Energy Audit Report-2023

PARIMAL MITRA SMRITI MAHAVIDYALAYA

ADDRESS: NEAR SOONGACHI T.G, P.O: MAL, DIST: JALPAIGURI, PIN: 735221

Content

1. Energy Audit Assessment Auditor:

Sl. No.	Name	Designation	Affiliation
1.	Dr. Arunava Bhadra	Director, High Energy & Cosmic Ray Department	University of North Bengal

2. Definition and Meaning:

An **e**nergy audit is a systematic review of the energy consuming installations in a facility to ensure that the energy is being used sensibly and efficiently. It is conducted to ensure that the energy saving practices are implemented in Educational Institutions in a sustainable way. It commences with the collection and analysis of all information that may affect the energy consumption of the facility, then follows with reviewing and analyzing the condition and performance of various installations and facility management, with an aim at identifying areas of inefficiency and suggesting means for improvement.

3. Introduction:

Parimal Mitra Smriti Mahavidyalaya has been established with the aim of achieving the educational aspirations of Dooars region, in many ways cut off from the mainstreams of learning. The college has been a torchbearer of higher education in the district of Jalpaiguri since 1985. For three decades and eight years, the college has been a pioneer in the field of learning enhancement, welcoming those who value and cherish education. The institution is committed to the cause of empowerment of native people of Dooars composed of number of tribes like the Bodo, Rava, Mech, Toto etc., who are socially and economically deprived through access to higher education. The College has always attempted to support and sustain the vision of Swami Vivekananda “Educate and Raise the Masses, and thus alone a Nation is Possible”.

The growth of economy and advancement of life style increases the demand of energy day by day and it becomes challenging to accomplish the demand with limited natural resources. As per Energy conservation Act, 2001 Energy Audit isdefined as “The verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for

improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption". With the view of saving our environment and less used natural non-renewable resources, PMSM has taken this matter sincerely and increased the usage of renewable resources, low energy consumed equipments as well as awareness among students, teachers and other members of the institution on energy alternatives.

4. General Outlook of the Institute:

Infrastructural details of the Institute:

Location	Malbazar, Jalpaiguri, 735221
Establishment Year	1985
Campus Size	13.69 acre
Affiliation	North Bengal University
Approval	UGC
Department	16
Faculties	45
Mode of Education	English, Bengali, Hindi and Nepali
Official Website	http://www.pmsm.org.in
Email Id	pmsm1985@gmail.com
Helpline No.	+91-3562-255-212

5. Members of Energy Audit Committee 2023-2024:

- Chairman : Dr. Kartick Ch. Dey, Principal PMS College
- Convenor : Ms. Rumi Paul Chowdhury, Assistant Professor, PMS College
- Member : Dr. Souraditya Chakraborty, Assistant Professor, PMS College
  Ms. Maitri Saha, Teaching Faculty, PMS College
  Mr Koushik Sengupta, Electrician PMS College
  Mr Siban Ekka, Generator/Pump Operator PMS College

6. Objective of the Study:

The objective of this study is to assess overall efficiency of the various systems and pacific energy consumption of the public building and make recommendations about potential energy saving opportunities, based on the observation of energy audit.

- ❖ Electrical Structural Details
- ❖ Use and Occupancy of the Building
- ❖ Energy Supply Features
- ❖ Details of Systems/ Equipments/ Appliances etc.
- ❖ Quality of Power

7. Methodology:

Detail energy audit consists of evaluation of the present trend of energy consumption. Energy audit activities, in general, include.

1. Parimal Mitra Smriti Mahavidyalaya, Mal, Jalpaiguri was requested to provide the electricity bills.
2. At incomer panel, locating all energy sources coming into a facility.
3. Identification of energy streams.
4. Quantification of energy streams into discreate functions (systems/ equipment/ appliances etc.)

5. Identification of energy and cost savings opportunities.
6. Establish measurement and verification protocol i.e., objective measurement through meters by identifying measurement points.
7. Required data collection, field measurements and analysis of data etc.

The deliverables are a report consisting of following:

a. Performance of major energy consuming equipment
b. Energy saving measures recommendations
c. The financial conclusion for the investment involved and the return on investment.

Evaluate the use and occupancy of the building and the condition of the building and building system equipment.

8. Room Wise Electronicals Equipment:

Sl No.	Location	Fixures	Quantity	Watt	Total Load in Watt
1	Science Gr. FL A	Fan	8	75	600
		Exhaust Fan	2	72	144
		Tube light	16	20	320
2	Departmental Room	Surface Light	2	10	20
		Wall light	2	10	20
		Fan	2	75	150
	Varandah	Spot Light	16	10	160
		Water Pump	1	1500	1500

	Toilet 2 Bathroom (Both Side)	Exhaust Fan	2	72	144
		Spot Light	3	10	30
		Wall light	4	10	40
		Mirror Light	1	10	10
	Chemistry Lab	Fan	8	75	600
		Exhaust Fan	2	72	144
		Tube Light	16	20	320
	Departmental Room	Surface Light	2	10	20
		Wall Light	2	10	20
		Fan	2	75	150
	Botany Class Room	Fan	8	75	600
		Exhaust Fan	2	72	144
		Tube Light	16	20	320
	Botany Lab	Hot Air Oven	1	1500	1500
		Incubator	1	1500	1500
		Vertical Autoclave	1	1500	1500
		Water Bath	2	1500	3000

		Distilled Water Plant	1	1000	1000
		Warming Table	1	1000	1000
		Magnetic Stirrer	1	500	500
		Melting Point	2	500	1000
		Laminar Air Flow	1	550	550
		Colorimeter	1	50	50
		Surface Light	2	10	20
		Wall Light	2	10	20
		Surface Light	2	10	20
	1st Fl. Varandah	Spot Light	16	10	160
	Landing	Spot light	1	10	10
	Toilet 2 Bathroom	Exhaust Fan	2	72	144
	(Both Side)	Spot Light	3	10	30
		Wall Light	4	10	40
		Mirror Light	1	10	10
	Zoology Class Room 2 Lab	Exhaust Fan	2	72	144

		Fan	8	75	600
		Tube Light	16	20	320
	Departmental Room	Surface Light	2	10	20
		Wall light	2	10	20
		Fan	2	75	150
	Smart Class	Exhaust Fan	2	72	144
		Fan	8	75	600
		Tube Light	16	20	320
		Projector	1	350	350
		Sound System	1	100	100
	Departmental Room	Surface light	2	10	20
		Wall Light	2	10	20
		Fan	2	75	150
	Geography Class Room	Exhaust Fan	2	72	144
		Fan	8	75	600
		Tube Light	16	20	320

