

ENERGY AUDIT REPORT

Client Name	K.E. Society's Rajarambapu Institute of Technology, Rajaramnagar, Islampur. Dist- Sangli.
Project Name	Energy Audit of Rajarambapu Institute of Technology, Rajaramnagar, Islampur. Dist- Sangli.
Date / Year	Year 2022-2023
Submitted by	Dept. of Electrical Engineering , Rajarambapu Institute of Technology, Rajaramnagar , Islampur Dist- Sangli.MH



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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 Rajarambapu Institute of Technology Rajaramnagar. 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.

Our Special thanks to Honorable Management and Director of Rajarambapu Institute of Technology, Islampur for continuous support and providing facilities regarding the energy audit.



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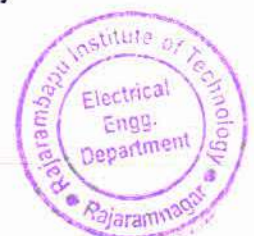
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1.0 EXECUTIVE SUMMARY:

Recommendations	Monthly present expenditure in Rs.	Investment for the saving of expenditure in Rs.	Savings per month in Rs.	Payback period
Instructional Building (Class rooms): Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -109 no	Rs.6278.40 (kw x4hrs x24 days x 15 Rs.)	Rs.18530.00 (Rs.170/- qty.)	Cost of energy Rs. 6278.40 -Rs.3139.20 Saving =Rs. 3139.20	5.9 months
Instructional Building (Class rooms): Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 03no	Rs. 108.00	Rs.510.00	Cost of energy Rs.108.00 - Rs. 86.40 Saving = Rs.21.60	1.9 years
Dept. Electrical Engineering Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -82 no	Rs.4723.20	Rs.13940.00	Cost of energy Rs.4723.20 - Rs.2361.61 Saving Rs. 2361.6	5.9 months.
Dept. Electrical Engineering Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 3no	Rs. 108.00	Rs.510.00	Cost of energy Rs.108.00 - Rs. 86.40 Saving = Rs.21.60	1.9 month
Administrative office: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity – 08 no	Rs. 432.00 6 hrs.	Rs.1360 .00	Cost of energy Rs. 432.00 - Rs. 345.60 Saving = Rs.86.40	1.3 years.
Administrative office: Replace 40W Copper choke tube set by 20 W LED Tube set Quantity - 4 no	Rs. 345.60 6hrs	Rs. 680.00	Cost of energy Rs. 345.60 - Rs.172.80 Saving = Rs.172.80	4 months.
K.E.S Office: Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -3 no	Rs.259.20	Rs. 510.00	Cost of energy Rs259.20 - Rs.129.60 Saving = Rs 129.60	3.9 months.
K.E.S Office: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity – 04no	Rs.216.00 6hrs x24 days x 15 rs)	Rs.680.00	Cost of energy Rs. 216.00 - Rs.172.80 Saving = Rs 43.20	1.3 years.
K.E.S Office: Replace 13W CFL (PL) set, with 8W LED ceiling set Quantity – 11 no	Rs. 308.88	Rs. 6675.00	Cost of energy Rs. 308.88 - Rs.190.08 Saving = Rs 118.80	4.6 years.
Admission cell: Replace 36 W CFL (PL) set, with 15W LED ceiling set. Quantity – 16 no	Rs. 829.44	Rs.10112.00	Cost of energy Rs. 829.44 - Rs.345.60 Saving = Rs.612.86	1.3 years.



Recommendations	Monthly present expenditure in Rs.	Investment for the saving of expenditure in Rs.	Savings per month in Rs.	Payback period
Admission cell: Replace 14 W CFL (PL) set, with 8W LED ceiling set. Quantity – 15 no	Rs.302.40	RS.6675.00	Cost of energy Rs. 302.40 - Rs.172.80 Saving = Rs.129.60	4.2 years.
Dept. Civil Engineering Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 57no	Rs. 2052.00	Rs. 9690.00	Cost of energy Rs. 2599.20 - Rs.1641.60 Saving = Rs.957.60	10 months.
Dept. Civil Engineering Replace 40W copper choke tube set with 20W LED Tube set. Quantity- 05 no	Rs. 288.00	Rs.850.00	Cost of energy Rs. 288.00 - Rs.144.00 Saving = Rs.144.00	5.9 months.
Dept. Civil Engineering Replace 110W Old fan with 80W energy efficient fan Quantity- 03 no	Rs. 475.20	Rs. 4740.00	Cost of energy Rs. 475.18 - Rs.345.60 Saving = Rs.130.00	3 years
Diploma Dept.: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 29no	Rs.1044.00	Rs.4930.00	Cost of energy Rs. 1044.00 - Rs.835.00 Saving = Rs.209.00	1.5 years
Diploma Dept.: 40W copper choke tube set with 20W LED Tube set. Quantity- 11 no	Rs.633.60	Rs.1870.00	Cost of energy Rs.633.60 - Rs.316.80 Saving = Rs.316.80	5.9months.
Dept. of IT Engg.: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 35 no	Rs. 1260.00	Rs.5950.00	Cost of energy Rs.1260.00 - Rs.1008.00 Saving = Rs.252.00	1.9months
Computer center: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 31no	Rs.1116.00	Rs.5270.00	Cost of energy Rs.1116.00 - Rs.893.00 Saving = Rs.282.47	1.8 years.
Examination center: Replace 40W copper choke tube set with 20W LED Tube set. Quantity- 12 no	Rs. 691.20	Rs. 2040 .00	Cost of energy Rs. 691.20 - Rs345.60 Saving = Rs.345.60	5.9 months.
Examination center: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity- 4 no	Rs.144.00	Rs.680.00	Cost of energy Rs.144.00 - Rs.115.00 Saving = Rs.29.00	1.9 month.
Finishing School: Replace 40W Polyester choke tube set with 20W LED Tube set. Quantity :- 4 no.	Rs.345.65	Rs. 680.00	Cost of energy Rs.345.65 - Rs.115.18 Saving = Rs.230.47	2.9 months.
Science & Humanity: - 40W copper choke tube set with 20W LED Tube set. Quantity: - 18 no.	Rs.1036.80	Rs.3060.00	Cost of energy Rs.1036.80 - Rs.518.40 Saving = Rs.518.40	5.9 months

