

TAGORE DENTAL COLLEGE & HOSPITAL

ENERGY AUDIT REPORT

Sr. No.	Activity	Start Date	End Date
1	Field study as mentioned in scope of work	1.6.2023	31.5.24

Sr. No.	Equipment Name	Observation	Recommendation
1	AC setting	Temperature settings are very low	Optimize the temperature setting to 23 -25 degree Celsius
2	Ceiling Fan (100 w)	Fans are older and without star rating. Replace it on priority	Replacement of existing fans with energy efficient Atomberg (BLDC) fans
3	CFL	College has installed CFL lights of 18 W	Replacement of conventional lights (CFL) with 12w LEDs lights
4	Tube Light	College has installed Tube lights of 40 W	Replacement of conventional Tube light with 20w LEDs lights
5	Ceiling Fan (70 w)	Fans are older and without star rating	Replacement of existing fans with energy efficient Super fans

Observations and Recommendations:

1. College has a 125kVA diesel generator set up for uninterrupted power supply in the event of a TNEB supply outage.
2. Currently, a 150kVA transformer is installed on campus, and it will be extended to 315 kVA in the near future.
3. According to information provided, there are 10 solar-powered LED street lights with a capacity of 40 Watts per panel and 15 W LEDs available on campus.
4. Load needs to be distributed through distribution panel boxes because load is unbalanced during field visits in the campus's electrical distribution system.




ENERGY CONSERVATION MEASURES & RECOMMENDATIONS

ECM 1: Replacement of Conventional Lights (CFL) with LED Lights

Name	Replacement of CFL light 18W with 12W LEDs
Location	All the buildings
Environmental Benefits.	Reduced CO ₂ emissions from less electricity @0.36t CO ₂ e per year

Observations:

The CFL lights are used for lighting purpose. Overhanging wires were observed.

Recommendations:

The existing lighting fittings could be replaced with suitable LEDs. LEDs have better efficiency per watt as well as they have much larger lifespan than CFLs.

Energy Saving Calculation		
Particular	Unit	Value
Power consumption of existing 18W CFL Lights	KW	1.78
Power consumption of 12W LED light	KW	1.19
Average power saving after replacement with LED light	KW	0.59
Replacement of conventional lights (CFL) of 18W with 12W LED Light	Nos	99
Average working hour per day	hrs	3
No. of working days in a year	Days	240



ECM 2: Replacement of Conventional Lights (Tube Light) with LED Lights

Name	Replacement of Conventional Tube Lights with 20W LED Lights
Location	All the buildings
Environmental Benefits.	Reduced CO ₂ emissions from less electricity @8t CO ₂ e per year

Observations:

The Tube lights are used for lighting purpose. Overhanging wires were observed.

Recommendations:

The existing lighting fittings could be replaced with suitable LEDs. LEDs have better efficiency per watt as well as they have much larger life span than FLs .

Type of Fitting	Wattage	Qty	Proposed LED W	Existing KW	Proposed KW	Saved kW
Tube light	40	682	20	27.28	13.64	13.64
TOTAL	40	682	20	27.28	13.64	13.64

Energy Saving Calculation		
Particular	Unit	Value
Power consumption of 40w tube lights	KW	27.28
Power consumption of 20w LED lights	KW	13.64
Average power saving after replacement with LED Street light	KW	13.64
Replacement of conventional lights of 40W with 20W LED lights	Nos	682
Average working hour per day	hrs	3
No. of working days in a year	Days	240



ECM 3: Replacement of Conventional Fans (70 W) with Super-Efficient Fans

Name	Replacement of existing old (without star rating) fans with 5 star rated energy efficient fans
Location	Almost all locations where old fans exist
Environmental Benefits.	Reduced CO ₂ emissions from less electricity @ 10.8t CO ₂ e per year

Observations:

Maximum fans are 70 W of old type without star rated.

Recommendations:

Atomberg Fan is one of the latest Super -Efficient Ceiling fan in the market. This fan has a Brushless DC electronic motor that is super-efficient.

