

Energy Audit Report (July' 2023 – June' 2024)

Barasat Government College

Barasat, Kolkata – 700124

Introduction –

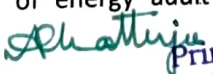
At present, the world is experiencing heavy depletion of conventional or non-renewable sources of energy. This means, unless judicious steps are taken for energy management and control, the situation can be really alarming and tend to go out of control. Moreover, the carbon foot print which is the main matter of concern has to be controlled very fast in a methodical process. In this regard, some immediate steps are required to explore sources of renewable energy with proper implementation in each and every sector involving environmentalists, scientists and industrialists.

It is very clear that the educational institutions are to take up the responsibility to nurture the generation of human resource for future actions and act as pillar-stone for our Nation's development. Therefore, it becomes an undeniable duty of every such institution to keep a track of its energy usage and take adequate measures to minimize energy consumption as far as practicable.

Barasat Government College is a premier Higher Educational Institution well-located at North-24 Parganas, West Bengal under the Government of West Bengal. It is affiliated to the West Bengal State University (WBSU) and is a UGC recognized HEI primarily offering under-graduation courses and also post-graduation courses in some subjects. The college has been accredited by NAAC with A grade. The college commenced its journey in 1950 under University of Calcutta. From 2008, the college got its affiliation under WBSU (West Bengal State University). In 2015, the College was awarded Grade 'A' in NAAC (Cycle II).

Energy Audit modalities and their implementation (Constituent Members / Data Collection / Application areas)

Energy audit report is a vital data analysis regarding electric energy consumption. It helps to identify some disorder in the electrical connectivity, uneven load distribution, detection of overload area etc and hence precautionary measurement can be taken for some particular overloaded area. The Principal of Barasat Govt College has taken the initiative for preparing the energy audit report in the academic year 2021-22, 2022-23 and 2023-24. A team has been formed comprising with Dr. Madhusudan Ghosh (Associate Professor of Physics), Dr. Abhijit De (Associate Professor of Physics) Mr. Narayan Ch. Paul (Lab Bearer) and Shri Pintu Chowdhury, Staff, PWD under the guidance of Principal, Barasat Govt College for completion of energy audit report. The college buildings


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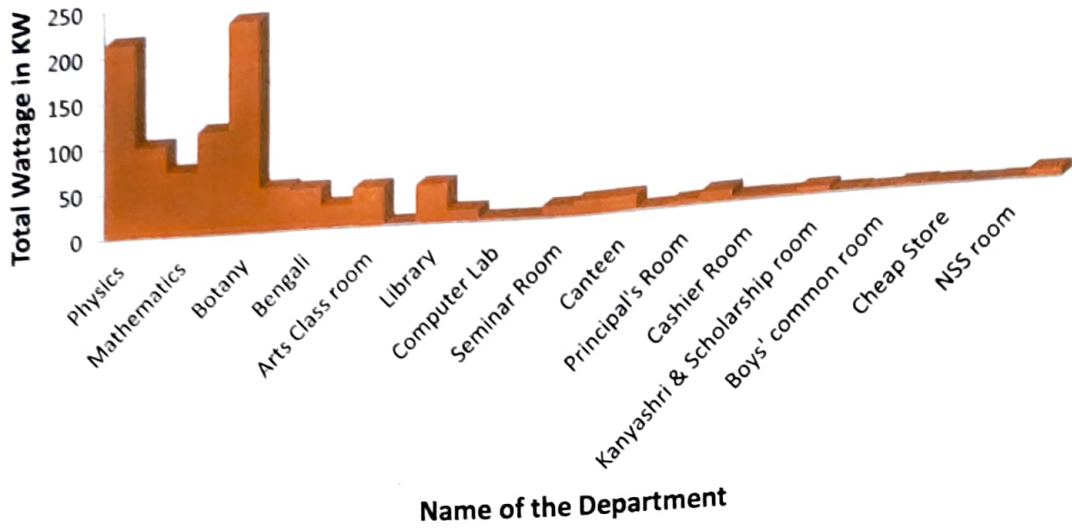
comprises with eight isolated Depts (Physics, Chemistry, Mathematics, Zoology, Botany, Geography, Economics & Bengali), Arts classrooms (for five Arts Depts: Sanskrit, Philosophy, History, English & Political Science), Staff room, Seminar room, Language room, Principal room, office, Cashier room, Library, Kayashree room, NSS room, ICC room, Cheap store, Student's Common rooms, PWD room, canteen, Union room, corridors, Toilet, Garden & Lawn. A solar panel setup of 10 KW has been installed in the roof-top of the main building in November, 2021 by West Bengal Pollution Control Board. Initially the solar panel was not connected in "ON GRID" mode through a recording meter and hence energy saving has not be recorded. But, later this solar panel has been connected in "ON GRID" mode (in the session 2022-23). The energy audit report team has collected all connected load and plug point load (room wise) and then calculated the maximum power requirement, maximum energy consumption in a month and so many energy consumption analysis (using bar diagram). The team also analyse the actual power consumption (month wise) and make a comparative study on monthly consumption. Device wise consumption and there comparative is also presented in bar diagram.

