

# **ENERGY AUDIT REPORT (July'22 - June'23)**

## **TAKI GOVERNMENT COLLEGE**

TAKI, HASNABAD,  
NORTH 24 PARGANAS -743429

### **Introduction**

Energy is one of the major inputs for economic development and hence the energy sector receives critical importance in the long-sighted view of ever-increasing energy needs, particularly in higher education institutions. Energy-saving certainly reduces the burden on energy resources and the economy and also saves money with energy-efficient appliances. It requires optimum use of energy by minimizing wastage and avoiding loss or excess use without compromising the actual need. An energy audit is an effective tool to manage energy more systematically. It regulates the amount of energy consumption associated with a building and the probable investments linked with that energy consumption. The audit makes aware of saving energy and encouraging renewable energy techniques and technologies in general, besides the use of energy-efficient materials in particular. It also acts as a tool to estimate and analyse energy consumption and its pattern. It identifies all the energy streams in a system and quantifies the use of energy according to its discrete functions. The audit inspects energy losses and wastage through an energy survey and provides provisions to elucidate Energy Conservation Opportunities. The audit benefits the college to reduce their billing cost and implementing best possible and cost-effective energy saving measures. Established in 1950, Taki Government college is a premium higher education institute situated beside the river 'Ichamati' in North 24 Parganas, West Bengal under the Higher Education Department of Government of West Bengal. It is affiliated to the West Bengal State University. The college provides graduation and post-graduation degree in various subjects. The college is a NAAC accredited institute.

### **Objectives**

- Generation of energy consumption profile of the campus
- Identification of major energy resources of the campus
- Identification of sustainable energy avenues existing in the campus

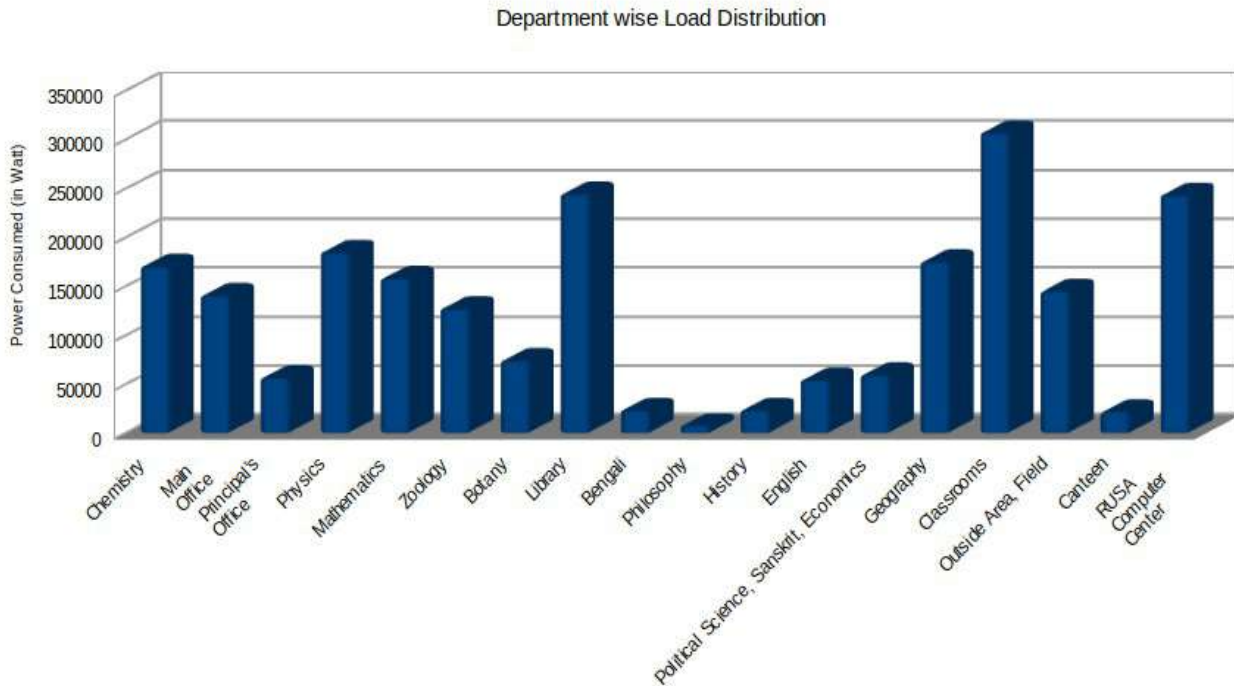
### **Methodology**

The Taki Government College has taken the initiative for preparing the energy audit report in the academic year 2022-23 to get an estimate of the energy consumed and to find out ways to reduce the energy consumption for future use. A team has been formed comprising with Dr. Debasish Das (Assistant Professor of Zoology), Dr. Rama Prasad Adak (Assistant Professor of Physics) under the guidance of Officer-In-Charge of Taki Government College for preparing an report on consumption of energy. The college buildings comprises with one main building where departments of Chemistry, Physics, Mathematics, Zoology, Botany, Bengali, English, Economics, Philosophy, History, Political Sciences, Sanskrit, are there. This building has many classrooms, RUSA computer rooms, library, Staff room, Seminar room, Principal room, office, Cashier room, Cheap store, Student's Common rooms, Sick room, canteen, Union room, corridors, Toilet, Garden and Lawn. There are other buildings of this college, mainly Geography Department building, New Build Principal Quarters. 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. 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.

