ENERGY AUDIT REPORT

OF

VELLALAR COLLEGE FOR WOMEN

Thindal, Erode, Tamilnadu-638012

JANUARY 2020

Study Conducted By:

TSP Engineers and Consultants

No.7, B-2-Ayothiya Complex, Thennur High Road,

Trichy, Tamilnadu-620 017

NATIONAL CERTIFICATION EXAMINATION FOR ENERGY MANAGERS AND ENERGY AUDITORS

NOTIFICATION

Notification No: 01/2020-21 **Released Date: 18th March 2020**

Subject: Issuance of Energy Auditor e-Certificate & Energy Auditor e-ID Card to all energy auditors who have attended the refresher course -Reg

The e-Certificate & e-ID card to all qualified energy auditors will be issued only after the relevant notification of the Energy Conservation Act (Amended in 2010), which would be notified by Bureau of Energy Efficiency (BEE).

NPC being the National Certifying Agency (NCA) had issued provisional certificate to all qualified energy auditors till date, which is valid to meet all the statutory requirements.

Upon receipt of BEE notification, NCA would take necessary action to enable the issuance of **e-Certificate & e-ID card to all energy auditor's who have attended the refresher course and got their renewed energy manager e-Certificate & energy manager e-ID Card.**

The list of qualified energy auditors shall be verified by copy pasting the following link http://www.aipnpc.org/Qualified_EA.aspx.

CONTROLLER OF EXAMINATION

TSP ENGINEERS & CONSULTANTS

ELECTRICAL CONTRACTOR. LT & HT (EA - 2582)

ENERGY AUDITOR (BEE CERTIFIED)

GSTIN : 33BDBPS2762N2Z7

25.06.2020

The Principal,

Vellalar College for Women,

Thindal,

Erode - 638012

This is to say that the energy audit was carried out by me and our team. And the recommendations are given based on the study at that moment. I am a certified Energy auditor by Bureau of Energy Efficiency.

Thanks and regards,

Yours sincerely,

T SUNDARAPANDIYAN

CERTIFIED ENERGY AUDITOR

T.SUNDARA PANDIYAN,B.Tech (Elec')
Certified Energy Auditor
No:3, 3rd Cross, 8th Main Road
Srinivasa Nagar, Trichy- 620 017
Cell: 94421 20350

Regn. No. EA-7959

Certificate No 5105

National Productivity Council

(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. .....Sundarapandiyan Thiyagarajan

son / daughter of Mr.....N.Thiyagarajan.....

has passed the National Certification Examination for Energy Auditors held in December 2009 conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001 subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency

Place : Chennai, India

Date : 11th February 2010

Controller of Examination

BUREAU OF ENERGY EFFICIENCY
NEW DELHI
CERTIFIED ENERGY MANAGER

Exam Reg. No.	: EA-7959
Certificate Reg. No.	: 7204
Name	: SUNDARAPANDIYAN THIYAGARAJAN
Son/Daughter of	: N.THIYAGARAJAN
Address	: No.3rd cross, 8th Main road, Srinivasanagar, Trichy - 620017.

Signature of Certified Energy Manager :

Date of Issue : 01.03.2020 Valid Upto : 28.02.2025

Digitally Signed: RAKESH KUMAR RAI
Sun Mar 01 10:45:23 IST 2020
Secretary, BEE New Delhi

Issuing Authority

Name	: R. K RAI
Designation	: Secretary (BEE)
Office Address	: 4th Floor SEWA Bhavan, R. K. Puram, New Delhi- 110066.

DETAILS OF CONSUMER

1. Name of the Consumer	: M/S Vellalar College for Women
2. Name of Contact Person	: Mr. Krishnamoorthy
3. Address	: Thindal, Erode-638012 Tamilnadu-India
4. Email Address	: vellalareducationaltrust@gmail.com
5. Website	: www.vcw.ac.in
6. Total Connected Load	: 554 kW [(110+110+112+112+110) kW]
7. Supporting Location	:VCW [Auditorium, Transport Office, Conference, Outdoor, Block A,B,C,D,E,F,G,H,I]
8. Installed Solar Capacity	: 0 kW
97. Purpose of Consumer	: Educational Institution
10. Type of Tariff	: LM2B2
11. Name of Supplier's Office	: TANGEDCO
12. Period of Audit	: January 2020
13. Date of Submission of Report	: March 2020

APPRECIATION

We wish to record our appreciation on Vellalar College for Women-Erode for their efforts in Energy efficiency, which ought to have benefitted them much, in the competitive business landscape. Vellalar College for Women-Erode certainly belong to select few institution, where many Energy efficiency measures have been implemented and cost savings realized. We appreciate their eagerness to further their Energy efficient journey. Listing below some of the excellent systems, installed.

- **Utilization of Day Light to the maximum**: During Audit period, Audit team noticed none of the lights of Vellalar College for Women were switched ON, wherever require during day time. (Lighting is one of the major energy consuming areas in any Factory/ Plant/ Building/ Institution).This is an appreciable energy conservation act.

Table of Contents

Chapter 1-Introduction

1. INTRODUCTION

1.1 Background

At Vellalar College for Women, Energy consumption depends upon product quality and quantity. Energy Consumption varies due to production levels, availability of raw material, quality of finished product, delays due to frequent change in product mix etc. The institution of perspective service connection has total connected load of 554 kW with the maximum demand of connected load itself. During power shortage, part of the demand is supplied by Diesel Generator.

This Energy Audit covers all major areas including Transformer, Diesel Generators, UPS, Lab Machineries, Compressors, Air Conditioning and Lightings. The Audit team collected the necessary data and measured with portable, sophisticated and diagnostic instruments. Further, with the measured data, all the proposals were discussed with the plant officials for the feasibility and possibility. Based on analyzed data and suggestions from the operating personnel, energy conservation proposals are worked out a detailed in respective chapters.

1.2 Scope of Work

- Carrying out Energy Audit services for achieving Energy Conservation in terms of energy minimizing, energy losses through improvement in the existing systems.
- Study of Energy Utilization in equipments and recommend energy conservation proposals for implementable modifications / alterations to enhance effectiveness, efficient utilization of equipments like:
  - Study of Electrical Power distribution system, quality of power supply and loading on transformer in the institution.
  - Study of Diesel Generators.
  - Study of UPS
  - Air Conditioners.
  - Study of motors/ pumps.
  - Lighting Study.
  - Fans.

1.3 Objectives and methodology

- This Energy Audit by TSP Engineers & Consultants provides a detailed energy project implementation plan for the facility and it evaluates all major energy consuming systems. The final aim of this comprehensive Energy Audit is to identify techno-economically viable energy conservation proposals.
- With this aim in mind, the auditing team carried out following works:
  - Checked all energy consuming equipments with our measuring instruments.
  - Compared the calculated and measured energy consumption with actual, to assess realistic energy saving potentials.
  - Recommendations have been proposed for energy conservation.

1.4 Energy Audit Team

1) Mr. T. Sundarapandiyan B.E., BEE Certified Energy Auditor

2) Mr. Dhamodharan B.E., (T.N.E.B-Retd.)

3) Mr. S. Kadar Muhaideen M.Tech., M.B.A., B.L.,

1.5 List of Instruments used for Energy Audit

Sl. No	INSTRUMENT NAME	MAKE	MODEL	SERIAL NUMBER	MEASURING RANGE
1	3 phase power and Harmonics analyzer	FLUKE	1730	212910	1 A to 3000 A ACCESSORIES: 1. Current Probe: Range: 1 /10 /100 A: 10/100/100A: 300/6300 A Model:382097 2.Voltage probe Make:Chising,Model:TL88-4 Range :650V
2	Digital Lux Meter	Lutron	LX-101	AE 23222	0-50,000 Lux

