

Energy Audit Report (July' 2021 – June' 2022)

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. 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 Mr. Pintu Caudhuri (PWD staff) under the guidance of Principal, Barasat Govt College for completion of energy audit report. The college buildings comprises with eight isolated

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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 rooftop 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.

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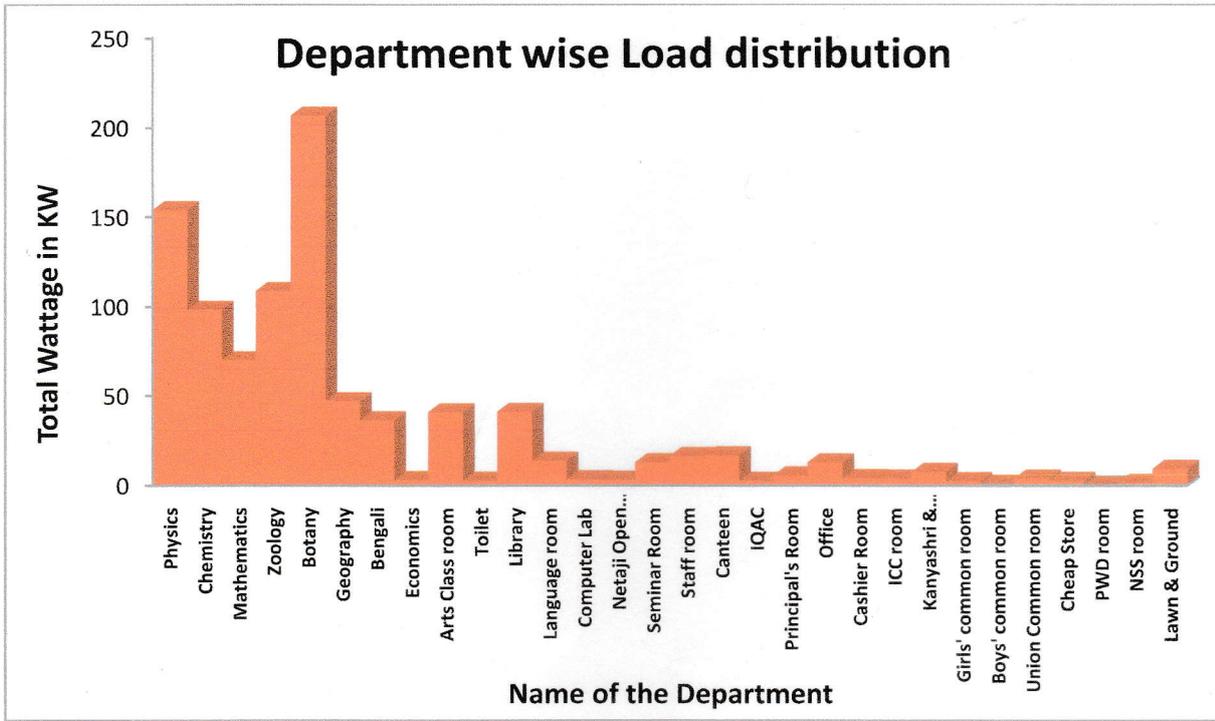


List of Energy Consuming Sources: - (Table Format) [Principal's Room, Principal's Office and Department wise)