	Geography Lab	Tracing Table	3	20	60
	Departmental Room	Surface Light	2	10	20
		Wall Light	2	10	20
		Fan	1	75	75
	Varandah (2nd Fl)	Spot Light	16	10	160
	Landing	Spot Light	1	10	10
	Toilet 2 Bathroom	Exhaust Fan	2	72	144
	(Both Side)	Spot Light	3	10	30
		Wall Light	4	10	40
		Mirror Light	1	10	10
	Sc. 3rd Fl- A	Exhaust Fan	2	72	144
		Fan	8	75	600
		Tube Light	20	20	400
	Departmental Room	Fan	2	75	144
		Wall Light	2	10	20
	Sc. 3rd Fl-B	Exhaust	2	72	144

		Fan			
		Fan	8	75	600
		Tube Light	20	20	400
	Departmental Room	Fan	2	75	150
		Wall Light	2	10	20
	3rd Fl				
	Varandah	Tube Light	13	20	260
	Landing	Spot Light	1	10	10
	Toilet 2 Bathroom	Exhaust Fan	2	72	144
	(Both side)	Spot Light	4	10	40
		Mirror Light	1	10	10
	Hall	Fan	21	75	1575
		Tube Light	20	20	400
	R/No. 314	Fan	2	75	150
		Tube Light	2	20	40
	R/No. 313	Fan	5	75	375

		Tube Light	4	20	80
	R/No. 312	Fan	5	75	375
		Tube Light	5	20	100
	R/No. 311	Fan	5	75	375
		Tube Light	5	20	100
	R/No. 310	Fan	5	75	375
		Tube Light	5	20	100
	R/No. 309	Fan	5	75	375
		Tube Light	5	20	100
	R/No. 308	Tube Light	2	20	40
	R/No. 307	Fan	4	75	300
		Tube Light	4	20	80
	R/No. 306	Fan	5	75	375
		Tube Light	4	20	80
	R/No. 305	Fan	5	75	375

		Tube Light	4	20	80
	R/No. 304	Fan	5	75	375
		Tube Light	2	20	40
	R/No. 303	Fan	4	75	300
		Tube Light	2	20	40
	R/No. 302	Fan	7	75	525
		Tube Light	6	20	120
	2nd Fl Varandah	Tube Light	4	20	80
	GCR	Fan	10	75	750
		Tube Light	10	20	200
		LED Halogen Light	2	100	200
		Projector	1	350	350
	TC Room	Water Purifier	1	60	60
	TC Room	Fan	10	75	750
		Tube Light	8	20	160
		Refrigerator	1	250	250

		TV	1	100	100
	Toilet 2 Bathroom	LED Bulb	8	10	80
	R/No. 206 (NCC)	Fan	2	75	150
		Tube Light	2	20	40
		Computer	1	200	200
	R/No. 205	Fan	7	75	525
		Tube Light	4	20	80
	R/No. 204	Fan	7	75	525
		Tube Light	5	20	100
	R/No. 110	Fan	4	75	300
		Tube Light	5	20	100
	R/No. 109	Fan	4	75	300
		Tube Light	6	20	120
	R/No. 108	Fan	5	75	375
		Tube Light	2	20	40

	R/No. 107	Fan	7	75	525
		Tube Light	6	20	120
	R/No. 103	Fan	4	75	300
		Tube Light	3	20	60
	R/No. 101	Fan	5	75	375
		Tube Light	7	20	140
		Projector	1	350	350
		Computer	1	200	200
	Library	Fan	7	75	525
		Tube Light	6	20	120
		Computer	1	200	200
		Xerox Machine	1	1500	1500
	Librarian Room	Fan	2	75	150
		Tube Light	3	20	60
		CFL	1	15	15
		Computer	2	200	400
		Printer	1	100	100

	Reading Room	Fan	6	75	450
		Tube Light	8	20	160
		Computer	2	200	400
		Printer	1	100	100
		Xerox Machine	1	1000	1000
	Media Lab	Fan	2	75	150
		Tube Light	6	20	120
		Exhaust Fan	2	72	144
	Kitchen	Tube Light	1	20	20
		Micro oven	1	800	800
		Induction oven	1	1900	1900
	Canteen	Tube Light	6	20	120
		Wall Hanging Fan	6	80	480
		Exhaust Fan	1	72	72

	Student's Union Room	Fan	6	75	450
		Tube Light	4	20	80
	Student's NCC Room	Fan	3	75	225
		Tube Light	2	20	40
		LED Bulb	1	15	15
	B1	Fan	8	75	600
		Tube Light	5	20	100
	B2	Fan	9	75	675
		Tube Light	9	20	180
	Staircase	Tube Light	2	20	40
	BCR	Fan	6	75	450
		Tube Light	3	20	60
	Bathroom	Tube Light	1	20	20
	Behind BCR	Water Pump	1	2 HP 15000	1500

	Office	Fan	4	75	300
		Tube Light	10	20	200
		Wall Hanging Fan	7	80	560
		Spot Light	9	40	360
		Computer	8	200	800
		Printer	6	100	600
		Xerox Machine	1	1500	1500
	Principle Desk	Spot Light	18	10	180
		Small Spot Light	6	5	30
		Air Conditioner	1	1800	1800
		Computer	1	200	200
		Printer	1	100	100
		T.V.	2	100	200
		Room Heater	1	2000	2000
		Pedestal Fan	1	70	70
	R/No. 106	Fan	2	75	150

		Tube Light	2	20	40
		CFL Bulb	1	40	40
1st FL	Meeting Room	Tube Light	2	20	40
		LED Bulb	2	10	20
2nd Fl	IQAC Room	Tube Light	2	20	40
		LED Bulb	1	10	10
		Computer	1	200	200
		Printer	1	100	100
		Pedestal Fan	1	70	70
3rd Fl		LED Bulb	2	10	20
		Tube Light	2	20	40
	Main Building	Water Pump	1	1500	1500
	Ground Floor	Water Purifier	2	850	1700

