Report

On

Green, Energy & Environment Audit

For

Parle Tilak Vidyalaya Association's
Sathaye College
Mumbai 400 057

Prepared

By

Senergy Consultants Pvt Ltd
Mumbai 400 088

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Helping You to Conserve Energy

Contents

I
Introduction

Green, Energy & Environment Audit was undertaken at Parle Tilak Vidyalaya Association's Sathaye College (Dixit Road, Satsang CHSL, Navpada, Vile Parle East, Mumbai 400 057) during the month of September 2022.

The organization is very keen to promote green culture wherever possible, as a commitment towards better environment and conservation of energy. A lot of efforts have already been put up to bring down the carbon footprint. To further optimize consumption and identify saving opportunities, M/s Senergy Consultants was assigned to carry out Green Energy & Environment Audit of the premises.

This Audit Report presents the analysis of the data collected, observations made at the facility and is governed by the objectives, scope of work, methodology etc. discussed in the ensuing paragraphs.

Team:

The team members of the audit study.

- Mr Ravindra Datar
- Mr Dharmendra Upadhyay

Acknowledgment:

We wish to express our gratitude towards Dr. M. R. Rajwade & Asst. Prof. Sukruta Pethe for having given us the opportunity for conducting the study and the support provided during the study.

We are also thankful to the entire team for extending the necessary help and co-operation from their side.

II
Executive Summary

The premises were evaluated against the various criterions laid down by the National Assessment and Accreditation Council (NAAC). The major observations are.

Air Quality & Ventilation:

- The classrooms and other area are well ventilated to ensure proper air quality.
- The fans are appropriately installed to ensure proper air circulation.
- The outdoor and few indoor plants have also been provided to improve the environment.
- The air conditioned rooms are provided with proper ventilation and fresh air.

Lighting System:

- The usage of natural light is optimized through well designed structure and windows.
- Almost all the light fitting are provided with high efficiency LED lamps.
- It is suggested to automate switching of lamps in the common areas and rest rooms with sensor based control.

Green Campus Initiative:

- The movement of vehicle inside the campus is restricted with vehicles of Staff and Special Dignitaries are allowed to enter the campus with designated parking area.
- There is a ban on plastic usage inside the campus.
- The campus is surrounded with a lot of greenery, trees, and proper landscaping.
- The college has internal committee for conservation of resources like energy, water.
- The student participation may be encouraged in such activities through student clubs and groups.

Environment & Energy Initiative:

- Tree Plantation drive was undertaken by students and staff members.
- Green Consumerism and Green Entrepreneurship workshop are conducted to create awareness related to the environment.

Water Quality & Conservation:

- The water is supplied by the Municipal Corporation, which is a common practice in Mumbai, Thane & Navi Mumbai.
- Water purifiers & coolers are provided at individual floors and convenient locations.
- The distribution network and piping are more or less satisfactory and adequate.
- The toilets are provided with water efficient (low usage) fittings.

Waste Management:

- The effluent water is discharged in the municipal drain, which is a common practice in and around Mumbai, Thane & Navi Mumbai.
- The organic waste is segregated and disposed through municipal waste management system.
- There is no hazardous or medical waste generated in the college.
- The electronic gadgets / waste is either donated if useful or handed over to appropriate waste collectors.
- The general solid waste is disposed through municipal corporation.

Air Conditioning System:

- The Air Conditioners are operated as required with manual control. The operation is minimal consequently automation may not be economical.
- The room temperature is maintained at 23 to 25 ^{o}C, which is well within the recommended values.
- The Air Conditioners are serviced regularly and properly maintained.

- Most of the Air Conditioners units are energy efficient with 3 star rating.

Infrastructure usage:

- The on-campus movement is distributed with multiple entrances as well as staircases.
- A special assistance is provided to address the needs of differently-abled persons.
- The fire extinguishers are provided at key areas.
- The draining system for washrooms is efficient and effective.
- There were no seepages observed in the building premises.

Green IT culture:

- The Energy efficient computers and laptops have been procured.
- The electronic communication is encouraged to minimize usage of papers.
- Most of the papers are reused for doubled sided printing to further minimize usage of paper.

Renewable Energy:

- The possibility of installing Solar Photovoltaic System with NET metering may be assessed to meet part of the electricity consumption.
- The quantity of plate waste (organic waste with higher starch contents) is negligible, consequently, there is no potential for biogas generation.

