Total=**	**15860 + 13080 = 28940 watts**

Room no.	Tube	Fan	Computer	Printer	A.C.	Instrument	Watts
7	2	2	1	Printer	-	-	300
8	8	5	-		-	TV. Aqua guard	300 100
9	3	4	2	Printer=2	-	-	200 200
10	2	1	1		-	-	
11	4	2	2	Printer=2	-	-	200 200
12	3	2	2	Printer=1	-	-	200 200
13	2	2	2	Printer=1		Projector	400
14	-	-	-	-	-	-	-
15	3	2	1	-	-	-	-
16	3	2	1	Printer=1	-	-	200

17	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-
24	-	-	-	-	-	-	
25	1	1	1	-	-	-	
Total	29x40= **1160**	23x100= **2300**	13x200= **6500**	8x200= **1600**			**2400 +9960=**
						Grand Total	**12360**

Tube Light	Fan	Computer	Printer	A.C.	Instruments
286x40w =**11440**w	187x100w **18700**w	84x200w **16800**	26x200w **5200**	6x5500w **33000**	65=xx **33460**w
Grand Total= 118600W					

Total cost units utilizes by college and total cost in rupees (All data collected in between January 2016 to Jully 2017)

Month	Meter no 1 190560086265	Bill	Meter no.2 190560043027	Bill	Meter no.3 190560029903	Bill	Total Unit	Bill
January	1955	19190	14	360	--	--	--	--
February	--	--	--	--	--	--	---	--
March	2338	21650	18	380	1351	11980	3707	25737
April	1934	19010	49	600	1048	10140	3031	22460
May	4786	26040	51	570	697	5830	5534	32440
June	1378	14190	20	400	313	2850	1711	17440
July	1993	18940	24	430	485	4350	2502	23720
August	2161	19880	24	420	985	8880	3170	29180
September	1835	16180	33	470	875	7550	2743	24200
October	2898	25750	69	690	1357	11900	4324	38340
November	1660	15310	51	610	715	6420	2426	22340
December	1561	15150	56	660	727	6830	2344	22640
January	1856	17710	55	650	1306	12350	3217	30710
February	1641	15480	41	560	977	9290	2659	25330
March	2138	20510	59	680			2197	--
April	3234	30550	103	980	1182	10890	4519	42420
May	2604	27480	114	1150	827	8420	3545	37050
June	1813	16180	63	680	647	5440	2523	22300
July	2238	20090	45	580	--	--	2283	--

Results and discussion:

As far concerning the energy audit, electricity audit is main concern regarding educational institution. We have collected data by considering the tube light, fan, computer, printer, A.C and instruments. In college most of the electricity required for instrument which is 37.64% out off total energy. A.C utilized 3.71%, Printers required 5.85%, computer required 18.9%, Fans are required 21.03% and tube light required 12.87%. The total required energy is 118600 W and percentage wise. Fig. 1 shows the Contribution of tube light, fan, computer, printer, AC and instrument in total use of energy.