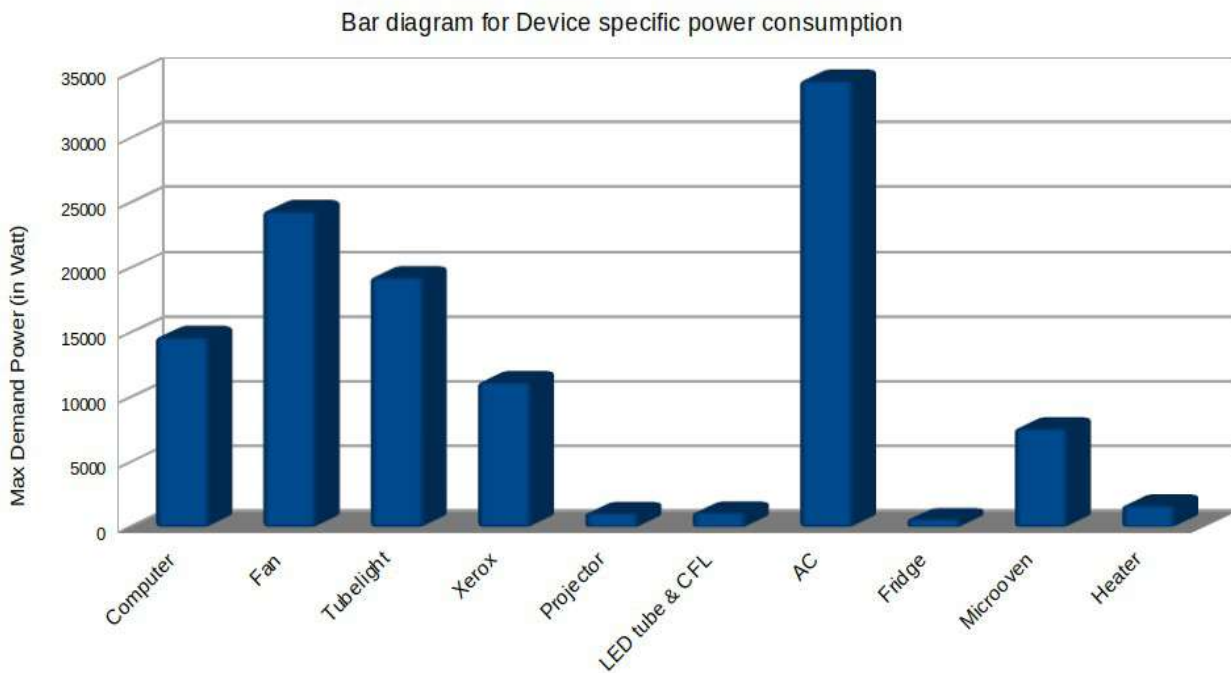
**List of Energy Consuming Sources: - (Table Format) (Principal's Room, Principal's Office and Department wise)**