III
Electrical System

Gadget

Air Conditioning Units:

ROOM NO	DEPARTMENT	AC Units per Class Room or Dept.		Capacity	STAR RATING
		Split	Window	TR	
105	PRINCIPAL CABIN	2	-	1.5	3
	VICE PRINCIPAL CABIN	1	-	1.5	3
105	ACCOUNTS DEPT	1	-	1.5	3
106	CONFERENCE ROOM	2	-	2	3
107	TYBCOM COMPUTER ROOM	2	-	2	3
109	CENTREL RESEARCH LAB	2	-	2	3
	IQAC DEPT	-	1	1.5	2
201	EXAM DEPT (CAP)	2	-	1.5	3
202	DC EXAM DEPT	2	-	1.5	3
203	JC RESULT DEPT	1	-	1.5	3
203	RESULT DEPT	1	1	1.5	3
221	BSc IT DEPT	-	4	1.5	2
310	BMS CLASS ROOM	2	-	1.5	3
401	BMM CLASS ROOM	2	-	1	3
402	BMM CLASS ROOM	2	-	1	3
403	BMM DEPT	2	-	1.5	3
303	COMPUTER LAB	-	2	1.5	2
	AUDI GREEN ROOM	-	1	1	2
	AUDI	10	-	2	3
8	MATHS DEPT	3	-	1.5	3

Observations & Suggestions:

- Most of the Air Conditioners units are energy efficient with 3 star rating.
- The Air Conditioners are operated as required with manual control.
- The rooms are well ventilated and provided with fans at appropriate location for proper air circulation.
- The temperature is maintained at 23 to 25 ^{o}C, which is within the recommended values.

Lamps:

Almost all the light fitting are provided with high efficiency LED lamps. The usage of natural light is optimized through well designed structure and windows.

It is suggested to automate switching of lamps in the common areas and rest rooms with sensor based control.

Fans:

Location	Rating W	Quantity (No.)
Ground Floor	70	85
First Floor	70	157
Second Floor	70	136
Third Floor	70	149
New Building	70	58

Observations & Suggestions:

- All the fans are of standard rating and efficiency.
- The fans may be progressively replaced with energy efficient BLDC fans, especially during replacements and new purchases.

Computers:

Almost all the computers are with energy efficient LCD / LED monitors.

The battery / power management system may be incorporated for more efficient operation.

General Observations & Suggestions:

- The rooms are well ventilated and provided with fans at appropriate location for proper air circulation.
- The gadgets are services properly and maintained in good condition.

Electricity Bill:

Description	Unit	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22
Consumer No: 101144768		**Adani Electricity**						
Meter No: 9052778		**Tariff Category: LT II (A)**						
Energy Consumption	KWH	3851	3216	3506	2442	3799	4342	4813
Bill	Rs	34931	29252	31846	22330	34466	39289	42453
Cost	Rs/KWH	9.07	9.10	9.08	9.14	9.07	9.05	8.82

Description	Unit	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Average
Consumer No: 101144768		**Adani Electricity**					
Meter No: 9052778		**Tariff Category: LT II (A)**					
Energy Consumption	KWH	4612	4264	5222	4482	4534	4090
Bill	Rs	40701	37669	52335	44992	45508	37981
Cost	Rs/KWH	8.83	8.83	10.02	10.04	10.04	9.29

Description	Unit	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Average
Consumer No: 101144825		**Adani Electricity**					
Meter No: 9184223		**Tariff Category: LT II (A)**					
Energy Consumption	KWH	374	336	489	309	507	403
Bill	Rs	3835	3495	4863	3254	5024	4094
Cost	Rs/KWH	10.25	10.40	9.94	10.53	9.91	10.16

Description	Unit	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22
Consumer No: 153112722		**Adani Electricity**						
Meter No: 9160247		**Tariff Category: LT II (A)**						
Energy Consumption	KWH	176	143	206	155	230	208	233
Bill	Rs	2064	1769	2332	1476	2547	2349	2545
Cost	Rs/KWH	11.73	12.37	11.32	9.52	11.07	11.29	10.92