Energy Saving Calculations:

Type of Fitting	Wattage	Qty	Proposed W	Existing KW	Proposed KW	Saved kW
Ceiling Fan	70	725	35	50.75	25.38	25.37
TOTAL	70	725	35	50.75	25.38	25.37

Particular	Unit	value
Total Energy consumption of existing Fans	kW	365 40
Total Energy consumption of proposed Fans	kW	35
Average power saving after replacement with proposed fans	kW	182 70
Operating hrs/year	Hrs/year	720
Diversity factor	%	70%
Annual Saving	kWh/year	127 89

ECM 4: Replacement of Conventional Fans (100 W) with Super-Efficient Fans



Name	Replacement of existing old (without star rating) fans with 5 star rated energy efficient fans
Location	College building
Environmental Benefits.	Reduced CO ₂ emissions from less electricity @0.99t CO ₂ e per year

Observations:

Maximum fans are 100W of old type without star rated. On priority basis Change 100W fans.

Recommendations:

Super Fan is one of the latest Super -Efficient Ceiling fan in the market. This fan has a Brushless DC electronic motor that is super-efficient.

Energy Saving Calculations:

Type of Fitting	Wattage	Qty	Proposed W	Existing KW	Proposed KW	Saved kW
Ceiling Fan	100	35	35	3.5	1.22	2.28
TOTAL	100	35	35	3.5	1.22	2.28

Particular	Unit	value
Total Energy consumption of existing Fans	kW	2520
Total Energy consumption of proposed Fans	kW	35
Average power saving after replacement with proposed fans	kW	882
Operating hrs/year	Hrs/ year	720
Diversity factor	%	70%
Annual Saving	kWh/year	1147



ECM 5: Optimize the Temperature Setting of ACs

Name	Optimize the temperature setting of ACs
Location	All ACs
Environmental Benefits	Reduced CO ₂ emissions from less electricity used @ 1.5 tCO ₂ e per year

Observations:

Temperature settings are very low

Recommendations:

During EEA study at facility it was observed that temperature settings of AC in office & meeting rooms were in the range of 17 °C to 22 °C. It is known that a 1°C raise in AC temperature can help to save almost 3 % on power consumption (this can also be verified in BEE guideline: Chapter 4. HVAC and Refrigeration System).

The TR capacity of the same AC systems will also increase with the increase in evaporator temperature (AC set points), as given in Table below:

Effect of variation in Evaporator Temperature on Compressor Power Consumption			
Evaporator temperature(° C)	Refrigeration Capacity* (tons)	Specific Power Consumption	Increase in kW/ton (%)
5	67.5 8	0.8 1	-
0	56.0 7	0.9 4	16
-5	45.9 8	1.0 8	33
- 10	37.2 5	1.2 5	54
- 20	23.1 2	1.6 7	106

* Condenser temperature 40°C

Hence it was recommended that temperature setting of outlet will be changed from present 23 °C to 25 °C and keeping inlet temperature unaltered.



Energy Saving Calculations:

Particular	Unit	Value
Estimated consumption of Acs	kWh/hr	5623 5
Estimated Saving	%	3%
Operating Hrs per day	hrs/day	3
Operating days per year	Days/year	100
Estimated Saving	kWh/year	1687



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PRIORITIZATION OF ENERGY CONSERVATION MEASURES

Sr. No	Equipment Name	ECM Details	Savings (kWh/year)	Carbon credit (Tons of Co2)
1	Air Conditioner	Optimize the Air Conditioner temperature setting to 23 -25 degree Celsius	1687	1.5
2	Ceiling Fan (100 w)	Replacement of existing fans with energy efficient Super fans	1146.6	0.97
3	CFL	Replacement of conventional lights (CFL) with 12w LEDs	427.68	0.36
4	Tube Light	Replacement of conventional Tube light with 20w LEDs	9820.8	8.35
5	Ceiling Fan (70 w)	Replacement of existing fans with energy efficient Super fans	12789	10.87
TOTAL			25871.08	22.05