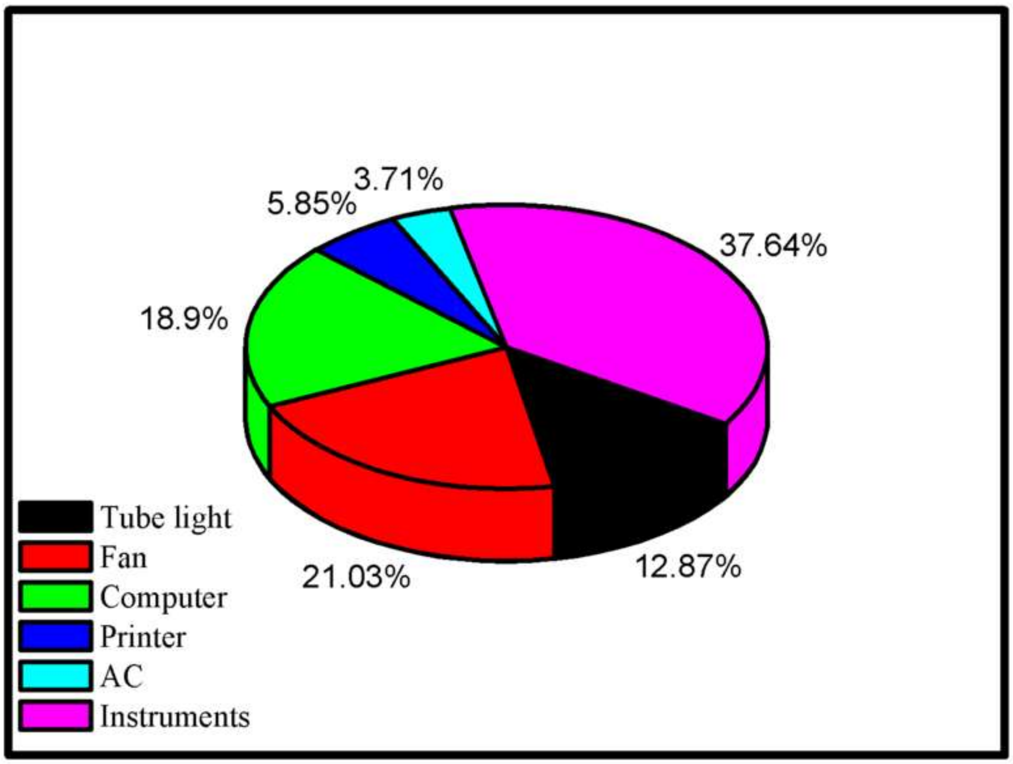

Fig. 1 Contribution of tube light, fan, computer, printer, AC and instrument in total use of energy

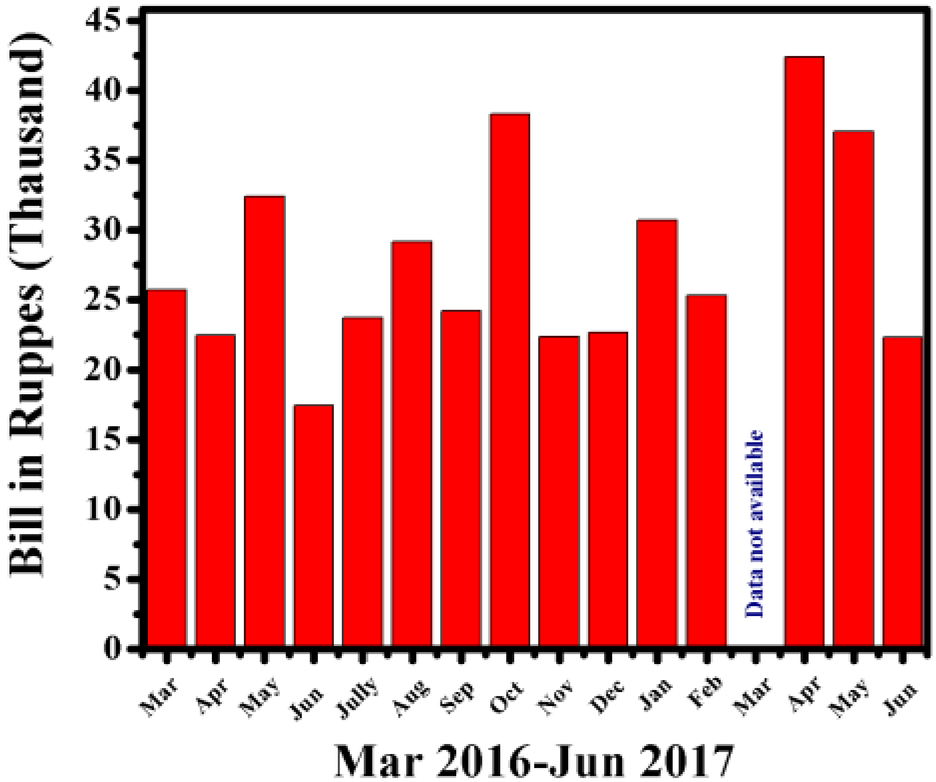

Fig. 2 Electricity bill with respect to month

College required money in between Rs.17000 to Rs. 44000 for every month. Variation in electricity bill is due to different programs, local environment, functions. In the month of April and May energy requirement is more, because exams and going on in this period and summer season is going on so more electricity is required in this month's mostly. Fig. 2 shows the all variations of the

Table 1 Total requirement of electricity, generation of electricity using renewable energy sources.

Power requirement met by renewable energy sources	**Total power requirement**	**Renewable energy source**	**Renewable energy generated and used**
180 units /Month	3233 Units/month	Hybrid Solar and Wind	180 units /Month

Fig.3 Photograph of hybrid (solar with wind miles) energy generation device

The hybrid energy generation devices contain a solar panel and wind turbine. The hybrid energy generation device generates 6 units per day. The college is now using 1.5 kW UPS and batteries for energy storage.

Suggestions: We can use LED bulbs for save more electricity.

Conclusion:

In conclusion, data generated in energy audit are useful for to understand the energy distribution and utilization of college. The college needs maximum 118600 W of electricity. In other words college needs 3233 Units/month and hybrid energy generation device generate the only 180 units/moths.

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