Description	Unit	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Average
Consumer No: 153112722		**Adani Electricity**					
Meter No: 9160247		**Tariff Category: LT II (A)**					
Energy Consumption	KWH	204	207	280	226	225	208
Bill	Rs	2292	2318	3293	2757	2747	2374
Cost	Rs/KWH	11.24	11.20	11.76	12.20	12.21	11.43

Description	Unit	Oct-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
Consumer No: 152692523		**Adani Electricity**						
Meter No: NA		**Tariff Category: LT II (A)**						
Energy Consumption	KWH	0	0	0	496	14	0	0
Bill	Rs	810	1640	810	31730	920	860	860
Cost	Rs/KWH				63.97	65.71		

Description	Unit	Jun-22	Jul-22	Aug-22	Sep-22	Average
Consumer No: 152692523		**Adani Electricity**				
Meter No: NA		**Tariff Category: LT II (A)**				
Energy Consumption	KWH	0	0	0	0	46
Bill	Rs	860	870	850	860	3734
Cost	Rs/KWH					80.53

Description	Unit	Oct-21	Dec-21	Average
Consumer No: 152692525		**Adani Electricity**		
Meter No: NA		**Tariff Category: LT II (C)**		
Energy Consumption	KWH	1	18	10
Bill	Rs	890	6770	3830
Cost	Rs/KWH	890.0	376.1	403.2

Description	Unit	Oct-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22
Consumer No: 150397627		**Adani Electricity**						
Meter No: NA		**Tariff Category: LT II (B)**						
Energy Consumption	KWH	1262	826	436	470	1707	2569	2136
Bill	Rs	19340	33500	11770	12120	23670	32290	28150
Cost	Rs/KWH	15.32	40.56	27.00	25.79	13.87	12.57	13.18

Description	Unit	Jun-22	Jul-22	Sep-22	Average
Consumer No: 150397627		**Adani Electricity**			
Meter No: NA		**Tariff Category: LT II (B)**			
Energy Consumption	KWH	1589	1091	1333	1342
Bill	Rs	22790	19660	22180	22547
Cost	Rs/KWH	14.34	18.02	16.64	16.80

Observations & Suggestions:

- The average cost of the power is around Rs 11.92/- per kWh.

IV
Environmental System

Ventilation & Air Quality:

- Several indoor & outdoor plants have been installed to improve air quality.




- The air ventilation is adequate.
- The air-conditioned rooms are provided with proper ventilation and fresh air.
- It has been a general practice to switch off the fans & lights in an unoccupied area.

Natural Lighting:

Indoor & Outdoor Plants:

Sr No	Description	Type/Category	Height	Quantity
			M	No
1	Ashoka	Local	9	25
2	Ashoka	Local	2.5	165
3	Neem	Local	15	3
4	Mango	Local	12	7
5	Banyan	Local	30	1
6	Tamarind	Local	24	2
7	Coconut	Local	25	14
8	Guava	Local	3	12
9	Palm	Local	10	4
10	Peepal	Local	30	1
11	Dead Stump	Local	1	2
12	Pittosporum	Local	7	6
13	Areca Palm	Local	3	14
14	Tecoma	Local	2	1
15	Badam	Local	14	4
16	SandPaper	Local	6	4
17	Kailas Pati	Local	2	2
18	Chafa	Local	4	7
19	Sita Ashoka	Local	7	5
20	Samudrafal	Local	3.5	1

Sr No	Description	Type/ Category	Height	Quantity
			M	No
21	Bakul	Local	10	1
22	Awala	Local	10	6
23	Cordia	Local	8	2
24	Safed jam	Local	1	3
25	Fanas	Local	6	4
26	Nirgudi	Local	8	1
27	Apta	Local	1	1
28	Wild	Local	6	2
29	Euphorbia	Local	10	1
30	Trema	Local	1	1
31	Cassia	Local	9	2
32	Bhokar	Local	3	1
33	Chinch	Local	6	1
34	Shevar	Local	3.5	2
35	Tuti	Local	8	1
36	Gunj	Local	10	2
37	Mohogani	Local	1	1
38	Star Fruit	Local	1	1
39	Shendri	Local	6	1
40	Fishtail Palm	Local	1	1
41	Taman	Local	1.5	1
42	Thevetia	Local	6	1
43	Arjun	Local	8	2
44	Karanj	Local	6	3
45	Anant	Local	6	2
46	Tej Pan	Local	3.5	5
47	Amaltesh	Local	2.5	4
48	Elephant Ear Pod	Local	2.5	2
49	Chendufal	Local	11	12
50	Kanak Champa	Local	3	7
51	Kaju	Local	3	4
52	Xmass tree	Local	3	2
53	Cordia	Local	1	8
54	Kamini	Local	8	3
55	Suru	Local	2	2
56	Mellintonea	Local	6	4
57	Spathodia	Local	1.5	7
58	Sonchafa	Local	10	5
59	Satvin	Local	6	4
60	Surangi	Local	3	6
61	khirni	Local	6	3
62	Wad	Local	5	6

