7.1.6.

Quality audits on environment and energy are regularly undertaken by the institution

Particulars

Sr. No.	Name
1	Environment, Green and Energy audit 2021-2022

ENERGY AUDIT REPORT

Client Name	**Dr. Babasaheb Ambedkar Mahavidhyalaya, Peth Vadgaon, Tal. Hatkanangle, Dist. Kolhapur Maharashtra 416112**
Project Name	**Dr. Babasaheb Ambedkar Mahavidhyalaya, Peth Vadgaon, Tal. Hatkanangle, Dist. Kolhapur Maharashtra 416112**
Date	Year 2021-22
Submitted by	**Ashokrao Mane Group of Institutions** Vathar Tarf Vadgaon, Tal- Hatkanangale, Dist.-Kolhapur (Maharashtra state)

DISCLAIMER

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ACKNOWLEDGEMENT

We appreciate the interest and participation of Honorable Management and Principal and Faculty in carrying out the energy audit at **Dr. Babasaheb Ambedkar Mahavidhyalaya, Peth Vadgaon, Tal. Hatkanangle, Dist. Kolhapur.** Our special thanks to Technicians and Staff involved for college who have extended their co-operation and courtesy to the energy audit team during the audit.

THE ENERGY AUDIT TEAM

Team Member	Dr. H.T. Jadhav Certified Energy Auditor Bureau of Energy Efficiency Director AMGOI, Vathar Tarf Vadgaon. Mr.R.S.Pukale Assistant Professor AMGOI, Vathar Tarf Vadgaon.

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1. EXECUTIVE SUMMARY (Lighting Load):

Recommendations	Monthly present expenditure in Rs.	Investment for the saving of expenditure in Rs.	Savings per month in Rs.	Payback period in years.
Dr. Babasaheb Ambedkar Mahavidhyalaya, Peth Vadgaon. Replace 40W Copper choke tube set by 20 W LED Tube set. Quantity -53 no Replace 80W old fan by energy efficient fan. Quantity -31 no	R.s. 6831	20 W LED bulb- (53 no. LED) =53*450=23850 35 W Fan – (31 No. fan) =31*3500 =108500 Total=132350	Cost of energy Rs. 3185.325 Saving=Rs. 6831 -Rs.3185.325 = Rs.3645.675	3 yrs

2. SUMMARY OF SAVINGS POTENTIAL OF CLASSROOM

1. Dr. Babasaheb Ambedkar Mahavidhyalaya, Peth Vadgaon.

Sr.no	Particulars	Wattage	Quantity	Run Time (Hr/Day)	Total wattage	Watt Hours/Day	Energy consumed per day kWh/day	Recommendation
1	Tube light	40	53	6	2120	12720	12.72	Replace 40W old tube light (53 no) & 80W old fan (31 no) by energy efficient tube light & fan.
2	Fan	80	31	6	2480	14880	14.88	
3	Air Conditioner	1350	4	6	5400	32400	32.4	
4	Projector	300	7	6	2100	12600	12.6	
5	Computer system	250	79	6	19750	118500	118.5	
6	LED bulb	20	27	6	540	3240	3.24	
7	T.V	60	1	6	60	360	0.36	
8	Printer	40	13	2	520	1040	1.04	
9	Xerox Machine	1500	4	2	6000	12000	12	
				Total	**38970**	**207740**	**207.74**	

3. SUMMARY ANALYSIS OF CURRENT SCENARIO:
3.1 ANALYSIS ENERGY METER.

Approx. Unit charges including taxes: - Rs.8.25/- Unit

Maximum Consumption in year 2021-22 = Mar-22 (4800 units)

Meter No:1

250252103895'		
Sr.No	**Month**	**Unit Consumed in KWh**
1	Mar-22	4800
2	Feb-22	906
3	Jan-22	706
4	Dec-21	845
5	Nov-21	765
6	Oct-21	785
7	Sep-21	795
8	Aug-21	747
9	Jul-21	747
10	Jun-21	558
11	May-21	1683
12	Apr-21	809
	Total	14,146
	Maximum	4800
	Minimum	558
	Average	1,179

Meter No:2

Maximum Consumption in year 2021-22 = May-21 (14 units)

250252024014'		
Sr.No	**Month**	**Unit Consumed in KWh**
1	Mar-22	2
2	Feb-22	2
3	Jan-22	2
4	Dec-21	2
5	Nov-21	2
6	Oct-21	2
7	Sep-21	2
8	Aug-21	2
9	Jul-21	2
10	Jun-21	2
11	May-21	14
12	Apr-21	2
	Total	36
	Maximum	14
	Minimum	2
	Average	3