Recommendations	Monthly present expenditure in Rs.	Investment for the saving of expenditure in Rs.	Savings per month in Rs.	Payback period
Science & Humanity: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity :- 46 no.	Rs.1656.00	Rs.7820.00	Cost of energy Rs.1656.00 - Rs. 574.80 Saving = Rs.1081.20	7.2months
Computer Science& Engg Dept: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 24 no.	Rs.1382.40	Rs.4080.00	Cost of energy Rs.1382.40 - Rs.691.20 Saving = Rs.691.20	5.9 months
Computer Science& Engg Dept: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity :- 42 no.	Rs. 1512.00	Rs.7140.00	Cost of energy Rs.1512.00 - Rs.1209.00 Saving = Rs.303.00	1.9 months
Electronics & Tele-communication Engg Dept.: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 77 no.	Rs.4435.20	Rs.13090.00	Cost of energy Rs.4435.20 - Rs.2217.60 Saving = Rs.2217.60	5.9 Months.
Electronics & Tele-communication Engg Dept.: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity :- 38	Rs.1368.00	Rs.6460.00	Cost of energy Rs.1368.00 - Rs.1094.40 Saving = Rs.273.60	1.9 months
MBA Dept: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 24 no	Rs.1382.40	Rs.4080.00	Cost of energy Rs.1382.40 - Rs.691.20 Saving = Rs.691.20	5.9 months.
MBA Dept: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity :- 75 no.	Rs. 2700.00	Rs. 12750 .00	Cost of energy Rs.2700.00 - Rs.2160.00 Saving = Rs.540.00	1.9 months
Electrical & Civil Maintenance Dept: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity : 14	Rs. 504.00	Rs. 2380.00	Cost of energy Rs.504.00 - Rs. 403.00 Saving = Rs.101.00	1.9 months
Electrical & Civil Maintenance Dept: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 02 no.	Rs. 114.00	Rs. 340.00	Cost of energy Rs.114.00 - Rs. 57.00 Saving = Rs.57.00	6 months.
Gymkhana: Replace 60W Polyester choke tube set with 20W LED Tube set. Quantity :- 10 no.	Rs. 864.00	Rs.1700.00	Cost of energy Rs.864.00 - Rs. 432.00 Saving = Rs.432.00	3.9 months.
Grahak Bhandar: Replace 60W Polyester choke tube set with 20W LED Tube set. Quantity : 03 no.	Rs. 259.20	Rs.510.00	Cost of energy Rs.259.20 - Rs. 129.60 Saving = Rs. 129.60	3.9 months