V
Water Management

The water supplied by the municipal corporation is used for drinking and other requirements. The incoming water from the municipal corporation is metered.

The consumption and costs are as under.

Connection No.	Period	Consumption	Amount	Cost
		KL	Rs	Rs/KL
KEH6010006	12-10-2021 To 12-01-2022	69	1125	16.30
KED5620000	12-10-2021 To 12-01-2022	1031	10411	10.10
KED5260006	07-10-2021 To 07-01-2022	280	3187	11.38
KEH6010006	12-01-2022 To 12-04-2022	67	1035	15.45
KED5620000	12-01-2022 To 12-04-2022	859	8673	10.10
KED5260006	07-01-2022 To 08-04-2022	301	3400	10.10

Connection No.	Period	Days	Consumption	Persons	Specific Water
			KL		L/Person/Day
KEH6010006	12-10-2021 To 12-01-2022	93	69	8382	0.59
KED5620000	12-10-2021 To 12-01-2022	93	1031		
KED5260006	07-10-2021 To 07-01-2022	93	280		
KEH6010006	12-01-2022 To 12-04-2022	90	67	8382	0.54
KED5620000	12-01-2022 To 12-04-2022	90	859		
KED5260006	07-01-2022 To 08-04-2022	91	301		

Observations & Suggestions:

- The consumption is within the normal range.

Water Purifiers & Coolers:

The water purifiers and coolers are provided at on individual floors, the details are as under.

Sr No	Location	Coolers	Purifier
1	Ground Floor	2	2
2	First Floor	5	5
3	Second Floor	2	2
4	Third Floor	1	1
Total		**10**	**10**

Water Distribution System:

The distribution network and piping are more or less satisfactory and adequate.

Rainwater Harvesting:

The rain water from the terrace area of the college building is being drained in to municipal storm water system through requisite ducts and pipes.

However, considering proximity to the seashore, rain water harvesting may not be practical.

VI
Waste Generation & Management

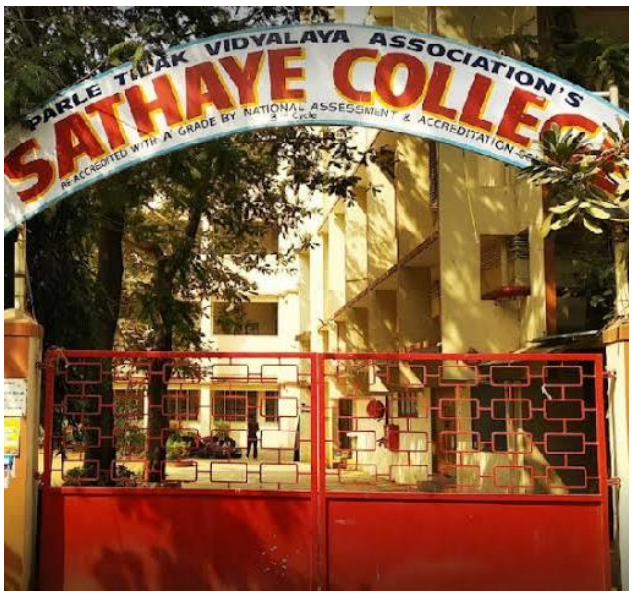
Solid Waste:

- The organic waste may be segregated and disposed through municipal system.
- There is no generation of hazardous or biomedical waste in the premises.
- The electronic gadgets with residual life are donated while the electronic waste is properly segregated and handed over to appropriate scrap collector.
- The total solid waste is disposed through Municipal system.