9. Details of Approximate Load Distribution at PMS College Campus, Malbazar

Year: 2021-22

Location	*Fan*	*Exhaust Fan*	*Tube light (Fluorescent)*	*Tube light (LED)*	*Surface light*	*Wall light*	*Spot light*	*Spot light small*	*Water pump*	*Mirror light*	*Projector*	*sound system*	*Led Halogen light*	*Computer*	*Xerox machine*	*CFL*	*Wall hanging Fan*	*LED bulb*	*Printer*	*AC*	*Room heater*	*Pedestal fan*	*TV*	*Water purifier*
Science Gr. FL A	8	2	10	6																				
Departmental Room	2				2	2																		
Veranda							16																	
Toilet 2 Bathroom (Both Side)		2				4	3			1														
Chemistry Lab	8	2	10	6																				
Departmental Room	2				2	2																		
Botany Class Room	8	2	10	6																				
Botany Lab and Departmental room	4	1	10		6																			
1st Fl. Veranda							16																	
Landing							1																	

Toilet 2 Bathroom (Both Side)		2				4	3			1														
Zoology Class Room 2	8	2	10	6																				
Zoo Lab and Departmental Room	4	1	10		6																			
Smart Class	8	2	10	6							1	1												
Departmental Room	2				2	2																		
Geography Class Room	8	2	10	6																				
Geography Lab	4	1	10		6																			
Veranda (2nd Fl)							16																	
Landing							1									1								
Toilet 2 Bathroom (Both Side)		2				4	3			1														
Sc. 3rd Fl- A	8	2	15	5																				
Departmental Room	2					2																		
Sc. 3rd Fl-B	8	2	15	5																				
Departmental Room	2					2																		
3rd Fl Veranda			13																					

Landing							1																	
Toilet 2 Bathroom (Both Side)		2				4	3			1						1								
Hall	21		20																					
R/No. 314	2		2																					
R/No. 313	5		4																					
R/No. 312	5		5																					
R/No. 311	5		5																					
R/No. 310	5		5																					
R/No. 309	5		5																					
R/No. 308			2																					
R/No. 307	4		4																					
R/No. 306	5		4																					
R/No. 305	5		4																					
R/No. 304	5		2																					
R/No. 303	4		2																					
R/No. 302	7		6																					
2nd Fl Veranda				4																				

GCR	10			10							1	1	2											
TC Room	10			8																				
Toilet 2 Bathroom																1		4						
R/No. 206 (NCC)	2		2											1										
R/No. 205	7		4																					
R/No. 204	7		5																					
R/No. 110	4		5																					
R/No. 109	4		6																					
R/No. 108	5		2																					
R/No. 107	7		6																					
R/No. 103	4		3																					
R/No. 101	5		7								1			1										
Library	7			6										1	1	1								
Librarian Room	2			3										1		2		1	1					
Reading Room	6			8										2	1				1					
Media Lab	2	2		6																				
Kitchen				1												1								

Canteen		1		6												2	6							
Student's Union Room	6			4												1								
Student's NCC Room	3			2												1		1						
B1	8			5																				
B2	9			9																				
Staircase				2																				
BCR	6			3																				
Bathroom				1												1								
Office	4			10			9							8	1		7		6					
Principal's Desk							18	6						1					1	1	1	1	1	
R/No. 106	2		2															1						
Meeting Room	2													2										
IQAC Room	2													1				1	1			1		
Main Building									1															
Ground Floor																								2
TOTAL	288	30	245	134	24	26	90	6	1	4	3	2	2	18	3	12	13	8	10	1	1	2	1	2
	216	21	98	26	24	26	90	30	15	40	10	20	20	36	45	27	10	12	10	18	20	14	10	17

	00	60	00	80	0	0	0		00		50	0	0	00	00	6	40	0	00	00	00	0	0	00
PER DAY CONSUMPTION in Watt*	172800	17280	78400	21440	1920	2080	7200	240	6000	320	4200	800	800	28800	13500	2208	8320	960	4000	14400	160000	1120	800	3400
Per day consumption in KW	172.8	17.28	78.4	21.44	1.92	2.08	7.2	0.24	6	0.32	4.2	0.8	0.8	28.8	13.5	2.208	8.32	0.96	4	14.4	16	1.12	0.8	3.4
Per month consumption in KW**	4147.2	414.72	1881.6	514.56	46.08	49.92	172.8	5.76	144	7.68	100.8	19.2	19.2	691.2	324	52.992	199.68	23.04	96	345.6	384	26.88	19.2	81.6
Consumption in Summer (150 days) (in KW)***	25920	2592	11760	3216	288	312	1080	36	900	48	630	120	120	4320	2025	331.2	1248	144	600	2160	0	168	120	510
Consumption in Winter (120 days) (in KW)******	**0**	**2073.6**	**9408**	**2572.8**	**230.4**	**249.6**	**864**	**28.8**	**720**	**38.4**	**504**	**96**	**96**	**3456**	**1620**	**264.96**	**0**	**115.2**	**480**	**0**	**1920**	**0**	**96**	**408**
TOTAL (in KW)	**25920**	**4665.6**	**21168**	**5788.8**	**518.4**	**561.6**	**1944**	**64.8**	**1620**	**86.4**	**1134**	**216**	**216**	**7776**	**3645**	**596.16**	**1248**	**259.2**	**1080**	**2160**	**1920**	**168**	**216**	**918**

**** Assuming 8 working hrs/day for all electronic items, except: projector (4 working hrs/day), Xerox machine (4 working hrs/day), printer (4 working hrs/day), water purifier (2 working hrs/day), water pump (4 working hrs/day), LED halogen bulb (4 working hrs/day)***

***** Assuming average working days to be 24 days/month***

****** Summer months (April- October): approximate working days: 150 days***

*****Winter months (November- March): approximate working days: 120 days***

10. Yearly Load Calculation and Estimated Expenditure for the year 2021-22

Load calculation of year 2022-2023	Unit in Kwh.	Total Cost in Rs.
Total load consumption (Kwh) in summer season	58648.2	645130.2
Total load consumption (Kwh) in Winter season	25241.76	277659.4
Total load consumption (Kwh) of 1 year	83889.96	922789.6

