I J C T A, 10(5) 2017, pp. 283-288

A Case Study of Energy Conservation

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Abstract: Energy conservation is done using Light Emitting Diode tube light and super fan in place of fluorescent tube light and normal fan. The total energy conserved of the GITAM University, Hyderabad campus in A, J, H and D blocks is found to be 55842 kilowatt-hours per month. Energy conservation is the energy saving rather than conventional energy generation . Then electrical energy saving means to save the convetional fuels, minimize the pollution and improve the economy of Indian government. This can give more compartable to the majority private sectors like education institutions, industries improve the quality.

Keywords: Energy conservation preparation, Light Emitting Diode tube light, super fan, economy, quality.

1. INTRODUCTION

Energy can be conserved by replacing normal tube light and fans by LED tube light and super fans. Earlier people used the oil lamps and kerosene lamps for lighting purpose. Likewise, as evolution the kerosene lamps were replaced by an incandescent bulb (invented by Edison). Similarly, incandescent bulbs have been replaced by fluorescent tube lights. As now, the fluorescent tube lights have been replaced by LED tube light. What we have understood by all this data is energy has been successively conserved and as well as cost payback period. DC motors were first invented for conversion of electrical energy to mechanical energy. DC motors were developed at the cost of high DC transmission line losses. Then after the invention of transformer, consumers were supplied with AC supply to minimize transmission and distribution losses. Hence, consumer end appliances like fan, grinder, bulb, tube light, etc. were design for AC supply. After the invention of semiconductors, rectifiers were developed which converts AC to DC. Hence consumer end appliances which require a DC supply was made possible by the rectifiers. So at the end major part of transmission and distribution were AC and end consumer's appliances were AC and if consumer needed DC supply it was through rectifier at the load end side. All the domestic consumers were supplied by AC supply and hence, to convert AC electrical energy to mechanical energy like the fan or mixer, single phase induction motor is used which is having a very poor efficiency. A typical value of single phase induction motor at slip s=0.04, efficiency is 73%. Single phase induction motor is not having sufficient starting torque. To overcome the disadvantages of single phase induction motor, permanent magnet BLDC motor is used in super fan. The following section II gives power consumed in case of normal tube light and ceiling fan.

2. POWER CONSUMPTION IN BLOCK 'A' IS GIVEN

Table 1
Power Consumption in each room in each floor of Block 'A'

Room No.	*Building allotment*	*No. of lights*	*Light wattage*	*No. of Fans*	*Fan wattage*	*Total wattage*
	STILT FLOOR					
	Contractor	2	84	1	80	164
	Telephone Exchange	3	126	3	240	366

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Room No.	*Building allotment*	*No. of lights*	*Light wattage*	*No. of Fans*	*Fan wattage*	*Total wattage*
	Surveillance Hub	11	462	1	80	542
	UPS Room	2	84	2	160	244
	Stationery Shop	2	84	1	80	164
	Ice cream counter	8	336	1	80	416
	Maint Store Elec	8	336	1	80	416
	Maint Store Civil	6	252	5	400	652
					TOTAL	2964
	GROUND FLOOR					
A-101A	Physics Lab	2	84	2	160	244
A-101B	Physics Lab	4	168	4	320	488
A-111	Maint Store					
A-112	Maint Store					
A-113	Maint Store					
A-114	Maint Store					
A-115	Maint Store					
A-116	Maint Store					
A-117	Maint Store					
A-118	Maint Store	10	420	5	400	820
A-119	Maint Store					
A-120	Maint Store					
A-121	Maint Store					
A-122	Maint Store					
A-123	Maint Store					
A-124	Maint Store					
A-125T	Ladies Staff Toilet	4	288	1	75	363
A-126T	Ladies Toilet	4	288	1	75	363
A130	Transport Dept	2	84	2	160	244
A131	Admissions	2	84	2	160	244
A132	Hostel	2	84	2	160	244
A133	PRO office	2	84	2	160	244
A134-A	Exam Section	2	84	2	160	244
A134-B	Exam Section	2	84	2	160	244
A135	Exam Strong Room	4	84	4	320	404
A127	Manjeera Hall					
A128	Manjeera Hall					
A129	Manjeera Hall					
A136	Manjeera Hall					
A137	Manjeera Hall					
A138	Manjeera Hall					
A139	Manjeera Hall	19	798	39	3120	3918
A140	Manjeera Hall					
A141	Manjeera Hall					
A142	Manjeera Hall					
A143	Manjeera Hall					
A144	Manjeera Hall					
A145	Manjeera Hall					