Recommendations	Monthly present expenditure in Rs.	Investment for the saving of expenditure in Rs.	Savings per month in Rs.	Payback period
Canteen: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 05 no.	Rs.288.00	Rs.850.00	Cost of energy Rs.288.00 - Rs. 144.00 Saving = Rs.144.00	5.9months.
Mechanical & Automobile Building: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 88 no	Rs.5068.80	Rs.14960.00	Cost of energy Rs. 5068.80 -Rs. 2534.00 Saving = Rs.2534.00	5.9 months
Mechanical & Automobile Building: Replace 25W Electronics choke tube set with 20W LED Tube set. Quantity : 31 no.	Rs. 1116.00	Rs.5270.00	Cost of energy Rs.1116.00 - Rs. 893.00 Saving = Rs.223.00	1.9 years
Student Hostel: Replace 40W copper choke tube set with 20W LED Tube set. Quantity : 190no	Rs.20520.00	Rs.32300.00	Cost of energy Rs.20520.00 - Rs. 10260.00 Saving = Rs.10260.00	3.1 months
Student Hostel: Replace 110W Old fan with 80W energy efficient fan Quantity- 40 no	Rs.11880.00	Rs. 63200.00	Cost of energy Rs. 11880.00 - Rs.8640.00 Saving = Rs.3240.00	1.6 years.
Student Hostel: Replace 80W CFL with 30W energy efficient LED street light Quantity- 15 no	Rs.3240.00	Rs.20940.00	Cost of energy Rs. 3240.00 - Rs.1215.00 Saving = Rs.2025.00	10 months.
Student Hostel: Replace 20W CFL with 8 W energy efficient LED surface Quantity- 120 no	Rs.6480.00 (6hrsx30 days x 19 Rs.)	Rs.53400.00	Cost of energy Rs. 6480.00 - Rs.2592.00 Saving = Rs.3888.00	1.1 year
Student Hostel: Replace 13W CFL (PL) set, with 8W LED ceiling set Quantity – 35 no	Rs. 1228.50	Rs.15575.00	Cost of energy Rs.1228.50 - Rs. 756.00 Saving = Rs. 472.50	2.7 years.
Student Hostel: Replace 30 W CFL (PL) set, with 18 W LED surface ceiling set Quantity – 120 no	Rs.9720.00	Rs. 112200.00 (Rs.935/ set)	Cost of energy Rs. 9720.00 - Rs.5831.00 Saving = Rs 3889.00	2.8 years.
All Workshops & hydraulic testing lab: Replace 60W copper choke tube set with 20W LED Tube set. Quantity : 152 no	Rs. 13132.80	Rs.25840.00	Cost of energy = Rs.13132.80 - Rs. 4377.60 Saving =Rs. 8755.20	2.9 month



2. SUMMARY OF SAVINGS POTENTIAL OF CLASSROOM, LABORATORIES OFFICE AND STREET LIGHTS.

1) Instructional Building -Class rooms:- - 24 working days' consumption

Particulars	Wattage W	Numbers	Load (KW)	Appro x. hrs.	Recommendation
Tube set (copper choke)	40	109	4.36	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	07	0.14	4hrs	
Electronic choke tube set	25	13	0.325	4hrs	Replace 25 W tube set by 20 W LED tube set.
Ceiling fan	80	72	5.76	4hrs	
Computer set	300	09	2.7	4hrs	
Projector (Epson)	300	13	3.9	4hrs	
Water Cooler	700	02	1.4	4hrs	
Bathroom exhaust fan	12	02	0.024	4hrs	
Total			18.609	4hrs	74.436 kWh / day

Total Lighting load = 4.825 kW Qty 129 nos

Led lighting load = 0.14 kW Qty 07 nos

2) Department of Electrical Engineering- 24 working days' consumption

Particulars	Wattage W	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	82	3.28	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	31	0.62	4hrs	
Electronic choke tube set	25	03	0.075	4hrs	Replace 25 W tube set by 20 W LED tube set.
Ceiling fan	80	80	6.4	4hrs	
Computer set	300	73	21.9	4hrs	
Projector (Epson)	300	01	0.3	4hrs	
Water Cooler	700	03	2.1	4hrs	
Bathroom exhaust fan	12	03	0.036	4hrs	
Air conditioning system	1070	01	1.07	4hrs	
Total			35.781	4hrs	143.124kWh / day

Total Lighting load = 3.975kW Qty 116nos

Led lighting load = 0.62 kw Qty 31 nos



3) Student Hostel 30 Days consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	190	7.6	6 hrs.	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	475	9.5	6 hrs	
Old Ceiling fan	110	40	4.4	6 hrs	Replace 110W Old fan with 80W energy efficient fan
C.G Ceiling fan	80	320	25.6	6 hrs	
LED Lamp	14	100	1.4	6 hrs	
LED Lamp	3	57	0.171	6 hrs	
LED street Light	60	79	4.74	11 hrs	
LED street Light	40	12	0.48	11 hrs	
CFL Lamp	5	80	0.4	6 hrs	
CFL Lamp	20	120	2.4	6 hrs	Replace 20W CFL with 8 W energy efficient LED
CFL Lamp	30	30	0.9	6 hrs	Replace 30W CFL with 18 W energy efficient LED
CFL Lamp	80	15	1.275	6 hrs	Replace 80W CFL with 30 W energy efficient LED
PL Tube	13	35	0.455	6 hrs	Replace 13W CFL with 8 W energy efficient LED
Geezer	3000	14	42	6 hrs	
Solar geezer coil	3000	22	66	6 hrs	
5 HP Motor pump set	3728.5	8	29.82	6 hrs	
3 HP Motor pump set	2237.1	5	11.18	6 hrs	
2 HP Motor pump set	1491.4	2	2.982	6 hrs	
Projector (Epson)	300	01	0.3	4 hrs	
Computer system	300	10	3	6 hrs	
Printer inkjet	450	04	1.8	2 hrs	
TV set	120	27	3.24	4 hrs	
Water Cooler	700	20	14	6 hrs	
Air conditioning system	1070	21	22.47	6 hrs	
Induction cooker	3000	17	51	4 hrs	
Fridge	130	6	0.78	6 hrs	
Total			307.893	6hrs	1847.358kWh/day