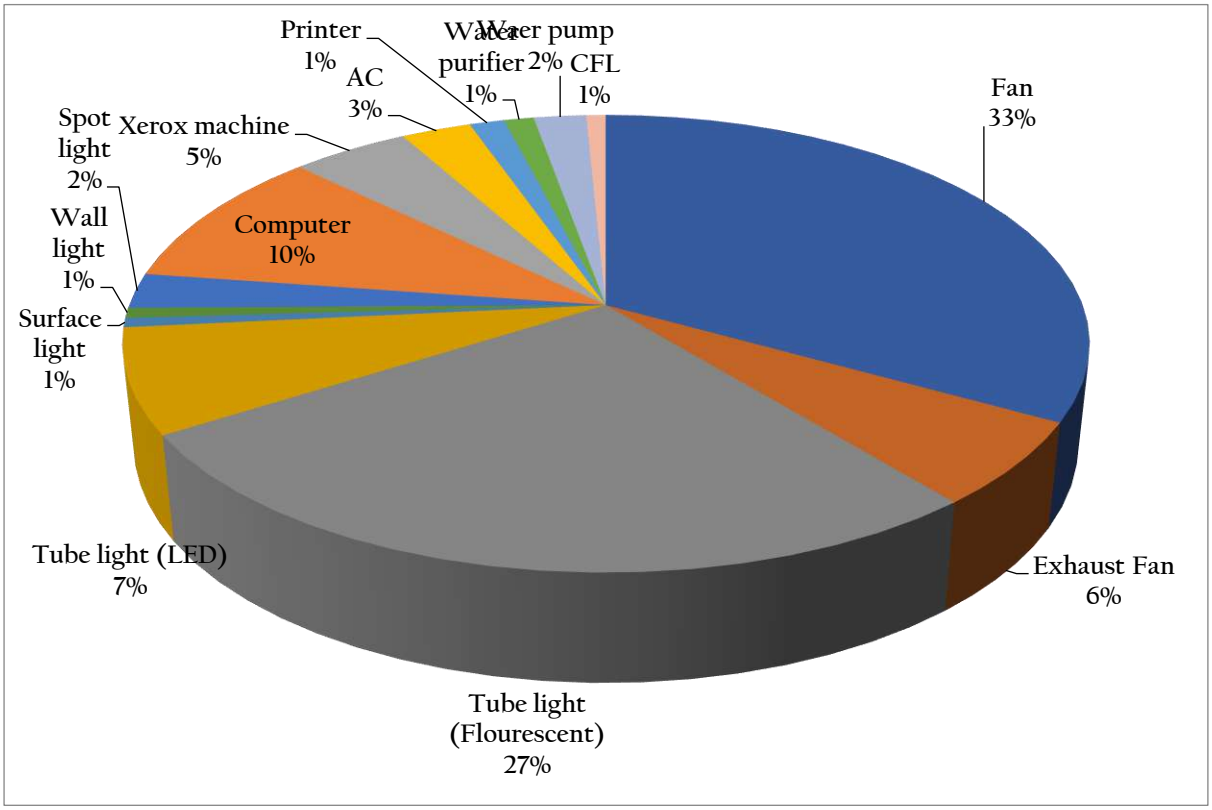


Fig., Pictorial representation of electricity consumption distribution by major appliances and equipment for the year 2021-22

The electricity consumption data for PMS College Campus, Malbazar for the year 2021-22 highlights the distribution and usage patterns of various appliances and equipment across different locations within the campus. The campus's total yearly electricity usage was 83,889.96 kW, costing Rs. 922,789.6. Daily consumption was highest for fans (172.8 kW), followed by fluorescent tube lights (78.4 kW) and computers (28.8 kW). Seasonal variation showed higher usage in summer (58,648.2 kW) due to fan operation, while winter usage was lower (25,241.76 kW) due to non-usage of fans and increased heater use. Notably, switching to more LED lights and optimizing the usage of high-consumption devices like computers and ACs could significantly reduce energy costs.

Details of Approximate Load Distribution at PMS College Campus, Malbazar

Year: 2022-23

Location	*Fan*	*Exhaust Fan*	*Tube light*	*Surface light*	*Wall light*	*Spot light*	*Spot light small*	*Water pump*	*Mirror light*	*Projector*	*sound system*	*Led Halogen light*	*Computer*	*Xerox machine*	*CFL*	*Wall hanging Fan*	*LED bulb*	*Printer*	*AC*	*Room heater*	*Pedestal fan*	*TV*	*Water purifier*
Science Gr. FL A	8	2	16																				
Departmental Room	2			2	2																		
Veranda						16																	
Toilet 2 Bathroom (Both Side)		2			4	3			1														
Chemistry Lab	8	2	16																				
Departmental Room	2			2	2																		
Botany Class Room	8	2	16																				
Botany Lab and Departmental room	4	1	10	6																			
1st Fl. Veranda						16																	
Landing						1																	

Toilet 2 Bathroom (Both Side)		2			4	3			1														
Zoology Class Room 2	8	2	16																				
Zoo Lab and Departmental Room	4	1	10	6																			
Smart Class	8	2	16							1	1												
Departmental Room	2			2	2																		
Geography Class Room	8	2	16																				
Geography Lab	4	1	10	6																			
Veranda (2nd Fl)						16																	
Landing						1																	
Toilet 2 Bathroom (Both Side)		2			4	3			1														
Sc. 3rd Fl- A	8	2	20																				
Departmental Room	2				2																		
Sc. 3rd Fl-B	8	2	20																				
Departmental Room	2				2																		
3rd Fl Veranda			13																				
Landing						1																	

Toilet 2 Bathroom (Both Side)		2			4	3			1														
Hall	21		20																				
R/No. 314	2		2																				
R/No. 313	5		4																				
R/No. 312	5		5																				
R/No. 311	5		5																				
R/No. 310	5		5																				
R/No. 309	5		5																				
R/No. 308			2																				
R/No. 307	4		4																				
R/No. 306	5		4																				
R/No. 305	5		4																				
R/No. 304	5		2																				
R/No. 303	4		2																				
R/No. 302	7		6																				
2nd Fl Veranda			4																				
GCR	10		10							1	1	2											

TC Room	10		8																				
Toilet 2 Bathroom																4							
R/No. 206 (NCC)	2		2									1											
R/No. 205	7		4																				
R/No. 204	7		5																				
R/No. 110	4		5																				
R/No. 109	4		6																				
R/No. 108	5		2																				
R/No. 107	7		6																				
R/No. 103	4		3																				
R/No. 101	5		7							1			1										
Library	7		6										1	1									
Librarian Room	2		3										1				1	1					
Reading Room	6		8										2	1				1					
Media Lab	2	2	6																				
Kitchen			1																				
Canteen		1	6													6							
Student’s Union Room	6		4																				