Room No.	*Building allotment*	*No. of lights*	*Light wattage*	*No. of Fans*	*Fan wattage*	*Total wattage*
A146	Exam Section	15	630	15	1200	1830
	caridor 1	10	420	0	0	420
	caridor 2	17	714	0	0	714
					TOTAL	11028
	I FLOOR					
A201	Electronic Devices & Circuits-1&2 Lab	10	420	12	960	1380
A211	Digital Electronics-1 Lab	8	336	9	720	1056
A212	ECE office	2	84	2	160	244
A213	Director GST	2	84	9	2320	2404
A214	Digital Electronics-2 Lab	7	294	8	640	934
A215	Comm Sys Linear IC Lab	3	126	7	560	686
A216	Microwave & Adv Comm Sys Lab	8	336	9	720	1056
A217	Gents Staff Toilet	4	288	1	75	363
A218	Gents Toilet	3	216	1	75	291
A219	Conference Hall	8	192	6	3680	3872
A220	Admin	9	378	8	640	1018
A221	Accounts	8	336	5	400	736
A222	ECE Head	9	378	6	480	858
A223	Linear IC Lab	7	294	11	880	1174
	caridor 1	12	504	0	0	504
	caridor 2	10	420	0	0	420
					TOTAL	16996
	II FLOOR					
A301	Teaching Faculty	6	252	6	480	732
A302	Teaching Faculty	4	168	4	320	488
A311	Teaching Faculty	14	588	14	1120	1708
A312	Teaching Faculty					
A313	Teaching Faculty					
A314	Teaching Faculty					
A315	Teaching Faculty					
A316	Teaching Faculty					
A317	Teaching Faculty					
A318	Teaching Faculty					
A319	Waiting Area	2	84	2	160	244
A320	Principal's chamber	8	336	7	560	896
A321	Teaching Faculty	5	210	3	240	450
A322	Teaching Faculty	3	126	3	240	366
A323	Teaching Faculty	3	126	2	160	286
A324	Teaching Faculty	1	42	1	80	122
A325	Teaching Faculty	2	84	1	80	164
A326	Teaching Faculty	2	84	2	160	244
A327	Teaching Faculty	3	126	3	240	366
A328	Waiting Area	1	42	1	80	122
A329	Waiting Area	2	84	1	80	164
A330	PA	1	42	1	80	122
A331	Utility	3	126	2	160	286

Room No.	*Building allotment*	*No. of lights*	*Light wattage*	*No. of Fans*	*Fan wattage*	*Total wattage*
A332	Seminar Hall	12	504	6	480	984
A333	Class Room	14	588	6	480	1068
A334T	Toilets	1	42	1	75	117
A335T	Toilets	1	42	1	75	117
A336	Class Room	20	840	10	800	1640
A337	Class Room	16	672	10	800	1472
A338	Class Room	10	420	10	800	1220
A339	Class Room	12	504	10	800	1304
A340	Class Room	8	336	7	560	896
	caridor 1	9	378	0	0	378
	caridor 2	11	462	0	0	462
					TOTAL	16418
	III FLOOR					
A401	Teaching Faculty	8	336	4	320	656
A402	Teaching Faculty	8	336	8	640	976
A403	HOD Chamber	3	126	3	240	366
A411	Teaching Faculty	7	294	7	560	854
A412	Teaching Faculty					
A413	Teaching Faculty					
A414	Teaching Faculty					
A415	Teaching Faculty					
A416	Teaching Faculty					
A417	Teaching Faculty					
A418	Teaching Faculty					
A421	Teaching Faculty	7	294	7	560	854
A422	Teaching Faculty					
A423	Teaching Faculty					
A424	Teaching Faculty					
A425	Teaching Faculty					
A426	Teaching Faculty					
A427	Teaching Faculty					
A431	Utility	1	42	0	0	42
A432	Seminar Hall	12	504	6	480	984
A433	Class Room	10	420	7	560	980
A434	Toilets	2	144	1	75	219
A435	Toilets	2	144	1	75	219
A436	Class Room	10	420	10	800	1220
A437	Class Room	12	504	10	800	1304
A438	Class Room	6	252	10	800	1052
A439	Class Room	10	420	10	800	1220
A440	Class Room	8	336	7	560	896
	caridor 1	9	378	0	0	378
	caridor 2	11	462	0	0	462
					TOTAL	12682