Total Lighting load = 28.866 kW Qty 1193 nos

Led lighting load = 16.29kW Qty 723 nos



4) Administrative Office: 30 Days consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	3	0.12	6hrs	Replace 40W tube set by 20W LED tube set.
Electronics choke tube set	25	19	0.475	6hrs	Replace 25 W tube set by 20 W LED tube set
LED Panel GB Hall	20	20	0.4	6hrs	
LED Panel Director office	20	10	0.2	6hrs	
LED Panel KES	15	04	0.06	6hrs	
LED tube set	20	27	0.54	6hrs	
LED bulb	15	15	0.225	6hrs	
LED bulb	7	6	0.042	6hrs	
LED bulb	9	29	0.261	6hrs	
Ceiling Fan old	80	61	4.88	6hrs	
Computer system LCD	300	42	12.6	6hrs	
Printer HP	750	12	09	6hrs	
Xerox Machine	1600	03	03	6hrs	
AC	3250	11	35.75	6hrs	
Wall fan	60	5	0.3	6hrs	
Total			67.853	6hrs.	407.118kwh/ day

Total Lighting load = 2.323kW Qty 133 nos

Led lighting load = 1.728kW Qty 111 nos

5) Civil Engineering Dept. 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	05	0.2	4hrs.	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	33	0.66	4hrs	
Electronics choke tube set	25	57	0.675	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	43	3.44	4hrs	
Ceiling Fan Old	110	03	0.33	4hrs	Replace 110W old fan by energy efficient fan(3no).
Computer system LCD	300	61	18.3	4hrs	
Printer HP	750	05	3.75	4hrs	
Xerox Machine	1000	01	1.0	4hrs	
AC	3250	01	3.250	4hrs	
LCD projector	300	01	0.3	4hrs	
Total			31.905	4hrs.	127.62 kWh/day

Total Lighting load = 1.535 kW Qty 95nos

Led lighting load = 0.66 kW Qty 33 nos



6) Information Technology Dept. 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	27	1.08	4hrs.	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	29	0.58	4hrs.	
Electronics choke tube set	25	35	0.875	4hrs.	Replace 25 W tube set by 20 W LED tube set
LED bulb	15	125	1.875	4hrs.	
LED bulb	14	24	0.336	4hrs.	
Ceiling Fan CG	80	72	5.76	4hrs.	
Ceiling Fan Old	110	01	0.11	4hrs.	Replace 110W old fan by energy efficient fan(1no).
Computer system LCD	300	197	59.1	4hrs.	
Printer HP	750	07	5.25	4hrs.	
AC	3250	11	35.75	4hrs.	
LCD projector	300	04	1.2	4hrs.	
Wall fan	60	01	0.06	4hrs.	
Table fan	60	04	0.24	4hrs.	
Total			112.21	4hrs.	449.04kwh/day

Total Lighting load = 4.746 kW Qty 240 nos

Led lighting load =2.791 kW Qty 178 nos

7) Diploma office 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	11	0.44	4hrs.	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	07	0.14	4hrs.	
Electronics choke tube set	25	29	0.725	4hrs.	Replace 25 W tube set by 20 W LED tube set
LED bulb	15	125	1.875	4hrs.	
LED bulb	13	62	0.806	4hrs.	
LED bulb	08	62	0.496	4hrs.	
Ceiling Fan CG	80	44	3.52	4hrs.	
Computer system LCD	300	61	18.3	4hrs.	
Printer HP	750	04	3.0	4hrs.	
Wall fan	60	11	0.66	4hrs.	
Table fan	60	15	0.9	4hrs.	
Total			30.68	4hrs.	122.728 kWh /day

Total Lighting load = 4.482 kW Qty 296 nos

Led lighting load =3.317 kW Qty 256 nos



8) Central Computer Center 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	01	0.04	4hrs.	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	23	0.46	4hrs.	
Electronics choke tube set	25	31	0.775	4hrs.	Replace 25 W tube set by 20 W LED tube set
LED bulb	18	62	1.116	4hrs.	
Computer system LCD	300	118	35.4	4hrs.	
Printer HP	750	02	1.5	4hrs.	
AC	3250	11	35.75	4hrs.	
LCD projector	300	02	0.6	4hrs.	
Wall fan	60	25	1.5	4hrs.	
Exhaust fan	60	03	0.18	4hrs.	
Total			77.321	4hrs.	309.284kWh/day

Total Lighting load = 2.39 kW Qty 117nos

Led lighting load =1.576 kW Qty 85 nos

9) Mechanical and Automobile Engg Dept. 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	88	3.52	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	21	0.42	4hrs	
Electronics choke tube set	25	31	0.775	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	80	6.4	4hrs	
Computer system LCD	300	165	49.5	4hrs	
Printer HP	750	06	4.5	4hrs	
AC	3250	02	6.5	4hrs	
LCD projector	300	11	3.3	4hrs	
Exhaust fan	60	02	0.12	4hrs	
Total			75.035	4hrs	300.14kWh/day