List of Energy Consuming Sources: - (Table Format) [Principal's Room, Principal's Office and Department wise)

Name of Dept/Section/ Room	Computer	Fan	Tube	Xerox/ Projector	Extra LED tube/ Ex-Fan/ CFL	AC	Fridge	Microwave Oven	Heater	16 Amp plug	6 Amp plug	Lab Instrument (Type-1)	Lab Instrument (Type-2)	Total Plug points Power in Watt	Total Power without plug Points in Watt	Total Watt
	No of Computer	No of Fan	No of Tube	No of Xerox/Proj	No of LED	No of AC	No of Fridge	No of oven	No of Heater	No of Plug	No of Plug	No of Instrument	No of Instrument			
Physics	31	77	119	4	14	6	2	0	0	160	274	3	0	176440	36558	212998
Chemistry	7	75	240	0	19	10	5	1	0	54	94	5	2	59640	40268	99908
Mathematics	20	21	35	0	0	4	0	0	0	52	135	0	0	60100	10870	70970
Zoology	13	40	63	3	29	12	6	0	0	69	88	4	1	74280	39000	113280
Botany	19	85	185	7	0	17	18	3	5	150	165	56	0	159900	70920	230820
Geography	13	34	53	7	9	2	0	0	0	28	90	0	0	33400	14431	47831
Bengali	6	55	93	2	4	9	0	0	0	16	68	0	0	20080	24410	44490
Economics	2	24	24	1	0	0	0	0	0	21	20	0	0	22200	3090	25290
Arts Class room	0	61	101	0	13	0	0	0	0	31	47	0	0	33820	8570	42390
Toilet	0	4	21	0	14	0	0	0	0	0	0	0	0	0	2620	2620
Library	7	41	126	1	7	3	0	0	0	22	68	0	0	26080	16587	42667
Language room	1	7	9	0	0	2	0	0	0	7	11	0	0	7660	5990	13650
Computer Lab	0	11	8	0	0	0	0	0	0	2	7	0	0	3510	2000	3510
Netaji Open University room	0	7	9	0	0	0	0	0	0	2	6	0	0	2360	850	3210
Seminar Room	0	12	28	0	0	5	0	0	0	3	7	0	0	3420	9348	12768
Staff room	1	10	12	0	0	4	0	0	0	6	8	0	0	6480	9690	16170
Canteen	0	10	10	0	2	0	0	0	0	15	5	0	0	15300	1300	16600
IQAC	1	4	4	0	0	2	0	0	0	0	0	0	0	0	2590	2590
Principal's Room	1	3	4	0	0	1	0	0	0	3	7	0	0	3420	2140	5560
Office	5	7	0	0	14	2	0	0	0	6	15	0	0	6900	5820	12720
Cashier Room	1	2	2	0	0	1	0	0	0	2	5	0	0	2300	1870	4170
ICC room	0	3	3	0	0	0	0	0	0	3	9	0	0	3540	330	3870
Kanyashri & Scholarship room	2	3	5	0	0	1	0	0	0	4	30	0	0	5800	1710	7510
Girls' common room	0	3	5	0	0	0	0	0	0	2	1	0	0	2060	410	2470
Boys' common room	0	4	8	0	0	0	0	0	0	0	4	0	0	240	600	840
Union Common room	1	4	5	0	4	2	0	0	0	0	5	0	0	300	3710	4010
Cheap Store	1	0	1	1	0	0	0	0	0	1	4	0	0	1240	1390	2630
PWD room	0	1	1	0	0	0	0	0	0	0	1	0	0	60	110	170
NSS room	1	1	2	0	0	0	0	0	0	1	5	0	0	1300	300	1600
Lawn & Ground	0	16	25	0	47	0	0	0	0	4	7	0	0	4420	4870	9290
Grand Total	133	625	1201	26	176	83	31	4	5	664	1186	68	3	736250	322352	1056602