Student's NCC Room	3		2													1							
B1	8		5																				
B2	9		9																				
Staircase			2																				
BCR	6		3																				
Bathroom			1																				
Office	4		10			9						8	1		7		6						
Principal's Desk						18	6					1					1	1	1	1	1		
R/No. 106	2		2													1							
Meeting Room	2											2											
IQAC Room	2											1				1	1			1			
Main Building								1															
Ground Floor																							2
TOTAL	288	30	379	24	26	90	6	1	4	3	2	2	18	3	0	13	8	10	1	1	2	1	2
	21600	2160	7580	240	260	900	30	1500	40	1050	200	200	3600	4500		1040	120	1000	1800	2000	140	100	1700
PER DAY CONSUMPTION in Watt*	172800	17280	60640	1920	2080	7200	240	6000	320	4200	800	800	28800	13500	0	8320	960	4000	14400	16000	1120	800	3400

Per day consumption in KW	172.8	17.28	60.64	1.92	2.08	7.2	0.24	6	0.32	4.2	0.8	0.8	28.8	13.5	0	8.32	0.96	4	14.4	16	1.12	0.8	3.4
Per month consumption in KW**	4147.2	414.72	1455.36	46.08	49.92	172.8	5.76	144	7.68	100.8	19.2	19.2	691.2	324	0	199.68	23.04	96	345.6	384	26.88	19.2	81.6
Consumption in Summer (150 days) (in KW)***	25920	2592	9096	288	312	1080	36	900	48	630	120	120	4320	2025	0	1248	144	600	2160	0	168	120	510
Consumption in Winter (120 days) (in KW)****	**0**	**2073.6**	**7276.8**	**230.4**	**249.6**	**864**	**28.8**	**720**	**38.4**	**504**	**96**	**96**	**3456**	**1620**	**0**	**0**	**115.2**	**480**	**0**	**1920**	**0**	**96**	**408**
TOTAL (in KW)	**25920**	**4665.6**	**16372.8**	**518.4**	**561.6**	**1944**	**64.8**	**1620**	**86.4**	**1134**	**216**	**216**	**7776**	**3645**	**0**	**1248**	**259.2**	**1080**	**2160**	**1920**	**168**	**216**	**918**

** Assuming 8 working hrs/day for all electronic items, except: projector (4 working hrs/day), Xerox machine (4 working hrs/day), printer (4 working hrs/day), water purifier (2 working hrs/day), water pump (4 working hrs/day), LED halogen bulb (4 working hrs/day)*

*** Assuming average working days to be 24 days/month*

**** Summer months (April- October): approximate working days: 150 days*

*****Winter months (November- March): approximate working days: 120 days*

Yearly Load Calculation and Estimated Expenditure for the Year 2022-23

Load calculation of year 2022-2023	**Unit in Kwh.**	**Total Cost in Rs.**
Total load consumption (Kwh) in summer season	52437	576807
Total load consumption (Kwh) in Winter season	20272.8	223000.8
Total load consumption (Kwh) of 1 year	72709.8	799807.8

Categories	**Unit in Kwh.**	**Total Cost in Rs.**
Approximate consumed load supplied through solar energy (non –conventional source)*	58167.84	Nil
Approximate consumed load supplied through conventional power supply**	14541.96	159962

*assuming 80% is supplied through solar energy plant running at college campus

**assuming 20% is supplied through conventional electricity (provided by WBSEDCL)

The electricity consumption data for PMS College Campus, Malbazar for the year 2022-23 highlights the distribution and usage patterns of various appliances and equipment across different locations within the campus. Usage of fans dominates the load distribution with 288 units consuming approximately 25,920 kW annually,

followed by tube lights with 379 units using around 16,373 kW. Spotlights, wall lights, and surface lights are also notable contributors to the electricity consumption in the campus (Fig., 1). Seasonal variation affects the consumption, with higher usage in summer (April to October) amounting to 54,018 kW due to cooling devices like fans and air conditioners. In contrast, winter consumption (November to March) is lower at 36,736.8 kW, with reduced use of cooling devices. Overall, the total annual electricity consumption amounts to approximately 101,123.8 kW. The data indicates the need for more adoption of energy-efficient practices and potential upgrades to reduce electric consumption.