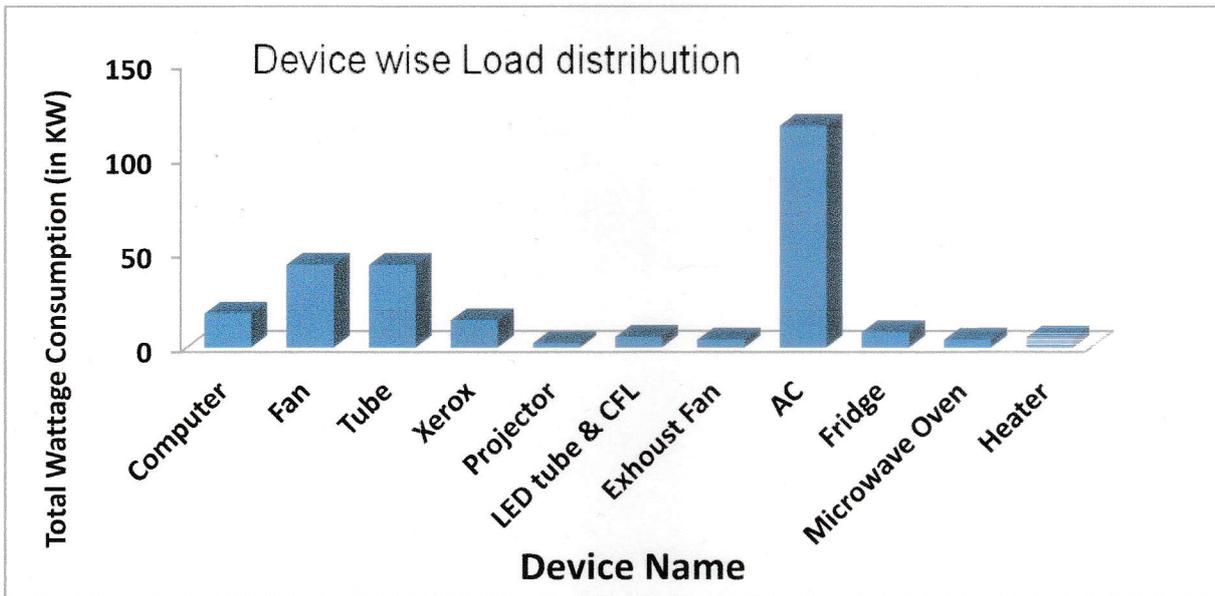
Name of Dept/Section/ Room	Computer	Fan	Tube	Xerox/ Projector	Extra LED tube/ Ex-Fan/ CFL	AC	Fridge	Microwave Oven	Heater	16 Amp plug	6 Amp plug	Lab Instrument (Type-1)	Lab Instrument (Type-2)	Total Plug points Power in Watt	Total Power without plug Points in Watt	Total Watt
	No of Computer	No of Fan	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	98	336	3	0	118160	33598	151758
Chemistry	7	75	240	0	19	10	5	1	0	54	94	5	2	59640	38610	98250
Mathematics	9	21	35	0	0	4	0	0	0	52	135	0	0	60100	9770	69870
Zoology	12	40	63	3	29	9	6	0	0	69	88	4	1	74280	34350	108630
Botany	16	78	167	8	0	17	18	3	5	128	134	56	0	136040	70460	206500
Geography	9	34	53	7	9	2	0	0	0	28	87	0	0	33220	13751	46971
Bengali	6	55	77	2	4	4	0	0	0	16	68	0	0	20080	16270	36350
Economics	2	24	24	1	0	0	0	0	0	0	0	0	0	0	3090	3090
Arts Class room	0	61	101	0	13	0	0	0	0	29	47	0	0	31820	8570	40390
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	14615	40695
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	390	1630
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	114	618	1167	27	176	75	31	4	5	557	1194	68	3	629730	302732	930462

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Bar diagram for Department/Section 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	114	150-200	17920	0.8	14336	
2	Fan	618	70-100	43790	0.85	37221.5	
3	Tube	1167	36-40	43764	0.85	37199.4	
4	Xerox	12	1200	14400	0.85	12240	
5	Projector	15	150	2250	0.8	1800	
6	LED tube & CFL	144	9 - 22	5478	0.85	4656.3	
7	Exhaust fan	27	70 - 300	4050	0.85	3442.5	
8	AC	75	1000-2000	117450	1	117450	
9	Fridge	31	8020	8020	0.85	6817	
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	557	1000	557000	0.25	139250	
14	6 Amp Plug	1194	60	71640	0.5	35820	

Total Wattage = 448228 KW

Sum of individual maximum demand in KW = 448.228 KW

Simultaneous maximum demand (50% of Total Demand) = 224.114 KW

Maximum Energy consumption one hour per day (kwh) = 224 BOT unit

Maximum Energy consumption five hour per day (kwh) = 1121 BOT unit

Maximum Energy consumption for one year (taking 240 working days) = 268937 BOT unit

Maximum Energy consumption for rest 125 days (taking 5% of normal consumption) = 7004 BOT unit