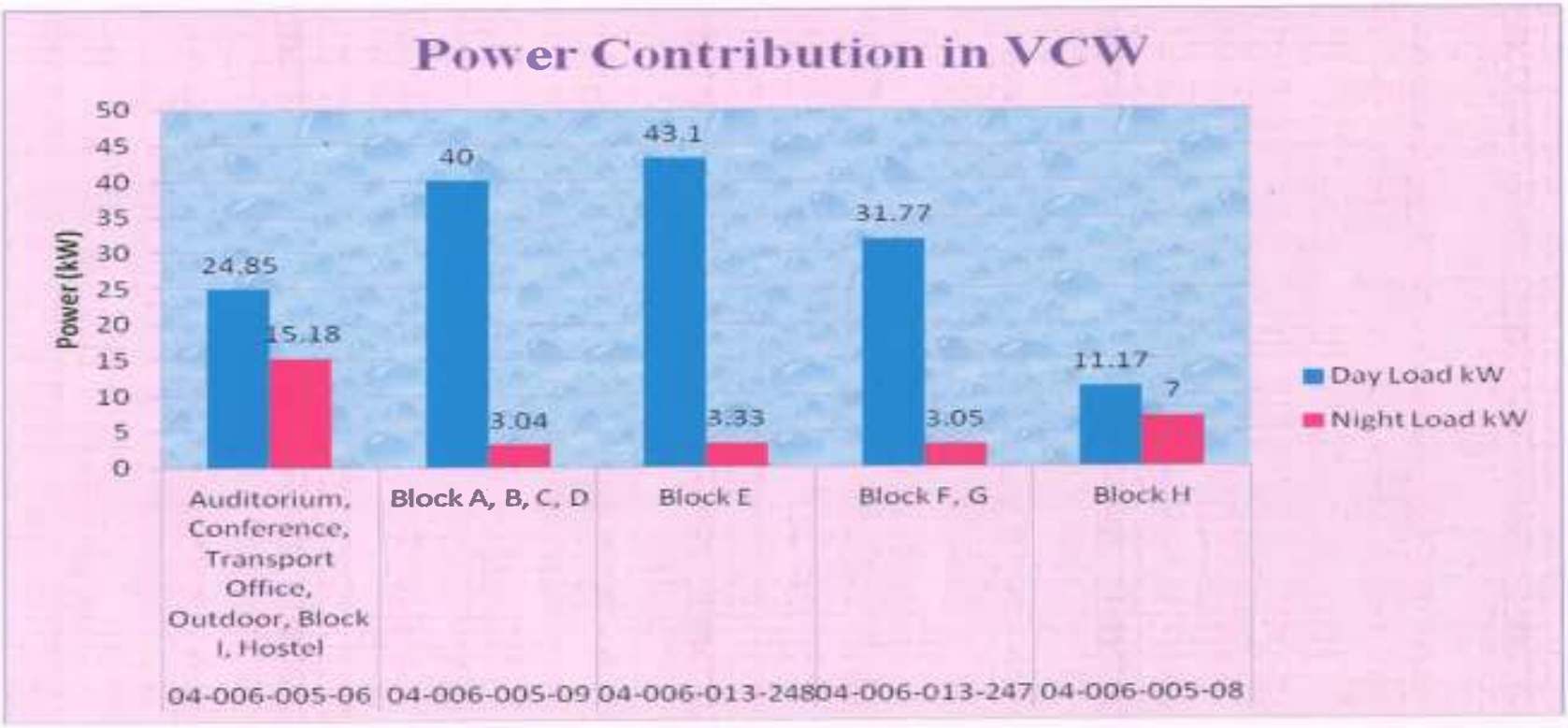
CHAPTER - 2

OVERALL EXECUTIVE SUMMARY OVERVIEW IN VCW

2. OVERALL EXECUTIVE SUMMARY OVERVIEW IN VCW

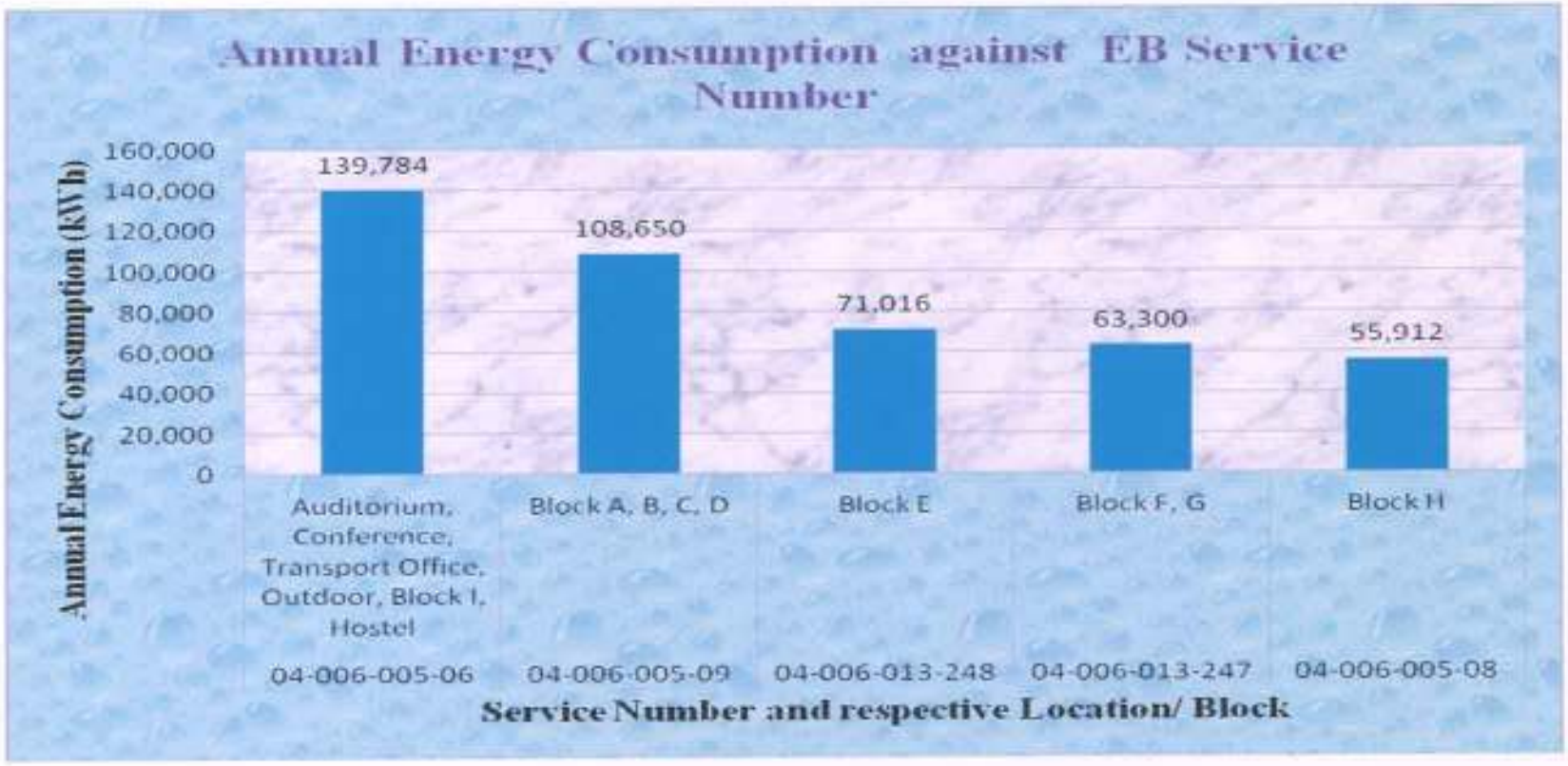
Service Number	Location	Day Load	Night Load	Annual Energy Consumption thru EB Bill	Amount Expendit for EB Bill	Overall Unit Rate	Annual Energy Savings	Annual Monetary Savings	Investment	Payback	Percentage of Energy Savings
		kW	kW	kWh/ Annum	Rs./ Annum	Rs./ kWh	kWh/ Annum	Rs./ Annum	Rs./ Annum	Months	%
04-006-005-06	Auditorium, Conference, Transport Office, Outdoor, Block I, Hostel	24.85	15.18	139,784	1,186,164		33,430	294,510	727,389	30	23.9
04-006-005-09	Block A, B, C, D	40	3.04	108,650	936,015	8.81	58,395	514,438	1,544,826	36	53.7
04-006-013-248	Block E	43.1	3.33	71,016	640,950		26,371	232,320	828,876	43	37.1
04-006-013-247	Block F, G	31.77	3.05	63,300	580,559		60,146	529,863	1,625,363	37	95.0
04-006-005-08	Block H	11.17	7	55,912	520,777		19,266	169,730	463,365	33	34.5
Total		150.8	31.6	438,662	3,864,465		197,608	1,740,861	5,189,820	36	45

2.1 Power Contribution in VCW



Note: Around 200 kVA UPS is available for Backup

2.2 Annual Energy Consumption against EB Service Number



CHAPTER - 3

SERVICE NUMBER: 04-006-005-6 [Transport Office, Auditorium, Conference, Outdoor, Block I]

3. SERVICE NUMBER: 04-006-005-6 [TRANSPORT OFFICE, AUDITORIUM, CONFERENCE, OUTDOOR, BLOCK I]

3. 1 Executive Summary-Service Number: 04-006-005-6 [Transport Office, Auditorium, Conference, Outdoor, Block I]