Room No.	*Building allotment*	*No. of lights*	*Light wattage*	*No. of Fans*	*Fan wattage*	*Total wattage*
	IV FLOOR					
A501	Lab	16	672	4	320	992
A502	Lab	16	672	4	320	992
A503	Lab	8	336	4	320	656
A511	Teaching Faculty	4	168	2	160	328
A512	Teaching Faculty	4	168	3	240	408
A513	Teaching Faculty	2	84	2	160	244
A514	Teaching Faculty	1	42	1	80	122
A515	Teaching Faculty	4	168	3	240	408
A516	Teaching Faculty	2	84	3	240	324
A517	Lab	16	672	4	320	992
A518	Teaching Faculty	4	168	2	160	328
A519	Lab	16	672	4	320	992
A520	Lab	16	672	4	320	992
A521	Utility	1	42	0	0	42
A522	Seminar Hall	10	420	9	720	1140
A523	Class Room	8	336	7	560	896
A524	Toilets	1	72	1	75	147
A525	Toilets	1	72	1	75	147
A526	Class Room	12	504	10	800	1304
A527	Class Room	12	504	10	800	1304
A528	Class Room	12	504	10	800	1304
A529	Class Room	12	504	10	800	1304
A530	Class Room	8	336	7	560	896
	caridor 1	8	336	0	0	336
	caridor 2	11	462	0	0	462
					TOTAL	17060
	V FLOOR					
A-601	Teaching Faculty					
A-602	Teaching Faculty	24	1008	16	1280	2288
A-603	Teaching Faculty					
A-611	HoD & Teaching Faculty	11	462	5	400	862
A-616	Utility	1	42	0	0	42
A-617	Seminar Hall	12	504	9	720	1224
A-618	Class Room	16	672	10	800	1472
A-619T	Toilets	1	72	1	75	147
A-620T	Toilets	1	72	1	75	147
A-621	Class Room	16	672	10	800	1472
A-622	Class Room	16	672	10	800	1472
A-623	Class Room	16	672	10	800	1472
A-624	Class Room	16	672	10	800	1472
A-625	Class Room	16	672	10	800	1472
	caridor 1	8	336	0	0	336
	caridor 2	10	420	0	0	420
					TOTAL	14298

The evaluation of energy conservation procedure is explained in reference [1] where the normal fan is replaced by a super fan and fluorescent tube light is replaced by LED tube light. This energy conservation procedure applying all blocks and the wattage of power saving is given for different blocks in GITAM University, Hyderabad below Table 2.

Table 2
Power savings by using two different LED tube lights of two different wattages

Block	*With 42W FTL, 80W FAN*	*With 27W TL, 32W FAN*	*Saving (W)*	*With 24W LED, 32W FAN*	*Saving (W)*
A BLOCK	91446	43902	47544	41136	50310
J BLOCK	180842	84039	96803	78072	102770
H BLOCK	90260	46673	43587	42904	47356
D BLOCK	66297	35769	30528	34056	32241
TOTAL CONSUMPTION	428845	210383	218462	196168	232677

3. CONCLUSION

Energy saved (assuming eight hours a day, thirty days a month) per month=55842 units per month in the case with 24 watts LED tube light and 32 watt fan. This is an excellent innovation theme where we can generate the energy indirectly, save human lives from pollution, improve the Indian economy and future establishment for private sectors.

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