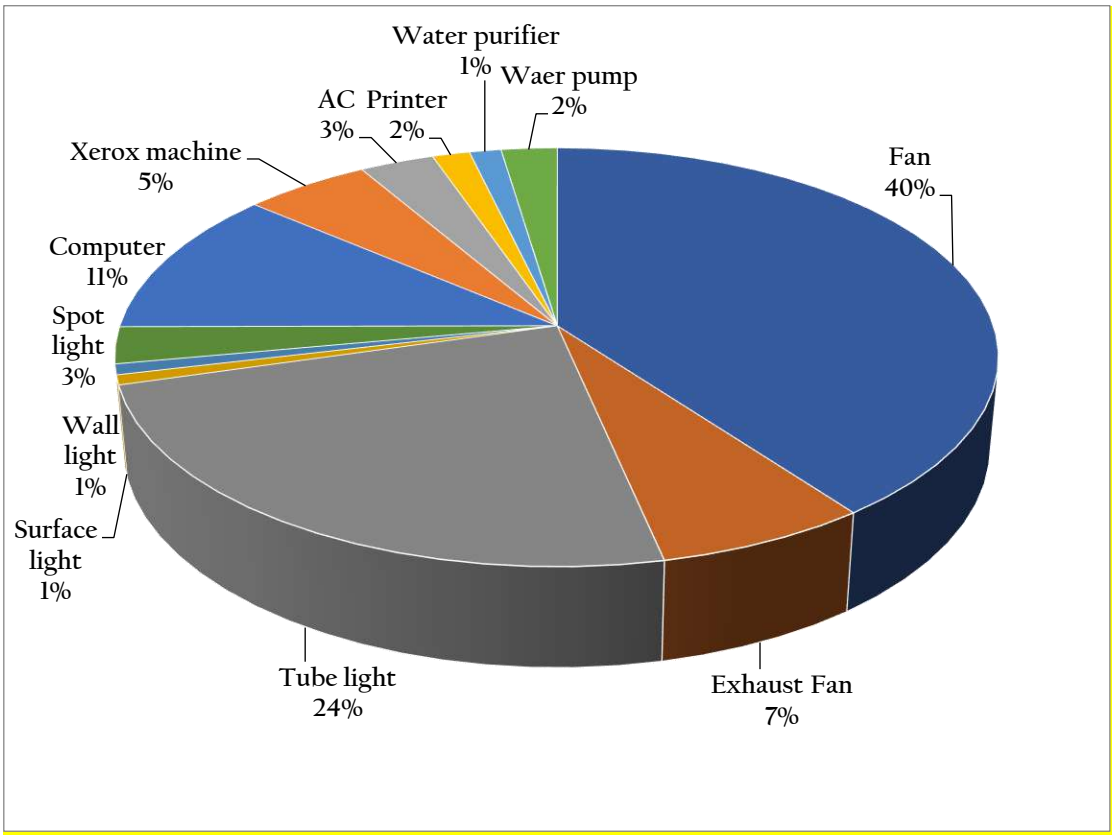


Fig.,1. Pictorial representation of electricity consumption distribution by major appliances and equipment for the year 2022-23

The data illustrates a successful integration of solar energy, significantly reducing overall energy costs. By covering 80% of the total energy demand through solar power, the organization is able to keep costs minimal, relying on conventional power

supply only for the remaining 20% of the demand, which is efficiently managed. This approach highlights the economic and environmental efficiencies of renewable energy usage, highlighting cost reduction, financial profitability, and a positive return on investment from the initial solar infrastructure setup.

11. Comparative Analysis of Energy Consumption and Energy Cost (between 2021-22 and 2022-23)

The comparison of energy consumption between 2021-22 and 2022-23 at Parimal Mitra Smriti Mahavidyalaya reflects a significant reduction in total energy usage. In 2022-23, the total load consumption decreased to 72,709.8 kWh, marking a decrease of 11,180.16 kWh compared to the 83,889.96 kWh consumed in 2021-22. This reduction represents a substantial decrease of approximately 13.34% in total energy consumption from 2021-22 to 2022-23. This notable decline in energy consumption suggests improved energy efficiency and effective energy management strategies, including usage of energy efficient electrical equipment during the period.