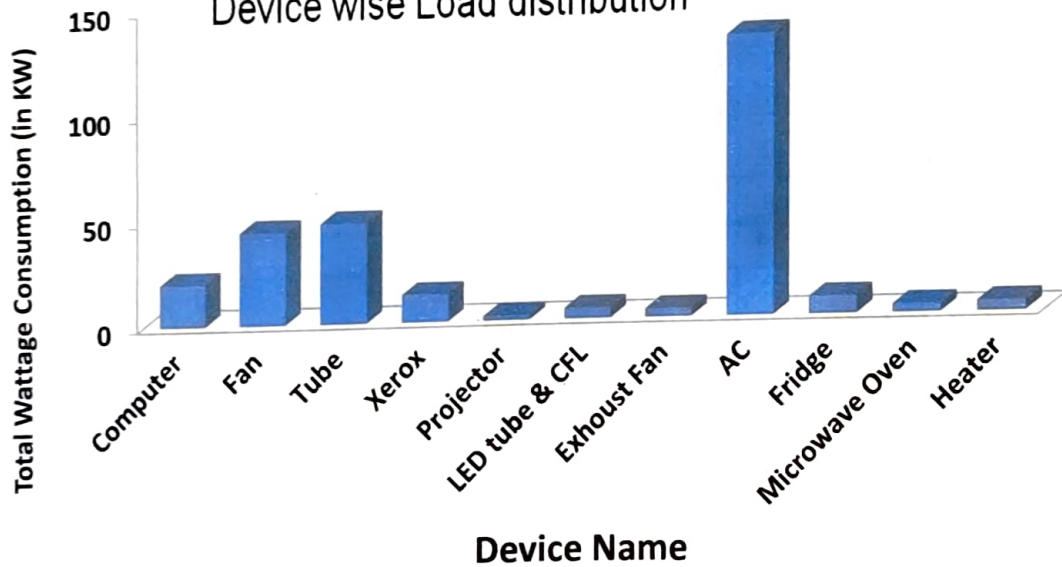
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Department wise Load distribution



Bar diagram for Department/Section wise load distribution

Device wise Load distribution



Bar diagram for Device specific power consumption

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Calculation of Electrical Load & Consumption: - (Table Format) [Equipment Item wise]

Sl. No.	Name of the Equipment	Total No. of Equipment	Wattage	Total Wattage	Demand Factor	Max. Demand	Remarks
1	Computer	133	150-200	20220	0.8	16176	
2	Fan	625	70-100	44280	0.85	37638	
3	Tube	1201	36-40	47836	0.85	40660.6	
4	Xerox	11	1200	13200	0.85	11220	
5	Projector	15	150	2250	0.8	1800	
6	LED tube & CFL	149	20-40	5136	0.85	4365.6	
7	Exhaust fan	27	70 - 300	4050	0.85	3442.5	
8	AC	83	1000-2000	131450	1	131450	
9	Fridge	31	8020	8320	0.85	7072	
10	Microwave Oven	4	1000	4000	0.85	3400	
11	Heater	5	1000	5000	0.85	4250	
12	Lab Instrument	71	200 - 2000	35700	0.85	30345	
13	16 Amp Plug	664	1000	664000	0.25	166000	
14	6 Amp Plug	1186	60	71160	0.5	35580	

Total Wattage = 493400 KWH

Sum of individual maximum demand in KW = 493.4 KWH

Simultaneous maximum demand (50% of Total Demand) = 246.7 KWH

Maximum Energy consumption one hour per day (kwh) = 247 KWH

Maximum Energy consumption five hour per day (kwh) = 1233 KWH

Maximum Energy consumption for one year (taking 240 working days) = 296040 KWH

Maximum Energy consumption for rest 125 days (taking 5% of normal consumption) = 7709 KWH