	Chemistry	Main Office	Principal's Office	Physics	Mathematics	Zoology	Botany	Library	Bengali	Philosophy	History	English	Political Science, Sanskrit, Economics	Geography	Classrooms	Outside Area, Field	Canteen	RUSA Computer Center	Grand Total	Average Power Consumption Per item In Watt	Total Power Consumption	
TV			2	1												2			1	7	250	1750
Computer	2	12	3	10	14	2	2	6	2	1	3	2	3	16				24	102	200	20400	
Laptop	2			1						1	1									5	70	350
Speakers		4														12		1	17	20	340	
Scanner				1															1	1	15	15
Projector						2	1			1						3		1	8	200	1600	
Water purifier													1	1			2		4	60	240	
Printer		7	3	5	3	1	2		2	1	2	1	3		1			2	32	375	12000	
Xerox/Big printers		4	1					1	1			1							3	11	1200	13200
Inverter Set	1		2						1	1									1	6	30	180
LED lamps			10	2	3	1		25	3				3		4	4	2		57	9	513	
CFL lamp(9W/15W)			12										26					18	56	10	560	
Pump (0.5,1.0 HP)	1														2		2		5	746	3730	
Tube light	63	43	10	33	18	56	26	94	8	2	4	10	24	201			6		598	20	11960	
Ceiling Fan	38	15	6	24	6	15	14	50	4	1	2	11	18	125			4	5	338	80	27040	
Mike Set		1			1											8		1	11	2400	26400	
Stand Fan	1			1	1								1	2					7	80	560	
CCTV		5	1					7						3	2				18	7	126	
AC		3	2	2	3	1	1	3	2			1	3					2	23	1500	34500	
Wifi modem			4	1							1								6	15	90	
6 A plug	31	31	12	36	40	19	20	50	3	3	6	11	16	46	85	12	6	55	482	1000	482000	
16 A plug	26	14	6	24	15	21	6	32	3	2	7	4	17	21	4	2	28	232	60	13920		
Generator(100 KVA)																	1		1	0	0	
MH light/Halogen 100W,60W																	11		11	100	1100	
Heavy duty fan											11							1	12	80	960	
Glow sign Board				1	1	1	1	1		1	1								7	80	560	
Electric Bell		1																	1	5	5	
Induction, Heater								1							1				2	1000	2000	
Micro-Oven	1		1	1		2	1												6	1200	7200	
Refrigerator				1		2	2						1					1	7	350	2450	
Pump Submersible																	1		1	373	373	
Laboratory Instrument LT				20		1	13								1				35	20	700	
Laboratory Instrument HT	4			36		4	6												50	100	5000	
<b>Total Plug Point Power In Watt</b>	132440	90200	36960	132000	105600	99000	47520	178640	14520	3960	14960	39160	35200	120560	186120	29920	14960	171160	1452880		671822	
<b>Total Power without</b>	39856	50745	21002	52973	52752	28864	27690	66054	9067	3845	8665	15295	24492	54813	121030	15361	7008	72310	671822			
<b>Total Power</b>	172296	140945	57962	184973	158352	127864	75210	244694	23587	7805	23625	54455	59692	175373	307150	45281	21968	243470	2124702			

## Bar diagram of Department wise Load Distribution:



## Bar diagram of Device specific Power Consumption:



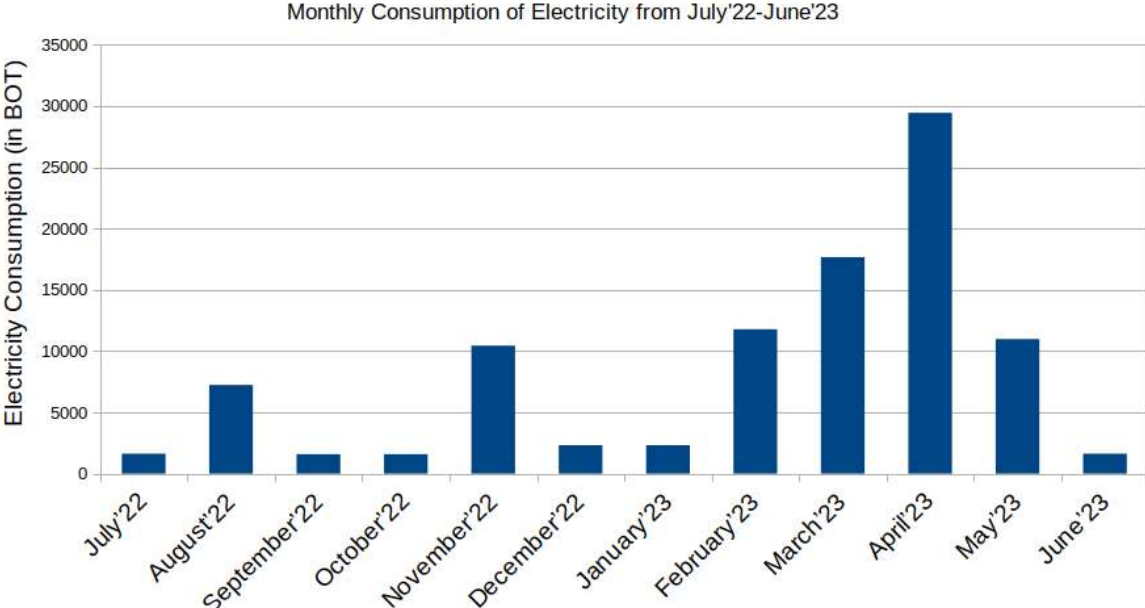
**Calculation of electric load and consumption : (Table format, item wise)**