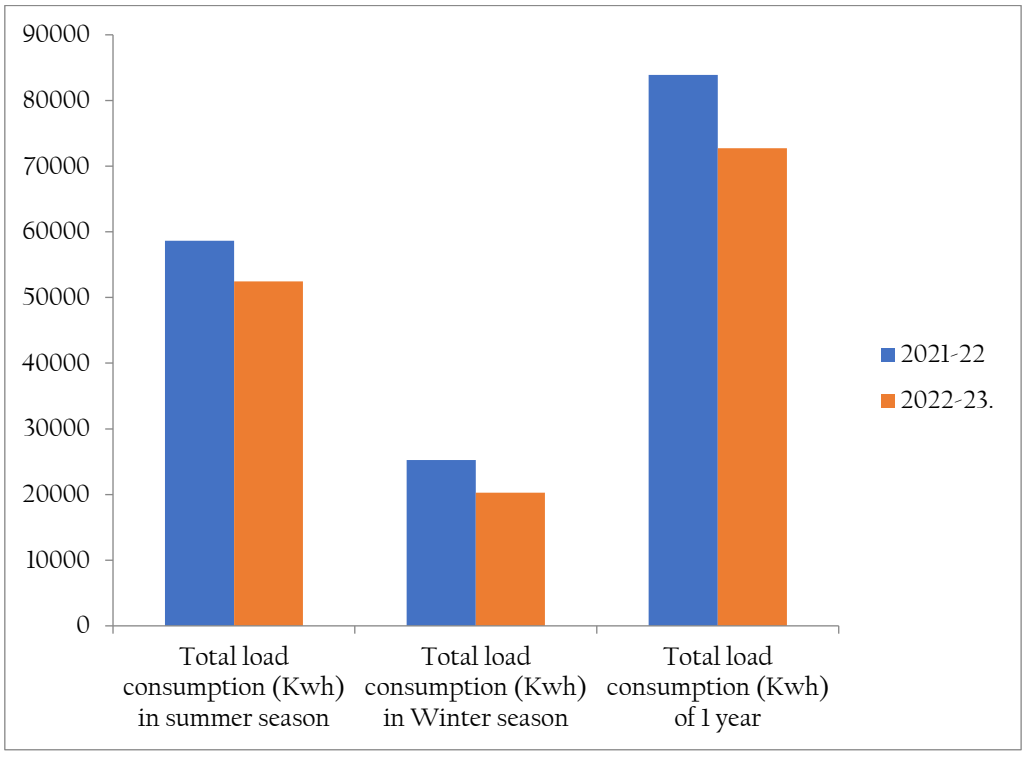


Fig.1. Comparison of unit consumption between 2021-22 and 2022-23

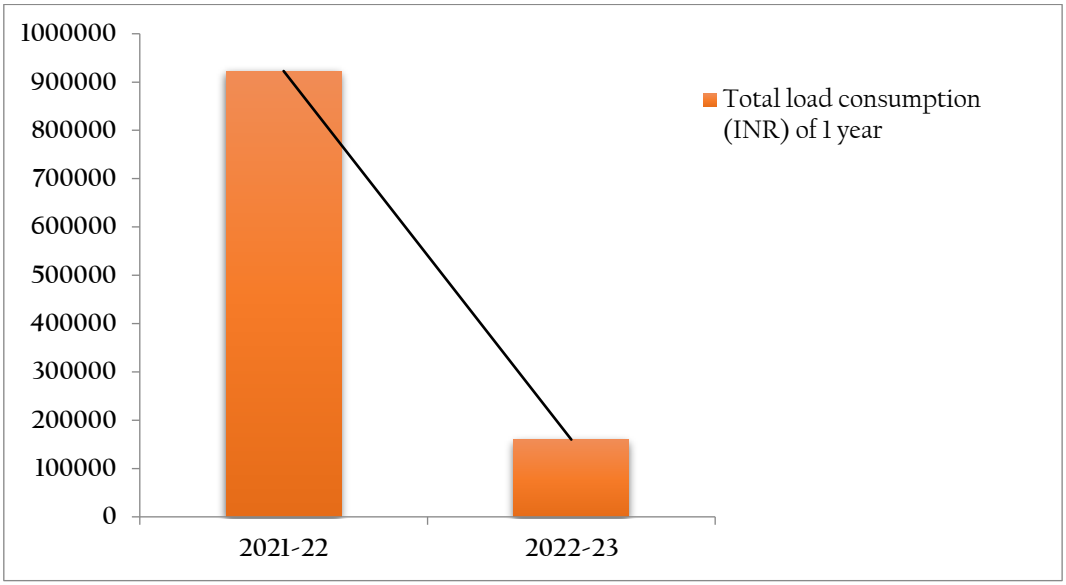


Fig.2. Comparison of energy consumption cost between 2021-22 and 2022-23

The analysis of the results reveals a notable shift in energy expenses due to the implementation of solar energy between 2021-22 and 2022-23. In 2022-23, the introduction of solar energy contributed to a substantial reduction in total energy costs, with a decrease of Rs.639, 845.8, representing a significant 69.38% reduction from the total energy costs incurred in 2021-22. This remarkable cost reduction can be attributed to the integration of solar energy, which covered 80% of the total energy demand at no cost. Furthermore, when comparing the total cost reduction from 2021-22 to 2022-23, which amounted to Rs.762,827.6, the cost reduction due to solar energy as well as usage of energy efficient equipment accounted for approximately 83.88% of the overall savings. This comprehensive analysis highlights the significant financial benefits of using renewable energy sources such as solar power, highlighting a substantial shift towards sustainability and also cost-efficiency in energy management strategies.

12. Conclusion:

The energy audit of Parimal Mitra Smriti Mahavidyalaya provided insightful data and actionable recommendations to enhance energy efficiency and sustainability within the institution. The comprehensive analysis covered various aspects of energy consumption, including lighting systems, electrical appliances, and overall energy infrastructure. The energy conservation initiatives, especially installation of in-campus solar energy plant, are extremely noteworthy and appreciable in context of sustainability. However, awareness creation among stake holders by putting up "switch off lights/fans when not is use" posters can be utilised for power savings. In addition, replacement of old appliances with energy-efficient alternatives, using LED lighting solutions, conducting regular energy conservation workshops and campaigns at the campus can prove to be instrumental in judicious electric usage. Implementing these recommendations will not only provide financial savings but also help the college in showing strong commitment to environmental sustainability and optimum energy management in future times.

13. Monitoring Committee for Judicious Power Consumption Practices:

- 'Switch off' drills in our institute.
- Cutting down in excessive power consumption, by running air conditioners at 25.5° C.
- Switching off the lights when not in use.
- Setting the printer default to duplex (double sided) printing, enabling to power saving mode.
- Using electronic media as mode to forward e-notes and announcements to students to conventional pen paper mode as an approach to save papers.

- A monitoring committee will help to reduce energy and provide advice relating to judicious use of energy.
- The main task of the advisory committee is to monitor the use of electrical appliances and to keep the switch off when it is not required.

14. Recommendations by the Auditor:

In November 2021, during the 26th session of the United Nations Framework Convention on Climate Change (COP 26), India announced its target of achieving net zero carbon emissions by 2070. One of the goals to reach this target is to increase energy efficiency across multiple sectors such as power generation, transportation, and industrial manufacturing. Each small step taken by organizations and individuals to reduce energy consumption and waste is crucial for achieving the energy efficiency goals of our country. In this regard, **Parimal Mitra Smriti Mahavidyalaya sets an example – the college's energy system highlights its use of clean solar energy, which meets 80% of the total energy demand without incurring any costs.**

The college receives electrical supplies from WBSEDCL. The sanctioned demand for the college is kW. There is three energy meters installed on the premises, along with two LT transformer. Additionally, the college operates a solar energy unit.

Existing energy efficiency policies include:

The college has an Energy Audit Committee which oversees initiatives for efficient energy management such as replacing all conventional FTL (46 Watt) lights with energy-efficient LED Tube Light fixtures (20 Watt).

Recommendations for further energy efficiency improvements:

- Continue replacing incandescent bulbs and fluorescent tube lights with energy-efficient LED bulbs in phases.
- Phase-wise replacement of conventional ceiling fans (80 Watt) with energy-efficient star-rated fans or BLDC-based fans (20 to 25 Watt).
- Install false ceilings in air-conditioned areas to reduce AC power load and energy consumption.
- Provide door closures for all air-conditioned rooms.
- Activate power management features on computers and monitors across the college.
- Install a master switch outside each classroom.
- Implement timer controls for street lighting within the college campus.
- Conduct awareness and training programs for faculty, students, and non-teaching staff.

Remark: The cost per unit of electric power is around Rs. 11, which is on the higher end. The college's peak demand (in kVA) appears to be substantially lower than the sanctioned load. It would be advisable to discuss with WBSEDCL whether the sanctioned load can be lowered. This adjustment may help reduce the fixed costs of the electricity bill.

ENERGY AUDIT CERTIFICATE

This is to certify that the ENERGY AUDIT of Parimal Mitra Smriti Mahavidyalaya was conducted today (20/06/2023) to assess the energy consumption in the institute and related issues in order to reduce energy consumption. Some recommendations have been made to reduce energy consumption and shift towards clean energy.

Kartick Ch. Dey 20.06.2023
.....

(Signature)