EXECUTIVE SUMMARY-VCW-Erode

Service Number: 04-006-005-6 [Auditorium, Transport Office, Conference, Outdoor, Block I]

Location	Sl No	Energy Conservation Opportunities	Annual Savings kWh	Annual Savings Rs.	Investment Rs.	Payback Months
		Payback - Immediate				
Auditorium	1	Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's	89	756	Nil	Immediate
Auditorium	2	Optimize Set Temperature of Split AC in Stated Locations	178	1,513	Nil	Immediate
Conference	3	Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's	594	5,043	Nil	Immediate
Conference	4	Optimize Set Temperature of Split AC in Stated Locations	1,188	10,086	Nil	Immediate
Outdoor	5	Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's	178	1,513	Nil	Immediate
Outdoor	6	Optimize Set Temperature of Split AC in Stated Locations	356	3,026	Nil	Immediate
		Short Term Payback < 12 Months				
Conference	7	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations	2,286	19,408	3,480	2.2
Transport Office	8	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations	428	3,637	950	3.1
Block I	9	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations	3,355	28,486	12,120	5.1
Auditorium	10	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations	11,380	96,613	44,390	5.5
Outdoor	11	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations	2,128	18,063	10,090	6.7
Outdoor	12	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	391	3,317	2,683	9.7
Transport Office	13	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	68	577	467	9.7
Auditorium	14	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	2,092	17,762	14,365	9.7
Conference	15	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	246	2,091	1,691	9.7
Block I	16	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	461	3,917	3,168	9.7
		Long Term Payback > 12 Months				
Outdoor	16	Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location	1,161	9,858	45,179	55.0
Conference	17	Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location	3,870	32,860	150,596	55.0
Auditorium	18	Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location	581	4,929	22,589	55.0
Transport Office	19	Replace Conventional Fan to Energy Efficient type of Super Fan	526	4,467	29,700	79.8
Conference	20	Replace Conventional Fan to Energy Efficient type of Super Fan	576	4,890	33,000	81.0
Outdoor	21	Replace Conventional Fan to Energy Efficient type of Super Fan	518	4,401	29,700	81.0
Block I	22	Replace Conventional Fan to Energy Efficient type of Super Fan	2,246	19,072	128,700	81.0
Auditorium	23	Replace Conventional Fan to Energy Efficient type of Super Fan	2,592	22,006	148,500	81.0
Transport Office	24	Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan	54	458	3,300	86.4
Auditorium	25	Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan	648	5,502	39,600	86.4
Outdoor	26	Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan	108	917	6,600	86.4

3.1.1 Summary of Savings

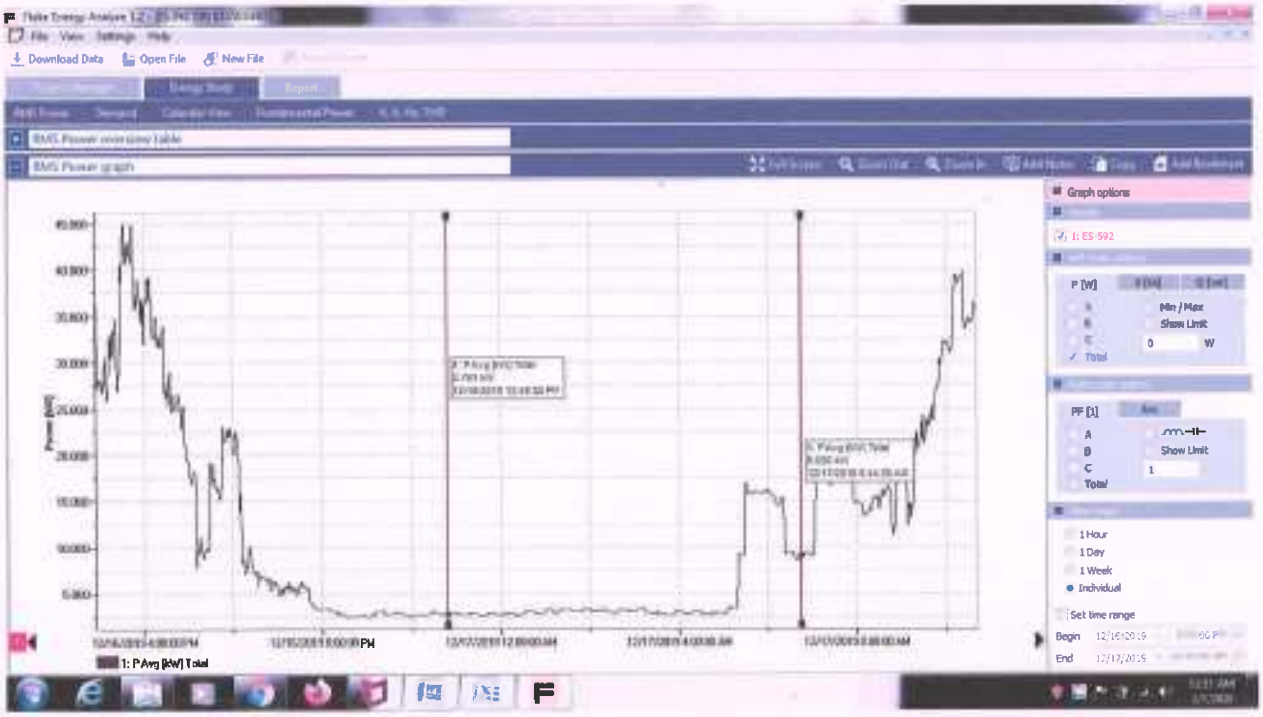
Summary of Savings		Annual Savings		Investment	Payback
		kWh	Rs.	Rs.	Months
Summary	Annual Energy (kWh) Savings	33,430	283,823	727,389	30.8
	Annual Energy Consumption (kWh)-thru EB only	139,784			
	Annual Energy Bill (Rs.)	1,186,164			
	% of Energy Savings	23.92			

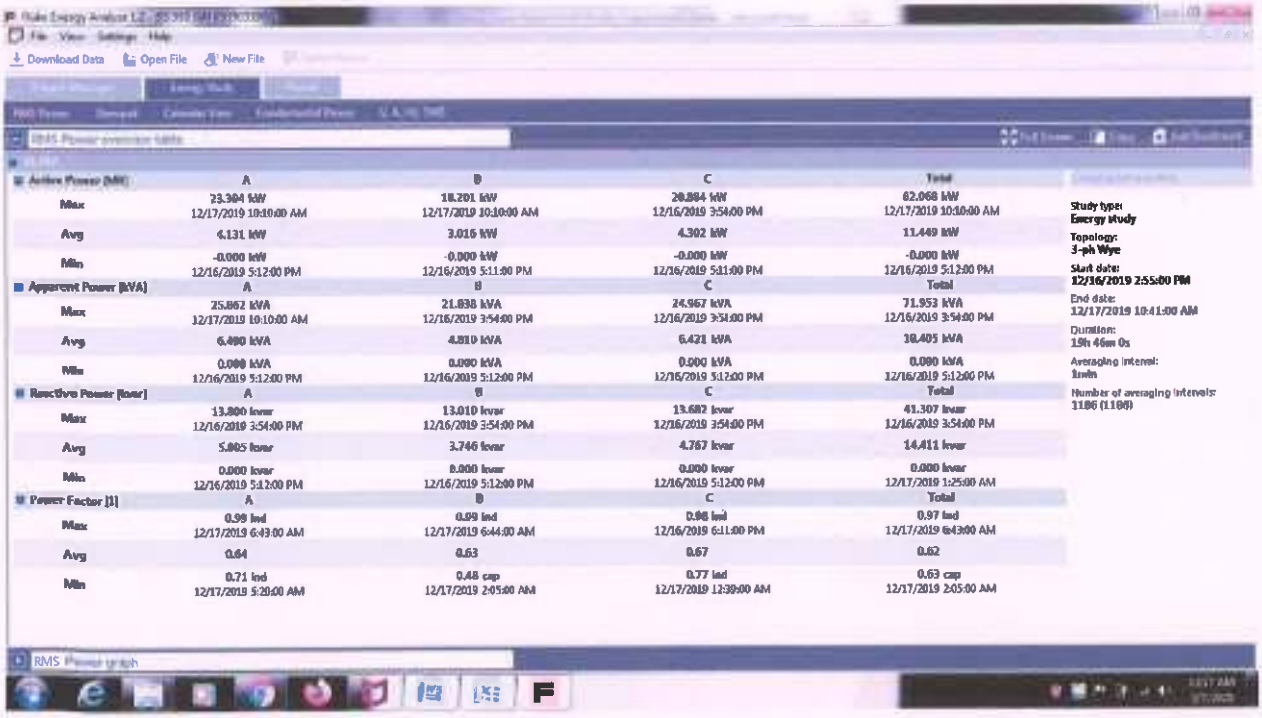
3.1.2 Green Energy Utilization

Green Energy Utilization						
Location	Sl. No	Energy Conservation Opportunities	Annual Savings		Investment	Payback
			kWh	Rs.	Rs.	Years
Transport Office	1	Install Solar Panel for the Specified Loads	2,741	37,895	127,932	3.4
Auditorium	2	Install Solar Panel for the Specified Loads	36,589	505,776	1,707,468	3.4
Conference	3	Install Solar Panel for the Specified Loads	24,952	344,914	1,164,408	3.4
Outdoor	4	Install Solar Panel for the Specified Loads	13,545	187,237	632,100	3.4
Block I	5	Install Solar Panel for the Specified Loads	11,009	152,178	252,336	3.4
Total			88,835	1,228,001	3,884,244	3.2