Total Lighting load = 4.715 kW Qty 140 nos

Led lighting load =0.42 kW Qty 21 nos



10) Computer science and Engg Dept. 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	24	0.96	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	48	0.96	4hrs	
Electronics choke tube set	25	42	1.05	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	98	7.84	4hrs	
Ceiling Fan old	110	07	0.77	4hrs	
Computer system LCD	300	206	61.8	4hrs	
Printer HP	750	07	5.25	4hrs	
LCD projector	300	07	2.1	4hrs	
Exhaust fan	60	05	0.3	4hrs	
TV	120	01	0.12	4hrs	
AC	3250	10	32.5	4hrs	
Total			113.65	4hrs	454.60 kWh /day

Total Lighting load = 2.97 kW Qty 114 nos

Led lighting load = 0.96 kW Qty 48 nos

11) Electronics and Telecommunication Engg Dept. 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	77	3.08	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	22	0.44	4hrs	
Electronics choke tube set	25	38	0.95	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	110	8.8	4hrs	
Computer system LCD	300	104	31.2	4hrs	
Printer HP	750	07	5.25	4hrs	
LCD projector	300	12	3.6	4hrs	
AC	3250	01	3.25	4hrs	
Total			56.57	4hrs	224.00 kWh/day

Total Lighting load = 4.47 kW Qty 137nos

Led lighting load = 0.44 kW Qty 22 nos

12) Rajarambapu Paramount Academic

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
LED Tube set	20	62	1.24	4hrs	
Ceiling Fan CG	80	34	3.72	4hrs	
Computer system LCD	300	02	0.6	4hrs	
Xerox	1600	01	1.6	4hrs	
Total			7.16	4hrs	28.64kWh/day

Total Lighting load = 1.24 kW Qty 62nos

Led lighting load = 1.24 kW Qty 62 nos



13) Management Department. 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	24	0.96	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	37	0.74	4hrs	
LED panel	15	40	0.6	4hrs	
Electronics choke tube set	25	75	1.875	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	88	7.04	4hrs	
Computer system LCD	300	114	34.2	4hrs	
Printer HP	750	04	3.0	4hrs	
LCD projector	300	10	3.0	4hrs	
AC	3250	08	26	4hrs	
Total			77.415	4hrs	309.66kWh/day

Total Lighting load = 4.69 kW Qty 176 nos, Led lighting load = 0.22 kW Qty 77nos

14) Workshop No2. 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	60	47	2.82	4hrs	Replace 60W tube set by 20W LED tube set.
LED Tube set	20	15	0.3	4hrs	
Electronics choke tube set	25	02	0.05	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	16	1.28	4hrs	
Ceiling Fan old	110	01	0.11	4hrs	
Comp. LCD	300	48	14.4	4hrs	
Printer HP	750	03	2.25	4hrs	
LCD projector	300	01	0.3	4hrs	
Wall fan	60	06	0.36	4hrs	
Total			21.87	4hrs	88.60kWh/ day

Total Lighting load = 3.17 kW Qty 64 nos, Led lighting load = 0.3 kW Qty 15 nos

15) Work shop No1 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	60	40	2.4	4hrs	Replace 60W tube set by 20W LED tube set.
LED tube	20	13	0.26		
Ceiling Fan CG	80	17	1.36	4hrs	
Comp. LCD	300	10	3.0	4hrs	
Printer HP	750	04	3.0	4hrs	
Industrial fan	1000	17	17	4hrs	
Industrial Lamp	250	14	3.5	4hrs	
AC	3250	01	3.250	4hrs	
Wall fan	60	04	0.24	4hrs	
Total			34.01	4hrs	136 kWh/day

Total Lighting load = 2.66 kW Qty 53 nos, Led lighting load = 0.26 kW Qty 13 nos



16) Civil Structure PG building 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	13	0.52	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	01	0.02	4hrs	
Electronics choke tube set	25	17	0.425	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	23	1.84	4hrs	
Computer system LCD	300	08	2.4	4hrs	
Printer HP	750	02	1.5	4hrs	
LCD projector	300	02	0.6	4hrs	
Industrial Fan	1000	01	1.0	4hrs	
Total			8.305	4hrs	33.22kWh/day

Total Lighting load = 0.965 kW Qty 31nos

Led lighting load = 0.02 kW Qty 01nos

17) Gymkhana 30 days

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	10	0.4	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	08	0.16	4hrs	
Electronics choke tube set	25	01	0.025	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	02	0.16	4hrs	
Computer system LCD	300	02	0.6	4hrs	
Printer HP	750	01	0.75	4hrs	
Xerox	1600	01	1.6	4hrs	
Total			3.695	4hrs	14.78 kWh /day

Total Lighting load = 0.585 kW Qty 19 nos

Led lighting load = 0.16 kW Qty 08 nos

18) Canteen 24 working days' consumption

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	40	05	0.2	4hrs	Replace 40W tube set by 20W LED tube set.
LED Tube set	20	04	0.1	4hrs	
Electronics choke tube set	25	05	0.125	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	06	0.48	4hrs	
Fridge	2200	03	6.6	4hrs	
Total				4hrs	

Total Lighting load = 0.425kW Qty 14nos.