Maximum Energy consumption for one Year = 275940 BOT unit

Maximum Energy consumption (average) for one month = 22995 BOT unit

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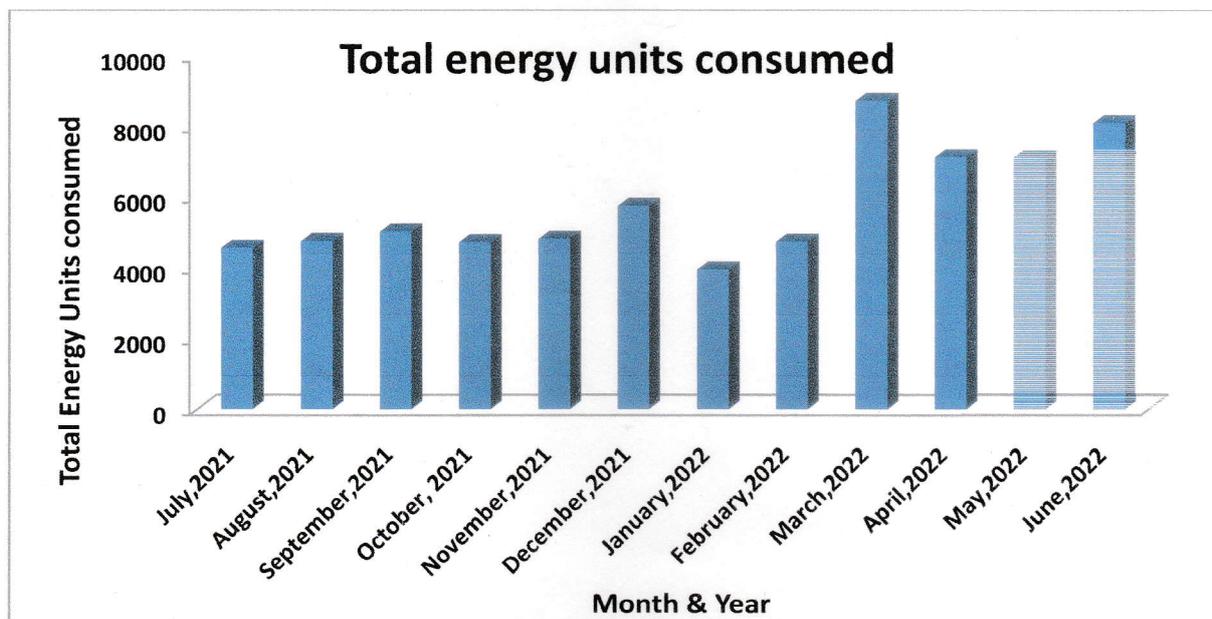


Consumption of Energy in the Period July, 2021 till June, 2022: - (Table Format)

Month and Year	Energy units consumed (Cust. Id 950039105 Installation no. 20937801)	Energy units consumed (Cust. Id 950027217 Installation no. 19165902)	Solar energy adjustment (units)	Total energy units consumed	Remarks
July,2021	3345	1219		4564	Solar Panel was installed in Nov,2021 but the meter for "ON Grid" connection has been installed in January, 2023, hence the power savings amount has not been recorded in the academic session: 2021-22. But billing amount has been reduced immediate after installation of the Solar panel.
August,2021	3698	1055		4753	
September,2021	3966	1055		5021	
October, 2021	3244	1470		4714	
November,2021	3998	805		4803	
December,2021	4530	1201		5731	
January,2022	2931	1012		3943	
February,2022	3833	893		4726	
March,2022	7074	1636		8710	
April,2022	5736	1375		7111	
May,2022	5737	1376		7113	
June,2022	6233	1859		8092	