Maximum Energy consumption for one Year = 303749 KWH

Maximum Energy consumption (average) for one month = 25312 KWH

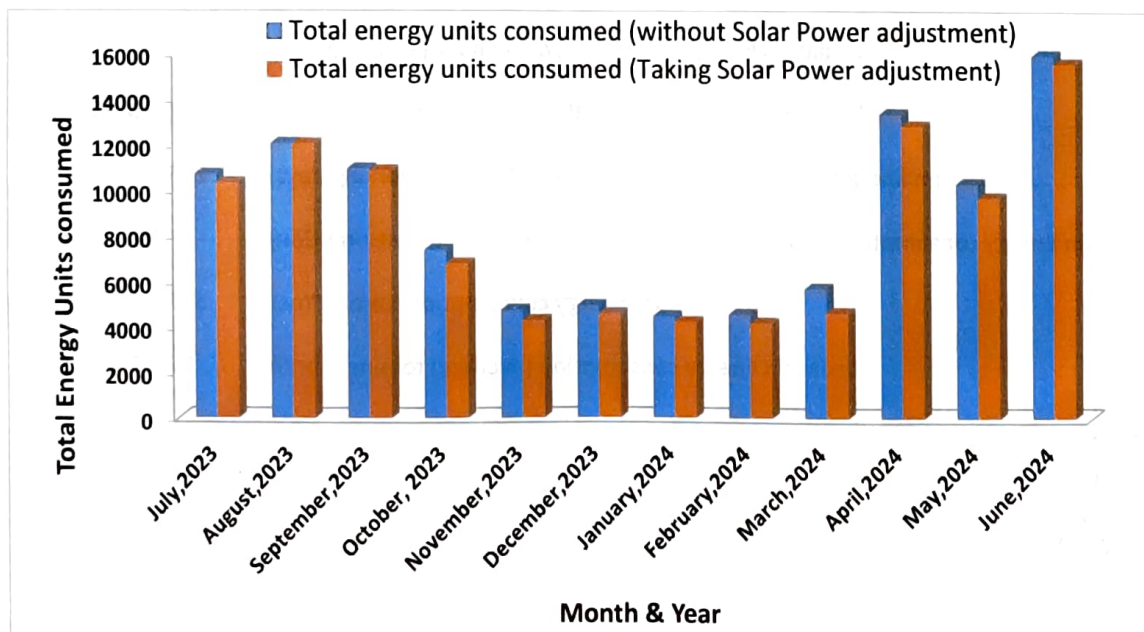
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Consumption of Energy in the Period July, 2023 till June, 2024: - (Table Format)

Month and Year	Energy units (KWH) consumed (Cust. Id 950039105 Installation no. 20937801)	Energy units (KWH) consumed (Cust. Id 950027217 Installation no. 19165902)	Solar energy adjustment (units)	Total energy units consumed	Remarks
July,2023	8854	2195.5	365	10684.5	Solar Panel was installed in 2017 but the meter for "ON Grid" power return back to the source has been installed in January, 2023, but billing amount has been reduced immediate after installation of the Solar panel.
August,2023	9736	2315	12	12039	
September,2023	9056	1964.5	86	10934.5	
October, 2023	6180	1789	593	7376	
November,2023	3790	1415.5	462	4743.5	
December,2023	3928	1341.5	349	4920.5	
January,2024	3552	1151	244	4459	
February,2024	3649	1275.5	374	4550.5	
March,2024	4973	1779.5	1062	5690.5	
April,2024	10045	3827	524.5	13347.5	
May,2024	8530.5	2387.5	617	10301	
June,2024	11042.5	5227	344.5	15925	

Yearly Total (off grid)	104971.5 KWH
Yearly Total (on grid)	99938.5 KWH
Monthly Average (off grid)	8748.0 KWH
Monthly Average (on grid)	8328.0 KWH
Monthly Savings (for on grid)	419.0 KWH

Bar Chart showing the relative consumption in the different months for the Period – July,23 to June,24



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Comparative of monthly energy consumption in the Academic Year 2023-24

Observations: - (Point Wise)



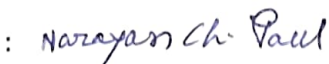

- a) Filament bulbs are completely replaced by LED bulbs and Tubes which save the power consumption.
- b) In the 2023-24 period, consumption has seen a slight increase compared to the previous year, as the prior year's consumption was limited due to the adjustments made in the "new normal" following the Covid-19 pandemic.
- c) Solar power reduces the monthly billing units though reduced data is not recorded due to lack of "ON GRID" meter connection
- d) Most of the energy consumption done by AC.
- e) Most of the plug points uses for low wattage devices.
- f) The Dept of Botany uses maximum energy out of total consumption of the college.

Conclusions:


During data collection for energy audit we find the actual load distribution among different Dept/Section inside the college campus. The load carrying capacity of the connecting wire for different Dept/Section must be chosen as per load distribution of that section and load distribution data helps us for this particular precautionary measurement. Energy audit must help to reduce the energy consumption as well as saving the electric power consumption billing amount. This study may prevent the accidental event caused by overload or short-circuit.


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Signature of Energy audit team

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The Energy audit report is certified by


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