Meter No:3

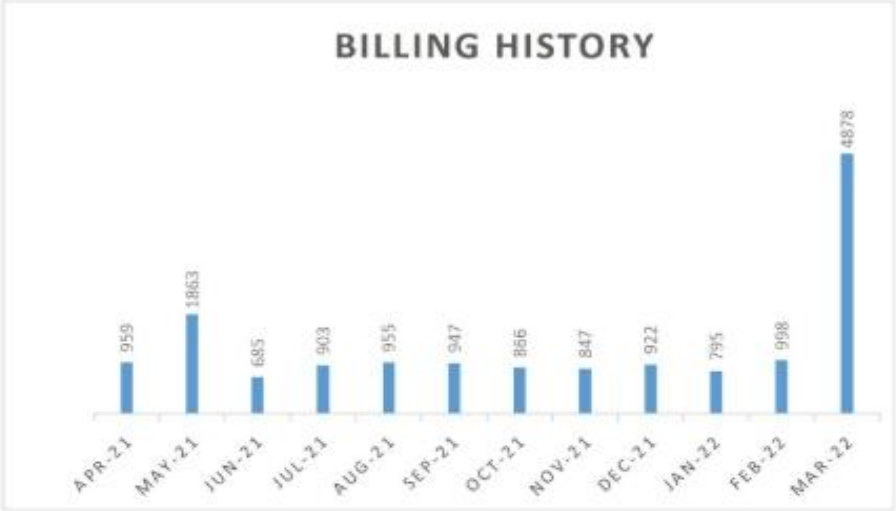
Maximum Consumption in year 2021-22 = Jul-18 (265 units)

250252150508'		
Sr.No	**Month**	**Unit Consumed in KWh**
1	Mar-22	76
2	Feb-22	90
3	Jan-22	87
4	Dec-21	75
5	Nov-21	80
6	Oct-21	79
7	Sep-21	150
8	Aug-21	206
9	Jul-21	154
10	Jun-21	125
11	May-21	166
12	Apr-21	148
	Total	1,436
	Maximum	206
	Minimum	76
	Average	120

Total Consumption

Maximum Consumption in year 2021-22 = Mar-22 (4878 units)

Total Consumption		
Sr.No	**Month**	**Unit Consumed in KWh**
1	Mar-22	4878
2	Feb-22	998
3	Jan-22	795
4	Dec-21	922
5	Nov-21	847
6	Oct-21	866
7	Sep-21	947
8	Aug-21	955
9	Jul-21	903
10	Jun-21	685
11	May-21	1863
12	Apr-21	959
	Total	15,618
	Maximum	4878
	Minimum	685
	Average	1,302



3.2. INSTITUTE IN PROCESS TOWARDS ENERGY CONSERVATION:

- Step by step replacing the 40 Watt i.e. T12 Fluorescent Tube Lights in the class rooms and Laboratory rooms and using 12W LED which gives almost same luminous flux.
- Replacing the 80W ceiling fan in class rooms and laboratories by energy efficient fans of 35 w is much help to save the energy.

4.0 SCOPE OF WORK:

1. Detailed examination of the existing energy uses of the facility.
2. Measurement and analysis of demand and power factor, energy meter to reduce the energy bill.
3. Detailed examination of lighting system and other electrical equipment in laboratory and class rooms.
4. Survey report of lighting system in overall institute.

5. METHODOLOGY:

5.1 MEASURED LUX LEVELS:

Sr.no.	Location/ Area/ Room	Measured Lux	Recommended Lux Level
01	**Principal cabin**	250	300-500
02	**Office**	210	300
03	**Staff Room**	200	300
04	**Store Room**	178	300
05	**Library**	178	300
06	**Students Reading Room**	250	300
07	**Exam strong Room**	220	300
08	**Girl's common room**	250	300
09	**Teacher Reading Room**	200	300
10	**NSS Office**	200	300
11	**Computer Lab**	178	300
12	**Class Room 1**	178	300
13	**Class Room 2**	190	300
14	**Class Room 3**	200	300
15	**Class Room 5**	210	300-500
16	**Class Room 6**	225	300-500
17	**Class Room 7**	255	300-500
18	**Class Room 8**	188	300-500
19	**Laboratories 1 Science**	175	300-500
20	**Laboratories 2 BCA**	170	300-500
21	**NAAC Room**	165	300-500

22	**Ladies Staff wash Room**	188	300-500
23	**Ladies Student wash Room**	225	300-500
24	**Conference Hall**	225	300-500