3.1.3 Load Analysis

Load Pattern (Day & Night)





3.1.4 EB Bill Analysis

EB Bill

Service Number		04-006-005-08												Total
Name of Party		Secretary												
Tariff		LM 2B2												
Connected Load		110 kW												
MF		40												
Month		Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	
Energy Consumption	kWh	4403	2781	5958	6506	3757	1744	4076	8401	5910	3892	5404	3080	55912
Demand Consumption	kVAh	4512	2886	6061	6641	3829	1790	4177	8726	6295	4257	5697	3317	58188
Power Factor	PF	0 97	0 96	0 98	0 98	0.98	0 97	0 98	0 96	0 94	0 91	0 95	0 92	0.958
Maximum Demand	kVA							44 72	56 8	54 56	41 12	46.24	27 02	
Energy Consumption Charges	Rs	33021	20859	44682	48795	28176	13077	30573	63009	44322	29193	40533	22878	419118
E Tax	Rs	1765	1142	2390	2590	1535	690	1664	3321	2381	1586	2168	1228	22459
Fixed Charges	Rs	6600	6600	6600	6600	6600	6600	6600	6600	6600	6600	6600	6600	79200
Total Amount	Rs	41386	28601	53672	57985	36311	20367	38837	72930	53303	37379	49301	30706	520777
Unit Charges	Rs /kWh	9 40	10 28	9.01	8 91	9 67	11.68	9.53	8 68	9 02	9 60	9 12	9 97	9.31

3.2 Energy Conservation Proposals-Transport Office

3.2.1 Lighting

Lighting is a very significant aspect from utility as well as from aesthetic point of view for any plant whether it is industrial or commercial. The efficiency, comfort factors and the quality of lighting should not be compromised.

All the discharge lamps like Fluorescent Tubular Lamp, Compact Fluorescent Lamp require control such as (Starters, ballasts and capacitors) because of their negative impedance characteristics. Therefore ballast is, used for limiting the current and providing the proper voltage for lamp during operation. Thus ballast stabilizes the power supply to the lamp. At Vellalar College for Women, there are various types of lighting fixtures installed in various sections. The Vellalar College for Women lighting system includes conventional tube lights (FTL) and Metal Halide Lamps of various rating.

The Following factors are considered during the Lighting Audit.

Lux (lx):

This is the illuminance produced by a luminous flux of one lumen, uniformly distributed over a surface area of one square metre. One lux is equal to one lumen per square meter.

Installed Load Efficacy:

The average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. **Unit: lux per watt per square metre (lux/W/m²)**

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Transport Office

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Transport Office.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Transport Office

Description	Unit	Conventional to LED Lighting										Total
Block		O/D	O/D	O/D	O/D	O/D	O/D	O/D	O/D	O/D	O/D	Auditorium
Floor												
Location		Transport Office										
Sub-Location		Outer		Bus Driver room	Office 1		Office 2		Room	Main Office	Pantry	
Type of Lamp		LED	FTL	FTL	FTL	LED	CFL	LED	FTL	FTL	FTL	CFL/ FTL/ LED
Capacity of Lamp	W	20	36	36	36	20	9	20	36	36	36	36/ 40
Number of Fixtures		2	1	1	1	2	1	2	1	4	1	
Number of Fittings		1	1	1	1	1	1	1	1	1	1	
Total Number of Lamps		2	1	1	1	2	1	2	1	4	1	16
Actual Power Consumption	kW	0.04	0.036	0.036	0.036	0.04	0.009	0.04	0.036	0.144	0.036	0.45
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	72	64.8	64.8	64.8	72	16.2	72	64.8	259.2	64.8	815
Identification		LED	FTL	FTL	FTL	LED	CFL	LED	FTL	FTL	FTL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	5	20	5	5	5	12/ 20
Expected Total Power Consumption	kW	0.04	0.02	0.02	0.02	0.04	0.005	0.04	0.005	0.02	0.005	0.215
Expected Annual Energy Consumption	kWh/ Annum	72	36	36	36	72	9	72	9	36	9	387
Expected Annual Energy Savings	kWh/ Annum	0	28.8	28.8	28.8	0	7.2	0	55.8	223.2	55.8	428
Percentage of Savings	%	0.00	44.44	44.44	44.44	0.00	44.44	0.00	86.11	86.11	86.11	53
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	0	245	245	245	0	61	0	474	1895	474	3637
Investment Cost	Rs.		200	200	200		50		50	200	50	950
Payback	Month	#DIV/0!	9.82	9.82	9.82	#DIV/0!	9.82	#DIV/0!	1.27	1.27	1.27	3.13

Savings Summary

Annual Energy Savings	*428*	kWh/ Annum
Annual Monetary Savings	*3637*	Rs./ Annum
Investment Cost	*950*	Rs.
Payback	*3.13*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver.***

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Transport Office
Present Average Power Consumption of Lightings	kW	0.45
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	3
Actual Annual Energy Consumption of Lighting	kWh/Year	815
Expected Annual Energy Savings using LES	kWh/Year	68
Energy Cost	Rs/kWh	8.5
Annual Savings	Rs./Annum	577
Capacity of Lighting Energy Saver	kVA	0.47
Investment Cost	Rs	467
Payback period	Months	10

Savings Summary

Annual Energy Savings	*68*	kWh/ Annum
Annual Monetary Savings	*577*	Rs./ Annum
Investment Cost	*467*	Rs.
Payback	*10*	Months

3.2.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan						Total
Block		O/D	O/D	O/D	O/D	O/D	O/D	
Floor								
Location		Transport Office						
Sub-Location		Bus Driver room	Office 1	Office 2	Room	Main Office	Pantry	
Type of Fan		Ceiling						Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60
Total Number of Fan	No.'s	2	1	2	1	2	1	9
Total Power Consumption	kW	0.12	0.06	0.12	0.06	0.12	0.06	0.54
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	7	6
Energy Consumption per Day	kWh/ Day	0.72	0.36	0.72	0.36	0.72	0.42	3.3
Annual Operating Days	Days/ Annum	300	300	300	300	300	301	300
Annual Energy Consumption	kWh/ Annum	216	108	216	108	216	126	990.42
Existing System		Ceiling						Ceiling
Suggestion		EE Super Fan						EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	29	28
Expected Power Consumption	kW	0.056	0.028	0.056	0.028	0.056	0.029	0.253
Expected Energy Consumption	kWh/ Annum	100.8	50.4	100.8	50.4	100.8	61.103	464
Expected Energy Savings	kWh/ Annum	115	58	115	58	115	65	526
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	51.67	53.1
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	978	489	978	489	978	555	4467
Investment	Rs.	6600	3300	6600	3300	6600	3300	29700
Payback	Months	80.98	80.98	80.98	80.98	80.98	71.41	79.8

Savings Summary

Annual Energy Savings	*526*	kWh/ Annum
Annual Monetary Savings	*4467*	Rs./ Annum
Investment Cost	*29700*	Rs.
Payback	*79.8*	Months

3.2.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan.***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan			
Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan	Total
Block		O/D	O/D
Floor			
Location		Transport Office	Transport Office
Sub-Location		Pantry	
Type of Fan		Exhaust Fan	**Exhaust Fan**
Capacity of Fan	W	50	**50**
Total Number of Fan	No 's	1	**1**
Total Power Consumption	kW	0.05	**0.05**
Average Operating Hours	Oper. Hours/ Day	6	**6**
Energy Consumption per Day	kWh/ Day	0 3	**0.3**
Annual Operating Days	Days/ Annum	300	**300**
Annual Energy Consumption	kWh/ Annum	90	**90**
Existing System		Exhaust Fan	**Exhaust Fan**
Suggestion		EE Exhaust Fan	**EE Exhaust Fan**
Suggested Capacity to be replaced	W	20	**20**
Expected Power Consumption	kW	0.02	**0.02**
Expected Energy Consumption	kWh/ Annum	36	**36**
Expected Energy Savings	kWh/ Annum	54	**54**
Savings Percentage	%	60.00	**60.0**
Energy Cost	Rs./ kWh	8.49	**8.49**
Annual Monetary Savings	Rs./ Annum	458	**458**
Investment	Rs.	3300	**3300**
Payback	Months	86.38	**86.4**