Led lighting load = 0.1kW Qty 04 nos.



19) Advanced Welding shop & fluid mechanics, Sheet metal Shop:

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
Tube set (copper choke)	60	65	3.9	4hrs	Replace 60W tube set by 20W LED tube set.
Electronics choke tube set	25	35	0.875	4hrs	Replace 25 W tube set by 20 W LED tube set
Ceiling Fan CG	80	41	3.28	4hrs	
Computer system LCD	300	05	1.5	4hrs	
AC	3250	02	6.5	4hrs	
Exhaust fan	60	03	0.18	4hrs	
Industrial Fan	1000	03	3.0	4hrs	
Total				4hrs	

Total Lighting load = 4.775kW Qty 100nos.

Led lighting load = 0.0kW Qty 0.0nos.

20) New Library Building 30 days

Particulars	Wattage	Numbers	Load (KW)	Approx. hrs.	Recommendation
LED Tube Set double side	56	101	5.656	8hrs.	
LED Aslimline	45	57	2.565	8hrs	
LED Tubo	42	45	1.890	8hrs	
LED Round Down Light	17	621	10.557	8hrs	
LED Strip	14.5	13	0.1885	8hrs	
LED Batten Tube	28	57	1.596	8hrs	
LED Cob Down Light	9	62	0.558	8hrs	
LED Projector Light	17	24	0.408	8hrs	
LED Down Lighter	17	5	0.085	8hrs	
Sodium vapor Lamp	250	4	1.0	8hrs	
CFL Bulk head	9	17	0.153	8hrs	
LED Flood Light	50	4	0.2	8hrs	
LED Wall Light	13	21	0.273	8hrs	
Pendant Mounted Light	18X2	34	1.224	8hrs	
LED Round Lighting	22	32	0.704	8hrs	
Bollard Light	18	8	0.144	8hrs	
LED Wall Light	7	11	0.077	8hrs	
Total		1116	27.9755	8hrs	223.804

Total Lighting load = 27.9755kW Qty 1116 nos.

Led lighting load = 27.9755kW Qty 1116nos.



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

As per MSEDCCL tariff HT IX- B Public Service –Other

Consumption Slab (kWh)	Fixed/ Demand Charge Rs. /kVA / month	Wheeling Charge (Rs/kWh)	Energy Charge (Rs. /kWh)
All Units	454.00	0.55	08.96
TOD Tariffs (In addition to above base tariffs)			
22.00 Hrs – 06.00 Hrs.			-1.50
06.00 Hrs – 09.00 Hrs.- 12.00 Hrs – 18.00Hrs.			0.00
09.00 Hrs – 12.00 Hrs.			0.80
18.00 Hrs – 22.00 Hrs.			1.10

Approx. unit charges including taxes and electricity duty: - Rs.15/- Unit

3.12 Connected load distribution at campus:

Sr.No.	Description of Building	Load (kW)
01	Main Building No.1	35
02	Main Building No.2	70
03	Electrical Building	14
04	Workshop No.2 Mech.& AUE Building	75
05	Workshop No.1	50
06	Advance Welding Shop	65
07	New Library Building	285
08	All Hostel Campus	91
	Total	685

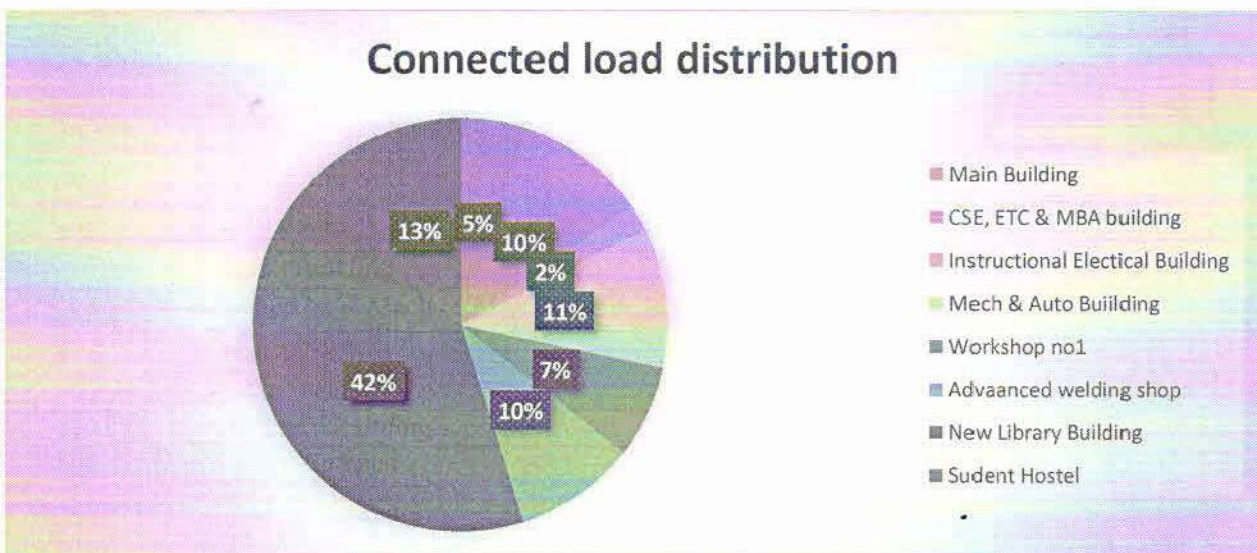
**Fig 1: Building wise Connected load distribution**