Yearly Total	69281 Unit
Monthly Average	5773 Unit

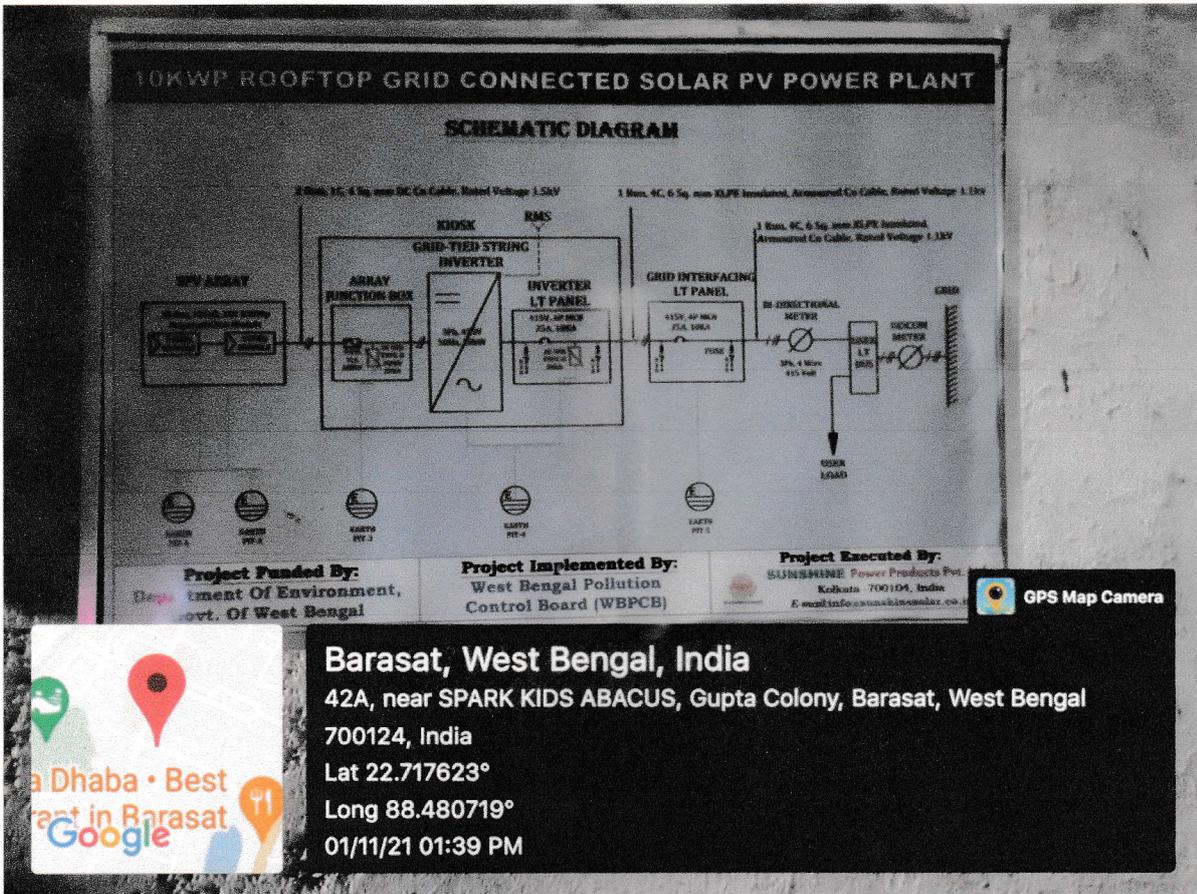
Bar Chart showing the relative consumption in the different months for the Period – July,21 to June,22



Comparative of monthly energy consumption in the Academic Year 2021-22

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Schematic Diagram of Solar power connection



Solar panel in the roof-top of main building implemented by West Bengal Pollution Control Board

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Observations: - (Point Wise)

- a) Filament bulbs are completely replaced by LED bulbs and Tubes which save the power consumption.
- b) Solar power reduces the monthly billing units though reduced data is not recorded due to lack of "ON GRID" meter connection
- c) Most of the energy consumption done by AC.
- d) Most of the plug points uses for low wattage devices.
- e) The Dept of Botany uses maximum energy out of total consumption of the college.

Conclusions:

During data collection for energy audit, we got to know 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 billing amount. This study may prevent the accidental event caused due to overload or short-circuit.



Signature of Energy audit team

Name	Signature
1) Dr. Madhusudan Ghosh, Associate Professor of Physics	: <i>Madhusudan Ghosh</i>
2) Dr. Abhijit De, Associate Professor of Physics	: <i>Abhijit De</i>
3) Shri Narayan Ch, Paul, Lab Bearer, Dept of Physics	: <i>Narayan Ch Paul</i>
4) Shri Pintu Chowdhury, Staff, PWD	: <i>Pintu Chowdhury</i>

The Energy audit report is certified by

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Countersigned by
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Principal
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