Savings Summary		
Annual Energy Savings	*54*	kWh/ Annum
Annual Monetary Savings	*458*	Rs./ Annum
Investment Cost	*3300*	Rs.
Payback	*66.4*	Months

3.2.4 Green Energy Utilization/ Solar Panel

ECP 5: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads										
Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	0.5	0			1	0.253	1	1.5	1
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	815	387	0	0	972	455	954	2,741	1,796
Capacity of Solar Panel Required	kW	0.5	0	0	0	1	0	1	2	1
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	1,087	516	0	0	1,296	607	1,272	3,655	2,395
Energy Cost (inside)	Rs / Annum	8	8	8	8	8	8	8	8	8
Expected Annual Monetary Savings (inside)	Rs / Annum	6,923	3,286	0	0	8,252	3,866	8,099	23,274	15,251
Expected Annual Energy Export	kWh/ Annum	272	129	0	0	324	152	318	913.8	599
Energy Cost for Export	Rs /kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs / Annum	4,349	2,064	0	0	5,184	2,429	5,088	14,621	9,581
Total Annual Monetary Savings	Rs / Annum	11,272	5,350	0	0	13,436	6,295	13,187	37,895	24,832
Investment Cost	Rs	38,052	18,060	0	0	45,360	21,252	44,520	127,932	83,832
Payback period	Year	3	3	#DIV/0!	#DIV/0!	3	3	3	3	3

Savings Summary		
Annual Energy Savings	*2741*	kWh/ Annum
Annual Monetary Savings	*37895*	Rs./ Annum
Investment Cost	*127932*	Rs.
Payback	*3*	Year

3.3 Energy Conservation Proposals-Auditorium

3.3.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional to LED Lighting							
Block		Auditorium							
Location		Stage		Guest room (Right)			Stage Steps	Left top	Right top
Sub-Location					Wash room	Store room			
Type of Lamp		LED	MHL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	24	400	40	40	40	40	40	40
Number of Fixtures		24	1	1	1	1	3	8	8
Number of Fittings		1	1	2	2	1	1	1	1
Total Number of Lamps		24	1	2	2	1	3	8	8
Actual Power Consumption	kW	0.576	0.4	0.08	0.08	0.04	0.12	0.32	0.32
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	1036.8	720	144	144	72	216	576	576
Identification		LED	MHL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	24	120	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.576	0.12	0.02	0.02	0.02	0.06	0.16	0.16
Expected Annual Energy Consumption	kWh/ Annum	1036.8	216	36	36	36	108	288	288
Expected Annual Energy Savings	kWh/ Annum	0	504	108	108	36	108	288	288
Percentage of Savings	%	0.00	70.00	75.00	75.00	50.00	50.00	50.00	50.00
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	0	4278.96	916.92	916.92	305.64	916.92	2445.12	2445.12
Investment Cost	Rs		1200	200	200	200	600	1600	1600
Payback	Month	#DIV/0!	3.37	2.62	2.62	7.85	7.85	7.85	7.85

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional to LED Lighting							
Block		Auditorium							
Location		Guest room (Left)		Stage Steps	Top	Top	Bottom	Bottom	Ladies rest room
Sub-Location			Store room		Row 1 to 6		Row 1 to 5		
Type of Lamp		FTL	FTL	FTL	LED	FTL	LED	FTL	FTL
Capacity of Lamp	W	40	40	40	15	28	15	28	40
Number of Fixtures		2	1	3	66	95	64	63	1
Number of Fittings		2	1	1	1	1	1	1	1
Total Number of Lamps		4	1	3	66	95	64	63	1
Actual Power Consumption	kW	0.16	0.04	0.12	0.99	2.66	0.96	1.764	0.04
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	288	72	216	1782	4788	1728	3175.2	72
Identification		FTL	FTL	FTL	LED	FTL	LED	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	15	12	15	12	12
Expected Total Power Consumption	kW	0.04	0.02	0.06	0.99	1.14	0.96	0.756	0.012
Expected Annual Energy Consumption	kWh/ Annum	72	36	108	1782	2052	1728	1360.8	21.6
Expected Annual Energy Savings	kWh/ Annum	216	36	108	0	2736	0	1814.4	50.4
Percentage of Savings	%	75.00	50.00	50.00	0.00	57.14	0.00	57.14	70.00
Energy Cost	Rs / kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs / Annum	1834	306	917	0	23229	0	15404	428
Investment Cost	Rs.	400	200	600		11400		7560	120
Payback	Month	2.62	7.85	7.85	#DIV/0!	5.89	#DIV/0!	5.89	3.37

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Light to LED Lighting							
Block		Auditorium							
Floor								FF	FF
Location			Front	Gents Toilet	Gents Toilet	Steps	Steps	Left Pathway	
Sub-Location		Pathway			Pathway	Left	Right		
Type of Lamp		FTL	FTL	FTL	FTL	SVL	SVL	CFL	CFL
Capacity of Lamp	W	40	9	40	40	150	150	9	9
Number of Fixtures		8	10	1	4	1	1	8	1
Number of Fittings		1	4	1	1	1	1	1	2
Total Number of Lamps		8	40	1	4	1	1	8	2
Actual Power Consumption	kW	0.32	0.36	0.04	0.16	0.15	0.15	0.072	0.018
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	576	648	72	288	270	270	129.6	32.4
Identification		FTL	FTL	FTL	FTL	SVL	SVL	CFL	CFL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	12	12	20	20	36	36	5	5
Expected Total Power Consumption	kW	0.096	0.12	0.02	0.08	0.036	0.036	0.04	0.005
Expected Annual Energy Consumption	kWh/ Annum	172.8	216	36	144	64.8	64.8	72	9
Expected Annual Energy Savings	kWh/ Annum	403.2	432	36	144	205.2	205.2	57.6	23.4
Percentage of Savings	%	70.00	66.67	50.00	50.00	76.00	76.00	44.44	72.22
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	3423	3668	306	1223	1742	1742	489	199
Investment Cost	Rs.	960	1200	200	800	360	360	400	50
Payback	Month	3.37	3.93	7.85	7.85	2.48	2.48	9.82	3.02

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Light to LED Lighting							
Block		Auditorium							
Floor		FF	FF	FF	FF	FF	FF	FF	FF
Location		Bathroom	Store room	Seating		Ladies Toilet	Store	Pathway	Mini Conference Hall
Sub-Location				Row 8/9/10					
Type of Lamp		FTL	FTL	LED	FTL	FTL	FTL	CFL	FTL
Capacity of Lamp	W	40	40	15	28	40	40	9	36
Number of Fixtures		1	1	44	44	1	1	9	6
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		1	1	44	44	1	1	9	6
Actual Power Consumption	kW	0.04	0.04	0.66	1.232	0.04	0.04	0.081	0.216
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	72	72	1188	2217.6	72	72	145.8	388.8
Identification		FTL	FTL	LED	FTL	FTL	FTL	CFL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	15	12	20	20	5	20
Expected Total Power Consumption	kW	0.02	0.02	0.66	0.528	0.02	0.02	0.045	0.12
Expected Annual Energy Consumption	kWh/ Annum	36	36	1188	950.4	36	36	81	216
Expected Annual Energy Savings	kWh/ Annum	36	36	0	1267.2	36	36	64.8	172.8
Percentage of Savings	%	50.00	50.00	0.00	57.14	50.00	50.00	44.44	44.44
Energy Cost	Rs / kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs / Annum	306	306	0	10759	306	306	550	1467
Investment Cost	Rs	200	200		5280	200	200	450	1200
Payback	Month	7.85	7.85	#DIV/0!	5.89	7.85	7.85	9.82	9.82