Sewage & Wastewater:

- The sewage is disposed through municipal system.
- There is no generation of harmful or hazardous effluent.
- The sewage treatment plant is not required due to minimal generation of waste.
- The municipal corporation charges cess for treating and disposing wastewater.

VII
Infrastructure & Safety



Observations:

- The premises are provided with multiple staircases with necessary entrances to ensure quick and effective movement in normal as well as emergency conditions.

- The movement of vehicle inside the campus is restricted and no parking is not provided in the premises.
- The students and many of the faculty members avail public transport system which is very convenient due to proximity to railway station and bus services. The municipal parking is available in the nearby areas.

Draining system:

- The drains from the washrooms are connected to the municipal drainage, which is a common practice in the colleges in and around Mumbai.

Seepage in the building:

- The premise was visually inspected for seepages. No seepages were observed in any of the places.

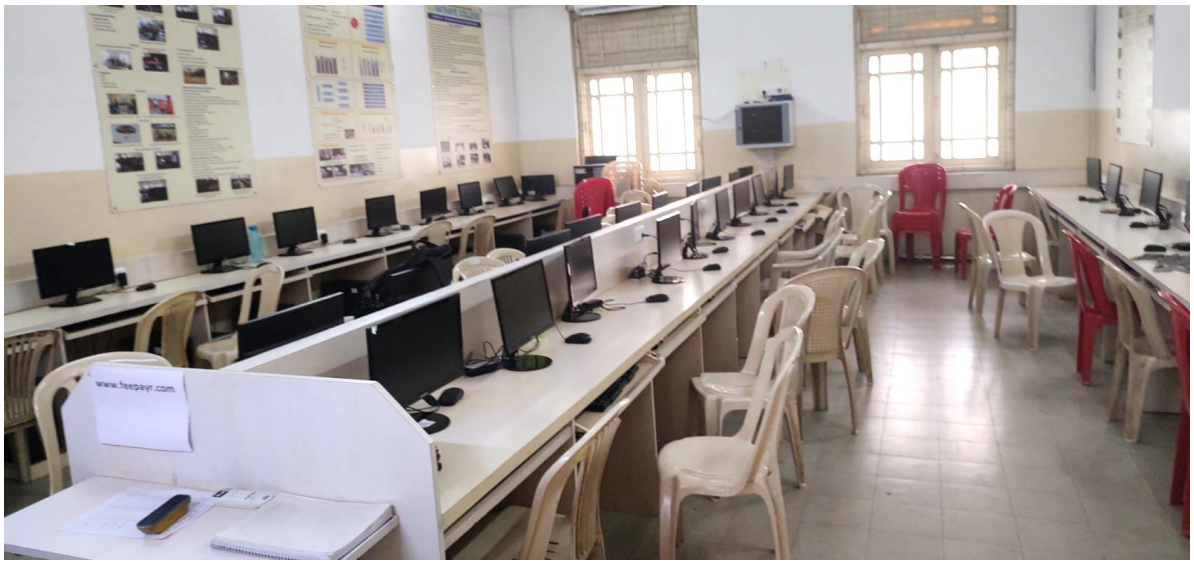
Fire-fighting & fire escape system:

There are efficient fire extinguishers in the premises; which are checked / refilled as per the stipulated frequency.

The premise is provided with multiple staircases with requisite entrances to ensure quick and effective movement in emergency conditions.

VIII
Green Culture

Computers:



Observations & Suggestions:

- The LED / LCD monitors & Laptops has been procured, which are energy efficient.
- These monitors are not only energy efficient but also generate minimal heat and cut down on air conditioning load.

The following steps may be initiated to further enhance efficiency of the systems.

1. An efficient power management system may be incorporated to
    a. Switch off the display if not in use.
    b. Put the computer in Sleep mode / switching off the machines, if not used for prolonged period.
2. Optimize brightness of the screen.
3. Discourage use of screen savers, which has similar power consumption.

Paper-less communication:

The major internal as well as external communication is through electronic medium.

Re-using one sided paper for printing:

It was observed that two side printing / printing on the back side of used paper in more than 80% of the cases.

IX
Renewable Energy

Solar Photovoltaic:

It is suggested to install rooftop solar panels with net metering for captive usage.

Solar Thermal:

There is no application of solar thermal system and does not find attractive in this case.

Biogas Plant:

There is no possibility of installing biogas plant for cooking as the quantity of plate waste is negligible.