Fig 2: Monthly unit Consumption 2022-2023

3.13 Renewable Energy Generation:

To promote green energy and energy conservation, the Rajarambapu Institute of Technology Rajaramnagar, is all set to generate 300kwp electricity by installing Solar PV system on the roof of its RCC buildings. The institute has installed a 300kWp rooftop plant connected to the power grid.

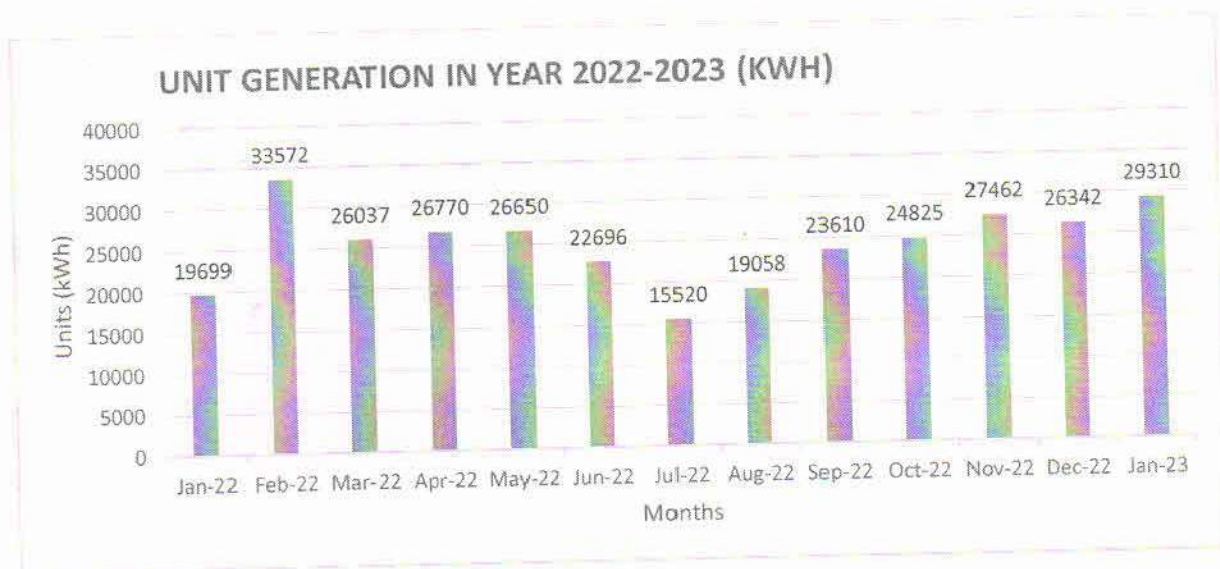


Fig 3: Monthly roof-top solar Energy Generation- 2022 -23

Total Roof Top Solar Electricity Generation for year 2022-2023: - 321551kWh.

Average unit rate of MSEDCL tariff for year 2022-2023: - Rs.15 /- Unit

Total Roof Top Solar Electricity Generation for year 2022-2023 in amounts: Rs. 48,23,265/-

3.14 Table shows the Solar water heater system implemented at hostel.

Sr. No.	Department	Student Capacity	Required Heat Water per Person / Liter	Total Require Water liter	Total Available Capacity of solar water heater in liter
1	New Ladies Hostel	184	20	3680	4000
2	A Hostel	150	20	3000	2000
3	B Hostel	150	20	3000	2500
4	C Hostel	150	20	3000	2000
5	D Hostel	167	20	3340	2500
6	E Hostel	135	20	2700	2000
7	F Hostel	194	20	3880	2000
Total		1130		22600	18000

Energy Saving and Economy Achievement Calculation:

No. of rooms available in hostel = 376 room.

Minimum single electrical geyser will be required for one room. Therefore, minimum 376 no. of geysers having 2kW capacity will be required.

Power being saved = 376 geysers x 2kW = 752kW / day

Energy being saved = 752kW x 1hr = 752 units per day.