Sl No	Name of the item	Total no of Equipments	Wattage	Total Wattage	Demand Factor	Max Demand	Remarks	
1	Computer	105	150-200	18375	0.8	14700		
2	Fan	338	70-100	28730	0.85	24420.5		
3	Tubelight	598	36-40	22724	0.85	19315.4		
4	Xerox	11	1200	13200	0.85	11220		
5	Projector	8	150-200	1400	0.8	1120		
6	LED tube & CFL	113	9-18	1356	0.85	1152.6		
7	AC	23	1000-2000	34500	1	34500		
8	Fridge	7	80-150	770	0.85	654.5		
9	Microoven	6	1000-2000	9000	0.85	7650		
10	Heater	2	1000	2000	0.85	1700		
11	Laboratory Instrument	84	200-1500	71400	0.85	60690		
12	16 A Plug	232	1000	232000	0.25	58000		
13	6 A plug	482	60	28920	0.5	14460		
					Total Wattage	249583	Watt	
		Sum of individual maximum demand in KW					249.583	KW
		Simultaneous maximum demand (50% of Total Demand)					124.791	KW
			Maximum Energy consumption one hour per day (kwh)			124	BOT unit	
			Maximum Energy consumption five hour per day (kwh)			624	BOT unit	
			Maximum Energy consumption for one year (taking 240 working days)			149750	BOT unit	
			Maximum Energy consumption for rest 125 days (taking 5% of normal consumption)			3900	BOT unit	
			Maximum Energy consumption for one Year			153650	BOT unit	
			Maximum Energy consumption (average) for one month			12804	BOT unit	

**Consumption of Electricity in the period from July'22 to June'23 : (table format)**

<b>Consumption of electricity (in BOT) from July'22-June'23</b>														
Sl No.	Consumer ID	Jul '22	Aug '22	Sep '22	Oct '22	Nov '22	Dec '22	Jan '23	Feb '23	Mar '23	Apr '23	May '23	Jun '23	Solar Energy Adjusted
1	150648729	242	2833	619	619	4507	1001	1002	372	558	930	1696	242	
2	150648730	1285	2836	619	619	4663	1036	1036	11143	16715	27858	8996	1285	6901
3	150648732	31	96	21	21	182	41	41	28	41	69	216	31	
4	150648734	0	153	33	33	387	86	86	0	0	0	0	0	573
5	150648755	29	267	58	58	514	114	114	62	93	155	29	29	
6	150648759	6	0	0	0	0	0	0	5	8	13	6	6	
7	150648760	0	0	0	0	0	0	0	0	0	0	0	0	
8	150648763	18	0	0	0	0	0	0	101	151	252	18	18	
9	150648764	5	0	0	0	0	0	0	0	0	0	5	5	
10	156048767	0	978	214	214	109	24	24	53	79	132	0	0	
11	150648768	8	67	15	15	75	17	17	11	17	28	8	8	
12	150648769	0	0	0	0	0	0	0	0	0	0	0	0	
	<b>Total unit</b>	<b>1624</b>	<b>7230</b>	<b>1579</b>	<b>1579</b>	<b>10437</b>	<b>2319</b>	<b>2320</b>	<b>11775</b>	<b>17662</b>	<b>29437</b>	<b>10974</b>	<b>1624</b>	<b>7474</b>
										Yearly Total (Off Grid)			106034	Unit
										Yearly Total (On Grid)			98560	Unit
										Monthly Avg (Off Grid)			8836	Unit
										Monthly Avg (On Grid)			8213	Unit
										Monthly Savings (for On Grid)			623	Unit

**Bar Diagram of Electricity consumption in different months from July'22-June'23**



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

Three rows of Solar panels were installed by the West Bengal Pollution Control Board on the roof top of the college. The total power generated by the solar panel is 10 kW. The current generated from the solar energy is fed to the main grid.

### **Photograph of the Solar Panels installed on the roof top**

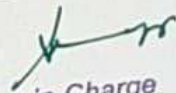


**Observations: -(Point Wise)**

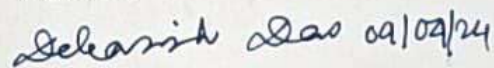
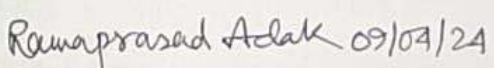
- a) Filament bulbs are completely replaced by LED bulbs and Tubes which save the power consumption.
- b) Solar power reduces the monthly billing units though reduced data is not recorded due to lack of "ON GRID" meter connection
- c) Most of the energy consumption done by AC.
- d) Most of the plug points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

**Conclusions:**

During data collection for energy audit we find the actual load distribution among different Department/Section inside the college campus. The load carrying capacity of the connecting wire for different Department/Section must be chosen as per load distribution of that section and load distribution data helps us for this particular precautionary measurement. Energy audit report 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.

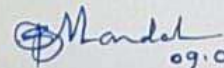
  
Officer-in-Charge  
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Signature of Energy audit team

Name	Signature
1. Dr. Debasish Das, Assistant Professor, Department of Zoology	 Debasish Das 09/09/24
2. Dr. Rama Prasad Adak, Assistant Professor Department of Physics	 Rama Prasad Adak 09/09/24

The Energy Audit report is certified by -

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Assistant Engineer  
Basirhat Electrical Sub-Division  
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