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Light to LED Lighting							
Block		Auditorium							
Floor		FF	GF	GF	GF	GF	GF	GF	GF
Location		Portico	Printing Press	Printing Press	Printing Press	Printing Press	Typewriting		
Sub-Location			Corridor	Stritching	Press				
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	CFL
Capacity of Lamp	W	9	36	36	36	36	40	40	18
Number of Fixtures		12	4	2	4	3	1	2	3
Number of Fittings		4	1	1	1	2	2	1	1
Total Number of Lamps		48	4	2	4	6	2	2	3
Actual Power Consumption	kW	0.432	0.144	0.072	0.144	0.216	0.08	0.08	0.054
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	777.6	259.2	129.6	259.2	388.8	144	144	97.2
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	CFL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	12	20	20	20	20	20	20	7
Expected Total Power Consumption	kW	0.144	0.08	0.04	0.08	0.06	0.02	0.04	0.021
Expected Annual Energy Consumption	kWh/ Annum	259.2	144	72	144	108	36	72	37.8
Expected Annual Energy Savings	kWh/ Annum	518.4	115.2	57.6	115.2	280.8	108	72	59.4
Percentage of Savings	%	66.67	44.44	44.44	44.44	72.22	75.00	50.00	61.11
Energy Cost	Rs / kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs / Annum	4401	978	489	978	2384	917	611	504
Investment Cost	Rs	1440	800	400	800	600	200	400	210
Payback	Month	3.93	9.82	9.82	9.82	3.02	2.62	7.85	5.00

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Light to LED Lighting				Total
Block		Auditorium				Auditorium
Floor		GF	GF	GF	GF	
Location			Thendral Beauty Care	Thendral Beauty Care	EB room	
Sub-Location				Room		
Type of Lamp		FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Capacity of Lamp	W	36	36	36	40	36/ 40
Number of Fixtures		3	2	2	1	
Number of Fittings		1	2	2	1	
Total Number of Lamps		3	4	4	1	601
Actual Power Consumption	kW	0.108	0.144	0.144	0.04	13.947
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	194.4	259.2	259.2	72	25104.6
Identification		FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	12/ 20
Expected Total Power Consumption	kW	0.06	0.04	0.04	0.02	7.625
Expected Annual Energy Consumption	kWh/ Annum	108	72	72	36	13725
Expected Annual Energy Savings	kWh/ Annum	86.4	187.2	187.2	36	11379.6
Percentage of Savings	%	44.44	72.22	72.22	50.00	45.33
Energy Cost	Rs / kWh	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	734	1589	1589	306	96613
Investment Cost	Rs.	600	400	400	200	44390
Payback	Month	9.82	3.02	3.02	7.85	5.51

Savings Summary

Annual Energy Savings	*11379*	kWh/ Annum
Annual Monetary Savings	*96613*	Rs./ Annum
Investment Cost	*44390*	Rs.
Payback	*5.5*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver***.

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Auditorium
Present Average Power Consumption of Lightings	kW	14
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	84
Actual Annual Energy Consumption of Lighting	kWh/Year	25,105
Expected Annual Energy Savings using LES	kWh/Year	2,092
Energy Cost	Rs/kWh	8.5
Annual Savings	Rs./Annum	17,762
Capacity of Lighting Energy Saver	kVA	14
Investment Cost	Rs	14,365
Payback period	Months	10

Savings Summary

Annual Energy Savings	*2002*	kWh/ Annum
Annual Monetary Savings	*17762*	Rs./ Annum
Investment Cost	*14365*	Rs.
Payback	*10*	Months

3.3.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan									Total
Block		Auditorium									
Floor			FF	FF	GF	GF	GF	GF	GF	GF	
Location		Guest room (Right)	Seating	Mini Conference Hall	Printing Press	Printing Press	Typewriti ng	Thendral Beauty Care	Thendral Beauty Care	EB room	
Sub-Location			Row 8/9/10		Stitching	Press			Room		
Type of Fan		Ceiling									Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	24	6	1	3	6	1	1	1	45
Total Power Consumption	kW	0.12	1.44	0.36	0.06	0.18	0.36	0.06	0.06	0.06	2.7
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	8.64	2.16	0.36	1.08	2.16	0.36	0.36	0.36	16.2
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	2592	648	108	324	648	108	108	108	4860
Existing System		Ceiling									Ceiling
Suggestion		EE Super Fan									EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.672	0.168	0.028	0.084	0.168	0.028	0.028	0.028	1.26
Expected Energy Consumption	kWh/ Annum	100.8	1209.6	302.4	50.4	151.2	302.4	50.4	50.4	50.4	2268
Expected Energy Savings	kWh/ Annum	115	1382	346	58	173	346	58	58	58	2592
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.3
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	978	11737	2934	489	1467	2934	489	489	489	22006
Investment	Rs.	6600	79200	19800	3300	9900	19800	3300	3300	3300	148500
Payback	Months	80.98	80.98	80.98	80.98	80.98	80.98	80.98	80.98	80.98	81.0

Savings Summary

Annual Energy Savings	*2592*	kWh/ Annum
Annual Monetary Savings	*22006*	Rs./ Annum
Investment Cost	*148500*	Rs.
Payback	*81*	Months

3.3.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan.***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan					Total
Block		Auditorium					Auditorium
Floor						GF	
Location		Seating	Guest room (Right)	Guest room (Left)	Bottom	EB room	
Sub-Location			Wash room		Row 1 to 5		
Type of Fan		Exhaust Fan					Exhaust Fan
Capacity of Fan	W	50	50	50	50	50	50
Total Number of Fan	No.'s	4	1	2	4	1	12
Total Power Consumption	kW	0.2	0.05	0.1	0.2	0.05	0.6
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	1.2	0.3	0.6	1.2	0.3	3.6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	360	90	180	360	90	1080
Existing System		Exhaust Fan					Exhaust Fan
Suggestion		EE Exhaust Fan					EE Exhaust Fan
Suggested Capacity to be replaced	W	20	20	20	20	20	20
Expected Power Consumption	kW	0.08	0.02	0.04	0.08	0.02	0.24
Expected Energy Consumption	kWh/ Annum	144	36	72	144	36	432
Expected Energy Savings	kWh/ Annum	216	54	108	216	54	648
Savings Percentage	%	60.00	60.00	60.00	60.00	60.00	60.0
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs / Annum	1834	458	917	1834	458	5502
Investment	Rs.	13200	3300	6600	13200	3300	39600
Payback	Months	86.38	86.38	86.38	86 38	86.38	86.4

Savings Summary

Annual Energy Savings	*648*	kWh/ Annum
Annual Monetary Savings	*5502*	Rs./ Annum
Investment Cost	*39600*	Rs.
Payback	*86.4*	Months

3.3.4 Air Conditioning

Air Conditioning System consumes significant amount of energy in Vellalar College for Women. Energy consumed by air conditioning systems is sensitive to load changes, seasonal variations, operation and maintenance, ambient conditions etc. In general the energy consumption of any air conditioning system depends on the following factors:

1. Room volume
2. Set temperature
3. Type of air conditioning system provided
4. Tonnage

At Vellalar College for Women, most of the AC's are utilized in office area, Conference room and Inverter room.

In general, most of the existing air conditioning units waste a significant part of consumed electricity because of uncontrolled set temperature, To make it more energy efficient, effective energy management steps are to be followed.

Theoretical Background:

There is a tendency of the process group to operate with high safety margins which influences the compressor suction pressure / evaporator set point. For instance, a process cooling requirement of 15°C would need chilled water at a lower temperature, but the range can vary from 6°C to say 10°C. At 10°C chilled water temperature, the refrigerant side temperature has to be lower, say –5°C to +5°C. The refrigerant temperature again sets the corresponding suction pressure of refrigerant which decides the inlet duty conditions for work of compression of the refrigerant compressor. Having the optimum / minimum driving force (temperature difference) can, thus, help to achieve highest possible suction pressure at the compressor, thereby leading to less energy requirement. This requires proper sizing of heat transfer areas of process heat exchangers and evaporators as well as rationalizing the temperature requirement to highest possible value. A 1°C raise in evaporator temperature can help to save almost 3% of energy savings.

The auditors had noted the set temperature at various locations in the plant. As per the standard, the set temperature should be in the range of 24 – 27 deg C, which is energy modest. Apart from this the specified temperature level is also good for human comfort. Hence it is recommended to reduce the set temperature of AC at the locations as given below.