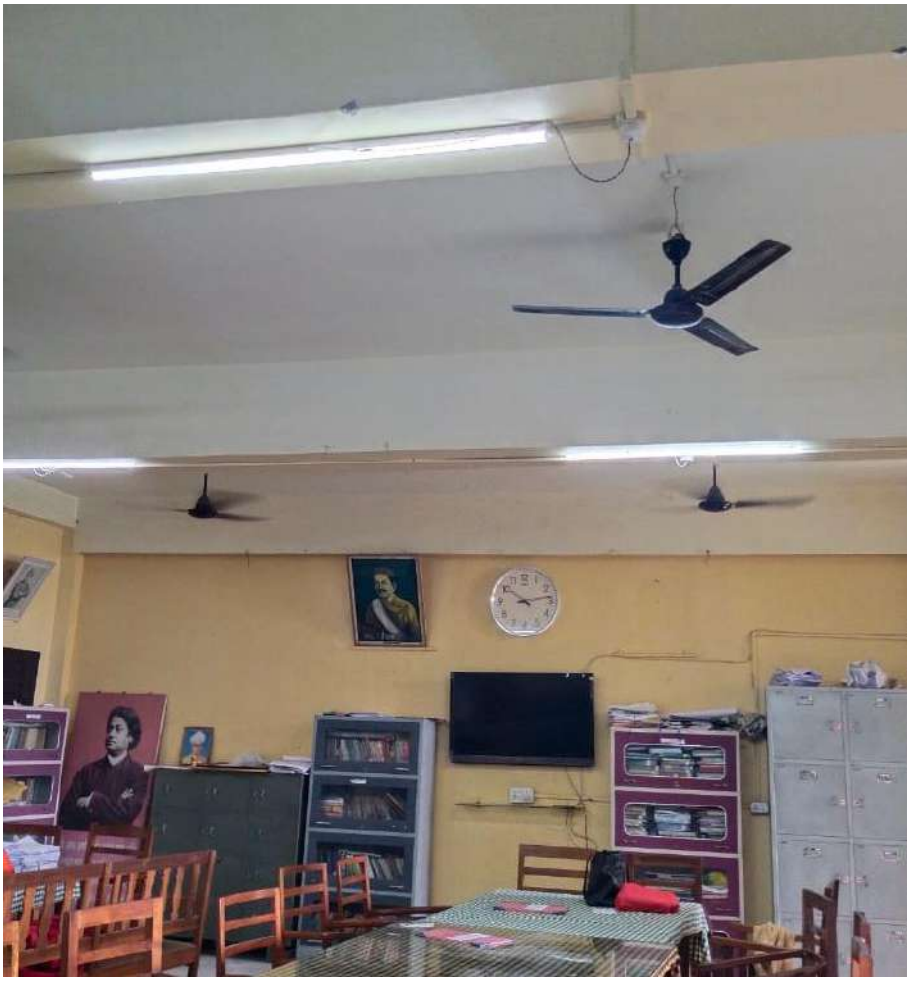
Principal
P.M.S. Mahavidyalaya
P.O.- Mal, Dist. Jalpaiguri

20.06.24
.....

(Signature)

(Dr. Arunava Bhadra)
DIRECTOR
HIGH ENERGY & COSMIC RAY
RESEARCH CENTRE
NORTH BENGAL UNIVERSITY

Photographic Proof




BIRMAL MITRA SMRITI MAHAVIDYALAYA
ROLL OF HONOUR


GPS Map Camera
Mal Bazar, West Bengal, India
VQJ2+FR2, Son Gachhi Tea Garden, Mal Bazar, West Bengal 735206, India
Lat 26.881568°
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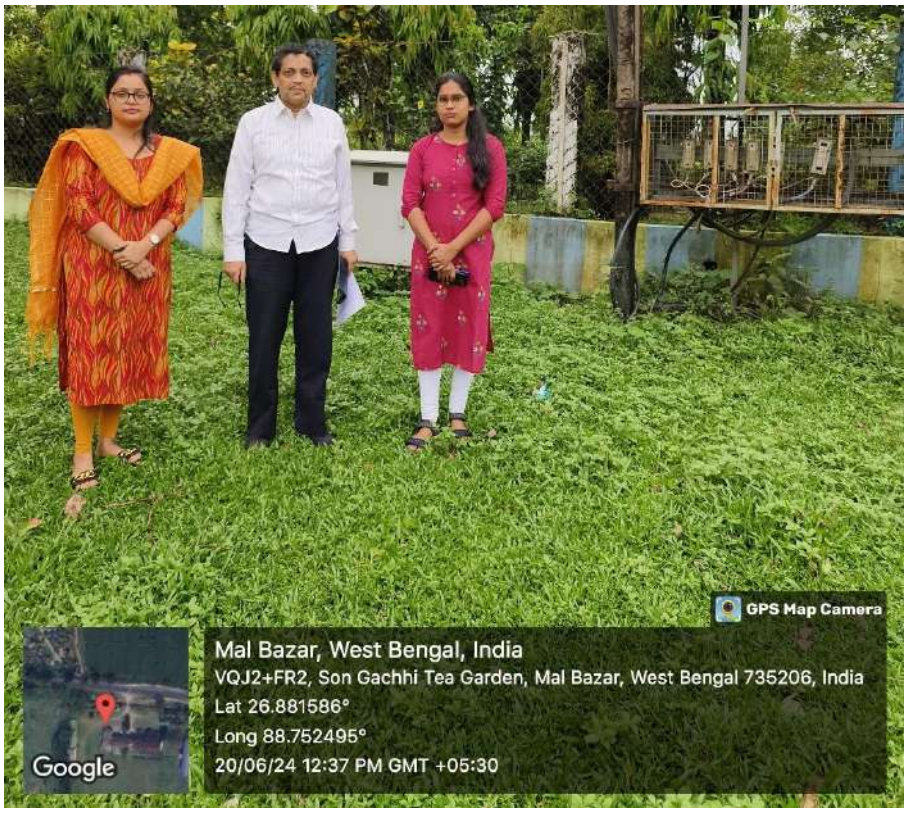
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GPS Map Camera
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Energy Audit - Observations and Recommendations:

In November 2021, during the 26th session of the United Nations Framework Convention on Climate Change (COP 26), India announced its target of achieving net zero carbon emissions by 2070. One of the goals to reach this target is to increase energy efficiency across multiple sectors, such as power generation, transportation, and industrial manufacturing. Each small step taken by organizations and individuals to reduce energy consumption and waste is crucial for achieving the energy efficiency goals of our country. In this regard, **Parimal Mitra Smriti Mahavidyalaya sets an example – the college's energy system highlights its use of clean solar energy, which meets 80% of the total energy demand without incurring costs.**

The college receives electrical supplies from WBSEDCL. The sanctioned demand for the college is 82.34 kW. Additionally, the college operates a solar energy unit. Three energy meters are installed on the premises, along with two LT transformers.

Existing energy efficiency policies include:

The college has an Energy Audit Committee, which oversees initiatives for efficient energy management, such as replacing all conventional FTL (46 Watt) lights with energy-efficient LED Tube Light fixtures (20 Watt).

Recommendations for further energy efficiency improvements:

- Continue replacing incandescent bulbs and fluorescent tube lights with energy-efficient LED bulbs in phases.
- Phase-wise replacement of conventional ceiling fans (80 watts) with energy-efficient star-rated or BLDC-based fans (20 to 25 watts).
- Install false ceilings in air-conditioned areas to reduce AC power load and energy consumption.
- Use curtains in all air-conditioned rooms.
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25.06.24

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