5.2 SAVING POTENTIAL CALCULATION IN EACH CLASS ROOM AND LABORATORY:

Assumptions: - Working hours of class room, laboratory and office = Approx.6hrs
Unit for institute energy bill = Approx. Rs.8.25/ kwh

Specimen calculation for Exam room :

Sr.no	Particulars	Wattage	Quantity	Run Time (Hr/Day)	Total wattage	Watt Hours/Day	Energy consumed per day kWh/day	Recommendation
1	Tube light	40	53	6	2120	12720	12.72	Replace 40W old tube light (53 no) & 80W old fan (31 no) by energy efficient tube light & fan.
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9	Xerox Machine	1500	4	2	6000	12000	12	
				Total	**38970**	**207740**	**207.74**	

Specimen calculation for tube set :- Energy consumption of conventional tube light set :- 40Watt capacity tube set used for 6hrs per day so unit consumed by tube is $\frac{40\text{Watt x } 6\text{hr}}{1000}$ = 0.24kwh per day and monthly unit consumed by tube set = 0.24x30 days = 7.2kwh / month. Energy consumption of one tube in terms of rupees = 7.2kwh x Rs.8.25 = Rs.59.4.

Specimen calculation for Fan :- A old fan capacity is 80W and used for 6 hrs. day so unit consumed by fan is $\frac{80\text{Watt x } 6\text{hr}}{1000}$ = 0.48 kwh per day and monthly unit consumed by fan = 0.48x30 days = 14.4 kwh / month. Energy consumption of fan in terms of Rs. = 14.4 kwh x Rs.8.25 = Rs.118.8.

Computer Lab has one old ceiling fan. So monthly expenditure due to fan is Rs.118.8

If old fan will have replaced by new energy efficient (BEE star rating) it will consume energy Rs. 51.97 for one month.

Tube set type	Cost Rs.	Payback	Life	Efficacy
T-8 LED tube light1.00 inch	1600-2000	3-4 Yrs	10-15 Yrs.	@100-120Lumens / watt
T-5 LED tube light 0.625 inch	500	6 month-1yr.	3-4 yrs.	110 lumens /watt

Evolution of BEE 5 star rated Fan

Speed	1	2	3	4	5
Wattage	13 W	24 W	30 W	40W	55W

Cost: - Rs. 1700 -2000 and Life: - 10-15 yrs.

Evolution of regular rated Fan

Speed	1	2	3	4	5
Wattage	14 W	26 W	39 W	48 W	76 W

Cost: - Rs. 1000 -1500 and Life: - 5-10 yrs.

A typical desktop computer uses about up to 250 watts and 20-40 watts for an LCD monitor and don't forget related devices like cable modem uses 7 watts, D-Link DI-604 router uses 4.5 watts,

To calculate your costs, use this formula:

$$\frac{\text{Watts} \times \text{Hours Used}}{1000} \times \text{Cost per kilowatt-hour} = \text{Total Cost}$$

One LCD computer consumes 1.5Kwh (Unit) per day i.e. 9Rs. Per day (300 W x 5 hrs.)

Old version computer consumes 2.5kwh(unit) per day i.e.15Rs. per day (500 W x5hrs)

6.0 CONCLUSIONS AND GENERAL RECOMMENDATION OF THE AUDIT

a) Replace conventional tube light fittings of 40W with T-5 LED Tube light for 400 – 500 lumens light efficacy. Replace 80 W old fan by energy efficient fans.

b) Replace old version computer system with energy efficient LCD monitor and new generation energy efficient computer systems.

c) Ensure maximum natural day light and natural ventilation in class rooms, Labs and staff rooms i.e. when it's bright outside in the daytime, turn off the light and open blinds of windows.

d) In fact, try to turn on lights in our cabin, labs only after the sun sets. Do your reading and writing near a window or natural illumination.

e) Installing occupancy sensors to turn ON-OFF lighting and fan can save considerable energy.

f) Overhead projectors, computers and UPS all use electricity for power. Be sure to unplug these types of items when they're not in use can achieve energy saving considerably.

g) Use power "saving option" (hibernate mode) for computer and possibly switched off when not in use.

h) Consider planting trees and shrubs in strategic locations to help to reduce the temperature and airflow in Laboratory, classroom etc. Trees planted on the west and south sides of buildings help to keep the buildings shaded during hotter weather.

i) Suggested to protect all Transformer, Generators and UPS with fencing and keep the awareness boards and safety signs on 'Dangers' and 'Warnings, etc.

j) Advised to cover Electrical wires, switch boxes, inverters, and stabilizers not to cause any problem to the staff and student members.

k) Advised to replace old generation computers and TVs with LED monitors and old incandescent (tungsten) bulbs with LED lights and install automatic street solar lights.

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