Annual Energy Saving = 752 x 300 = 2, 25, 600/- units

Total amount of energy saved/day = 752 Units x 15 Rs/unit. = Rs 11,280 /- per day

Total amount of energy saved /year (300days) = Rs. 11280 x 300 = Rs. 33,84,000/year

Outcome: The implementation of Solar heater system has achieved annual energy saving of 2, 25,600 units and amount Rs. 33,84,000/-

3.2 ENVIRONMENTAL CONSCIOUSNESS AND SUSTAINABILITY: -

i) Percentage of lighting power requirements met through LED bulb =

$$\frac{\text{Lighting power through LED bulb}}{\text{Total Lighting power requirement!}} \times 100$$

$$\frac{59.2175 \text{ kWatt}}{111.7825 \text{ kWatt}} \times 100$$

Percentage of lighting power requirements met through LED bulb = 52.97 % (in terms of wattage)

ii) Percentage of lighting power requirements met through LED bulb =

$$\frac{2811 \text{ Nos.}}{4345 \text{ Nos.}} \times 100 = 64.69 \%$$

Percentage of lighting power requirements met through LED bulb = 64.69 % (in terms of quantity)



3.3 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 for same luminous flux.
- Replacing the 80W ceiling fan in class rooms and laboratories by energy efficient fans of 60w is much help to save the energy.

4.0 SCOPE OF WORK:

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

5. METHODOLOGY:**5.1 SAVING CALCULATION IN EACH CLASS ROOM AND LABORATORY:**

Assumptions: - Working hours of class room, laboratory and office = Approx.4 hrs
Unit for institute energy bill = Approx. Rs.15 / kwh

Specimen calculations:**1) Instructional Building. :**

Recommendations	Monthly present expenditure in Rs.	Investment for the saving of expenditure in Rs.	Savings per month in Rs.	Payback period
Instructional Building (Class rooms): Replace 40W Copper choke tube set by 20 W LED Tube set Quantity -109 no	Rs.6278.40 (kw x4hrs x24 days x 15 Rs.)	Rs.18530.00 (Rs.170/- qty.)	Cost of energy Rs. 6278.40 -Rs.3139.20 Saving =Rs. 3139.20	5.9 months

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 $\frac{40\text{Watt} \times 4\text{hr}}{1000} = 0.16$ kwh per day and monthly unit consumed by tube set = $0.16 \times 24 \text{ days} = 3.84$ kwh / month. Energy consumption of one tube in terms of rupees = $3.84 \text{ kwh} \times \text{Rs.}15 = \text{Rs.}57.60$ / month



Specimen calculation for Fan :- A old fan capacity is 110 W and used for 4 hrs. day so unit consumed by fan is $\frac{110 \text{ Watt} \times 4\text{hr}}{1000} = 0.44 \text{ kwh}$ per day and monthly unit consumed by fan = $0.44 \times 24 \text{ days} = 10.56$

Dept. of Civil has three old ceiling fan. So monthly expenditure due to fan is Rs.475.20

If old fan will have replaced by new energy efficient (BEE star rating) it will consume energy Rs. 12.60 for one month.

Dept. Civil Engineering Replace 110W Old fan with 60W energy efficient fan Quantity- 03 no	Rs.475.20	Rs. 4740.00	Cost of energy Rs. 475.20 - Rs.259.20 Saving = Rs.129.60	3 years
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Tube set type	Cost Rs.	Payback	Life	Efficacy
T-8 LED tube light 1.00 inch	1600-2000	3-4 Yrs	10-15 Yrs.	@100-120 Lumens / 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.

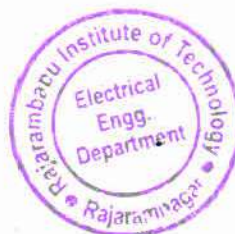
A typical desktop computer uses about up to 250 watts and 20-40 watts for an LCD monitor and don't forget related devices like cable modem uses 7 watts, D-Link DI-604 router uses 4.5 watts,

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 RECOMMENDATIONS

- 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 daylight 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) Do your reading and writing near a window or natural illumination.
- e) Be sure to unplug Overhead projectors, computers and UPS when they're not in use to achieve significant energy saving
- f) Use power "saving option" (hibernate mode) for computer for very short duration and possibly switched off when not in use.
- g) 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.
- h) At hotel Bhattacharya (B), Chanakya (C) and ladies hostel EESHA (E) replace the old type of electric wiring and fitting by new proper ratings, Heat Resistant and Fire Retardant (HRFR) cables and wire with energy efficient luminaries.
- i) At workshop no.1 and workshop no.2 replace the old type of electric wiring and fitting by new proper ratings, Heat Resistant and Fire Retardant (HRFR) cables and wire with energy efficient luminaries.



Mr.D.A.Sawant
Technical Expert



Mr.A.N.Jadhav
Technical Expert



Mr.S.S.Kadam
Technical Expert



Dr. V N Kalkhambkar
Head of Electrical Dept.

Energy Manager BEE (EM-2816)



Energy Audit Certificate

This is to certify that energy audit has been carried as per guidelines provided in Energy Conservation act 2001.

Name of the organization	Rajarambapu Institute of Technology Rajaramnagar , Maharashtra
Building Audited	Educational Institute
Month / Year	Jan 2023
Name of Auditing Authority	1) Dr. Vaiju N. Kalkhambkar Energy Manager, EM-2816, Head, Dept of Electrical Engg.
Validity	1 Year