ECP 5: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance	Total
Block		Auditorium	**Auditorium**
Floor			
Location		Guest room (Right)	
Sub-Location			
Type	Split/ Window	Split	
Make		Bluestar	
Capacity - TR	TR	1.5	**1.5**
Star rate			
Quantity	No.'s	1	**1**
EER			
Power Consumption - kW	kW	1.65	**1.65**
Total Power Consumption, kW	kW	1.65	**1.7**
Working hours	Hours/ Day	6	**6**
Annual Operating Days	Days/ Annum	300	**300**
Annual Energy Consumption	kWh/ Annum	2970	**2970**
Expected Power Consumption	kW	1.60	**1.6005**
Expected Power Savings	kW	0.05	**0.0495**
Savings Percentage	%	3.00	**3**
Expected Annual Energy Consumption	kWh/ Annum	2881	**2880.9**
Expected Annual Energy Savings	kWh/ Annum	89	**89.1**
Energy Cost	Rs./ kWh	8	**8.49**
Cost Saving Per annum	Rs./ Annum	756	**756**
Investment	Rs.	Nil	**Nil**
Payback	Months	Immediate	**Immediate**

Savings Summary

Annual Energy Savings	*89*	kWh/ Annum
Annual Monetary Savings	*756*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 6: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations			
Description	**Unit**	**Set Temp. Reduction**	**Total**
Block		Auditorium	**Auditorium**
Floor			
Location		Guest room (Right)	
Sub-Location			
Type	Split/ Window	Split	
Make		Bluestar	
Capacity	TR	1.5	**1.5**
Star rate			
Quantity	No.'s	1	**1**
EER			
Power Consumption	kW	1.65	**1.65**
Total Power Consumption	kW	1.65	**1.65**
Working hours	Hour	6	**6**
Annual Working Days	Days/ Annum	300	**300**
Actual Energy Consumption	kWh/ Annum	2970	**2970**
Present Set Temperature	Deg C	20	
Required Temperature	Deg C	24	
Set Point @ Thermostat	Deg. C	22	
Expected Power Consumption	kW	1 55	**1.551**
Expected Power Savings	kW	0.10	**0.099**
Savings Percentage	%	6.00	**6**
Expected Annual Energy Consumption	kWh/ Annum	2792	**2791.8**
Expected Annual Energy Savings	kWh/ Annum	178	**178.2**
Energy Cost	Rs./ kWh	8	**8.49**
Cost Saving per Annum	Rs./ Annum	1,513	**1513**
Investment	Rs.	Nil	**Nil**
Payback	Months	Immediate	**Immediate**

Savings Summary		
Annual Energy Savings	*178*	kWh/ Annum
Annual Monetary Savings	*1513*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 7: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC	Total
Block		Auditorium	**Auditorium**
Floor			
Location		Guest room (Right)	
Sub-Location			
Type of AC	Type	Split	**Split/ Window**
Make		Bluestar	
Rated Capacity of AC's	TR	1.5	**1.5**
Actual Star Rated			
No of AC		1	**1**
Energy Efficiency Ratio (EER)	EER		
Cooling Capacity	kCal/hr	4539	
Total Capacity of AC's	TR	1.5	**2**
Power Consumption of Actual AC	Watt	1623	**1623**
EER of 5 Star AC	EER	3 21	
Power Consumption of 5 Star AC	Watt	1414	**1414**
Estimated Power Savings	Watt	322.5	**323**
Expected Power Consumption	kW	1.1	**1.09**
Operating Hours	Hours/ Day	6	**6.0**
Annual Working Days	Days/Annum	300	**300**
Annual Actual Energy Consumption	kWh/Annum	2922	**2922**
Expected Annual Energy Consumption	kWh/Annum	2342	**2342**
Estimated Annual Energy Savings	kWh/Annum	581	**581**
Energy Cost	Rs /kWh	8.49	**8.5**
Annual Monetary Savings	Rs./Annum	4929	**4929**
Investment Cost	Rs.	22589	**22589**
Payback	Months	55	**55.0**

Savings Summary

Annual Energy Savings	*581*	kWh/ Annum
Annual Monetary Savings	*4929*	Rs./ Annum
Investment Cost	*22589*	Rs.
Payback	*55*	Months

3.3.5 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	14	8	2	1	3	1 260	2	20	12
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	25,105	13,725	3,060	2,545	4,860	2,268	3,564	36,589	22,102
Capacity of Solar Panel Required	kW	15	8	2	1	3	1	2	21	13
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	33,473	18,300	4,080	3,393	6,480	3,024	4,752	48,785	29,469
Energy Cost (inside)	Rs / Annum	8	8	8	8	8	8	8	8	8
Expected Annual Monetary Savings (inside)	Rs./ Annum	213,138	116,525	25,979	21,604	41,261	19,255	30,258	310,637	187,643
Expected Annual Energy Export	kWh/ Annum	8,368	4,575	1,020	848	1,620	756	1,188	12,196.2	7,367
Energy Cost for Export	Rs /kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs / Annum	133,891	73,200	16,320	13,571	25,920	12,096	19,008	195,139	117,875
Total Annual Monetary Savings	Rs / Annum	347,029	189,725	42,299	35,175	67,181	31,351	49,266	505,776	305,518
Investment Cost	Rs	1,171,548	640,500	142,800	118,748	226,800	105,840	166,320	1,707,468	1,031,408
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*36589*	kWh/ Annum
Annual Monetary Savings	*505776*	Rs./ Annum
Investment Cost	*1707468*	Rs.
Payback	*3*	Year

3.4 Energy Conservation Proposals-Conference

3.4.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Light to LED Lighting							Total
Block		Conference Hall							Conference Hall
Location		Steps towards Conference Hall		Corridor	Hall			Bus Shed	
Sub-Location									
Type of Lamp		LED	SVL	CFL	FTL	CFL	CFL	FTL	SVL/ CFL/ FTL/ LED
Capacity of Lamp	W	24	250	24	40	36	18	36	250/ 36/ 40
Number of Fixtures		1	1	2	3	4	18	4	
Number of Fittings		1	1	1	2	2	2	1	
Total Number of Lamps		1	1	2	6	8	36	4	58
Actual Power Consumption	kW	0.024	0.25	0.048	0.24	0.288	0.648	0.144	1.642
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	43.2	450	86.4	432	518.4	1166.4	259.2	2955.6
Identification		LED	SVL	CFL	FTL	CFL	CFL	FTL	SVL/ CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	24	24	9	20	12	9	9	12/ 20
Expected Total Power Consumption	kW	0.024	0.024	0.018	0.06	0.048	0.162	0.036	0.372
Expected Annual Energy Consumption	kWh/ Annum	43.2	43.2	32.4	108	86.4	291.6	64.8	669.6
Expected Annual Energy Savings	kWh/ Annum	0	406.8	54	324	432	874.8	194.4	2286
Percentage of Savings	%	0.00	90.40	62.50	75.00	83.33	75.00	75.00	77.34
Energy Cost	Rs / kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs / Annum	0	3454	458	2751	3668	7427	1650	19408
Investment Cost	Rs		240	180	600	480	1620	360	3480
Payback	Month	#DIV/0!	0.83	4.71	2.62	1.57	2.62	2.62	2.15

Savings Summary

Annual Energy Savings	*2286*	kWh/ Annum
Annual Monetary Savings	*19408*	Rs./ Annum
Investment Cost	*3480*	Rs.
Payback	*2.15*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver***.

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver		
Description	**Units**	**Conference**
Present Average Power Consumption of Lightings	kW	2
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	10
Actual Annual Energy Consumption of Lighting	kWh/Year	2,956
Expected Annual Energy Savings using LES	kWh/Year	246
Energy Cost	Rs/kWh	8.5
Annual Savings	Rs./Annum	2,091
Capacity of Lighting Energy Saver	kVA	2
Investment Cost	Rs	1,691
Payback period	Months	10

Savings Summary		
Annual Energy Savings	*246*	kWh/ Annum
Annual Monetary Savings	*2091*	Rs./ Annum
Investment Cost	*1691*	Rs.
Payback	*10*	Months

3.4.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan		Total
Block		Conference Hall		
Floor				
Location		Hall	Bus Shed	
Sub-Location				
Type of Fan		Ceiling	Ceiling	**Ceiling**
Capacity of Fan	W	60	60	**60**
Total Number of Fan	No.'s	8	2	**10**
Total Power Consumption	kW	0.48	0.12	**0.6**
Average Operating Hours	Oper. Hours/ Day	6	6	**6**
Energy Consumption per Day	kWh/ Day	2.88	0.72	**3.6**
Annual Operating Days	Days/ Annum	300	300	**300**
Annual Energy Consumption	kWh/ Annum	864	216	**1080**
Existing System		Ceiling	Ceiling	**Ceiling**
Suggestion		EE Super Fan	EE Super Fan	**EE Super Fan**
Suggested Capacity to be replaced	W	28	28	**28**
Expected Power Consumption	kW	0.224	0.056	**0.28**
Expected Energy Consumption	kWh/ Annum	403.2	100.8	**504**
Expected Energy Savings	kWh/ Annum	461	115	**576**
Savings Percentage	%	53.33	53.33	**53.3**
Energy Cost	Rs./ kWh	8.49	8.49	**8.49**
Annual Monetary Savings	Rs./ Annum	3912	978	**4890**
Investment	Rs.	26400	6600	**33000**
Payback	Months	80.98	80.98	**81.0**

Savings Summary

Annual Energy Savings	*576*	kWh/ Annum
Annual Monetary Savings	*4890*	Rs./ Annum
Investment Cost	*33000*	Rs.
Payback	*81*	Months

3.4.3 Air Conditioning

ECP 4: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance	Total
Block		Conference Hall	**Conference Hall**
Floor			
Location		Hall	
Sub-Location			
Type	Split/ Window	Split	
Make			
Capacity - TR	TR	2	**2**
Star rate			
Quantity	No.'s	5	**5**
EER			
Power Consumption - kW	kW	2.2	**2.2**
Total Power Consumption, kW	kW	11	**11.0**
Working hours	Hours/ Day	6	**6**
Annual Operating Days	Days/ Annum	300	**300**
Annual Energy Consumption	kWh/ Annum	19800	**19800**
Expected Power Consumption	kW	10.67	**10.67**
Expected Power Savings	kW	0.33	**0.33**
Savings Percentage	%	3.00	**3**
Expected Annual Energy Consumption	kWh/ Annum	19206	**19206**
Expected Annual Energy Savings	kWh/ Annum	594	**594**
Energy Cost	Rs./ kWh	8	**8.49**
Cost Saving Per annum	Rs./ Annum	5,043	**5043**
Investment	Rs.	Nil	**Nil**
Payback	Months	Immediate	**Immediate**

Savings Summary

Annual Energy Savings	*594*	kWh/ Annum
Annual Monetary Savings	*5043*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 5: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations

Description	Unit	Set Temp. Reduction	Total
Block		Conference Hall	**Conference Hall**
Floor			
Location		Hall	
Sub-Location			
Type	Split/ Window	Split	
Make			
Capacity	TR	2	**2**
Star rate			
Quantity	No.'s	5	**5**
EER			
Power Consumption	kW	2.2	**2.2**
Total Power Consumption	kW	11	**11**
Working hours	Hour	6	**6**
Annual Working Days	Days/ Annum	300	**300**
Actual Energy Consumption	kWh/ Annum	19800	**19800**
Present Set Temperature	Deg. C	20	
Required Temperature	Deg. C	24	
Set Point @ Thermostat	Deg. C	22	
Expected Power Consumption	kW	10.34	**10.34**
Expected Power Savings	kW	0.66	**0.66**
Savings Percentage	%	6.00	**6**
Expected Annual Energy Consumption	kWh/ Annum	18612	**18612**
Expected Annual Energy Savings	kWh/ Annum	1188	**1188**
Energy Cost	Rs./ kWh	8	**8.49**
Cost Saving per Annum	Rs./ Annum	10,086	**10086**
Investment	Rs.	Nil	**Nil**
Payback	Months	Immediate	**Immediate**

Savings Summary

Annual Energy Savings	*1188*	kWh/ Annum
Annual Monetary Savings	*10086*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 6: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC	Total
Block		Conference Hall	**Conference Hall**
Floor			
Location		Hall	
Sub-Location			
Type of AC	Type	Split	**Split/ Window**
Make			
Rated Capacity of AC's	TR	2	**2**
Actual Star Rated			
No of AC		5	**5**
Energy Efficiency Ratio (EER)	EER		
Cooling Capacity	kCal/hr	6052	
Total Capacity of AC's	TR	10.0	**10**
Power Consumption of Actual AC	Watt	10823	**10823**
EER of 5 Star AC	EER	3.21	
Power Consumption of 5 Star AC	Watt	9427	**9427**
Estimated Power Savings	Watt	2150.3	**2150**
Expected Power Consumption	kW	7.3	**7.28**
Operating Hours	Hours/ Day	6	**6.0**
Annual Working Days	Days/Annum	300	**300**
Annual Actual Energy Consumption	kWh/Annum	19481	**19481**
Expected Annual Energy Consumption	kWh/Annum	15611	**15611**
Estimated Annual Energy Savings	kWh/Annum	3870	**3870**
Energy Cost	Rs./kWh	8.49	**8.5**
Annual Monetary Savings	Rs./Annum	32860	**32860**
Investment Cost	Rs.	150596	**150596**
Payback	Months	55	**55.0**

Savings Summary

Annual Energy Savings	*3870*	kWh/ Annum
Annual Monetary Savings	*32860*	Rs./ Annum
Investment Cost	*150596*	Rs.
Payback	*55*	Months

3.4.4 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	2	0.37	11	9	1	0.280	1	14	11
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption/ Savings	kWh/ Annum	2,956	670	19,800	16,974	1,080	504	1,116	24,952	19,264
Capacity of Solar Panel Required	kW	2	0	12	10	1	0	1	15	11
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	3,941	893	26,400	22,632	1,440	672	1,488	33,269	25,685
Energy Cost (inside)	Rs / Annum	8	8	8	8	8	8	8	8	8
Expected Annual Monetary Savings (inside)	Rs / Annum	25,093	5,685	168,102	144,109	9,169	4,279	9,475	211,839	163,548
Expected Annual Energy Export	kWh/ Annum	985	223	6,600	5,658	360	168	372	8,317.2	6,421
Energy Cost for Export	Rs /kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs / Annum	15,763	3,571	105,600	90,528	5,760	2,688	5,952	133,075	102,739
Total Annual Monetary Savings	Rs / Annum	40,856	9,256	273,702	234,637	14,929	6,967	15,427	344,914	266,287
Investment Cost	Rs	137,928	31,248	924,000	792,120	50,400	23,520	52,080	1,164,408	898,968
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*24952*	kWh/ Annum
Annual Monetary Savings	*344914*	Rs./ Annum
Investment Cost	*1164408*	Rs.
Payback	*3*	Year

3.5 Energy Conservation Proposals-Outdoor

3.5.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Light to LED Lighting							
Block		O/D	O/D	O/D	O/D	O/D/ Street	O/D	O/D	O/D
Floor									
Location		Training & Placement Cell					Xerox room	Canteen	
Sub-Location				Supervisor room	Counselling Centre				
Type of Lamp		FTL	FTL	FTL	CFL	FTL	FTL	FTL	CFL
Capacity of Lamp	W	36	40	36	18	36	36	36	36
Number of Fixtures		1	1	2	1	1	3	5	1
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		1	1	2	1	1	3	5	1
Actual Power Consumption	kW	0.036	0.04	0.072	0.018	0.036	0.108	0.18	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	64.8	72	129.6	32.4	64.8	194.4	324	64.8
Identification		FTL	FTL	FTL	CFL	FTL	FTL	FTL	CFL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	5	20	20	20	12
Expected Total Power Consumption	kW	0.02	0.02	0.04	0.005	0.02	0.06	0.1	0.012
Expected Annual Energy Consumption	kWh/ Annum	36	36	72	9	36	108	180	21.6
Expected Annual Energy Savings	kWh/ Annum	28.8	36	57.6	23.4	28.8	86.4	144	43.2
Percentage of Savings	%	44.44	50.00	44.44	72.22	44.44	44.44	44.44	66.67
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs / Annum	245	306	489	199	245	734	1223	367
Investment Cost	Rs.	200	200	400	50	200	600	1000	120
Payback	Month	9.82	7.85	9.82	3.02	9.82	9.82	9.82	3.93

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Light to LED Lighting							
Block		O/D	O/D	O/D	O/D		O/D	SL/ PL	SL/ PL
Floor									
Location		Bike Stand1	Arch	Arch	Side wall	Security Main Gate		SL/ PL	SL/ PL
Sub-Location									
Type of Lamp		FTL	LED	LED	Halogen	CFL	LED	LED	SVL
Capacity of Lamp	W	36	9	20	70	15	20	20	150
Number of Fixtures		1	6	12	12	1	1	5	3
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		1	6	12	12	1	1	5	3
Actual Power Consumption	kW	0.036	0.054	0.24	0.84	0.015	0.02	0.1	0.45
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	64.8	97.2	432	1512	27	36	180	810
Identification		FTL	LED	LED	Halogen	CFL	LED	LED	SVL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	9	20	35	7	20	20	35
Expected Total Power Consumption	kW	0.02	0.054	0.24	0.42	0.007	0.02	0.1	0.105
Expected Annual Energy Consumption	kWh/ Annum	36	97.2	432	756	12.6	36	180	189
Expected Annual Energy Savings	kWh/ Annum	28.8	0	0	756	14.4	0	0	621
Percentage of Savings	%	44.44	0.00	0.00	50.00	53.33	0.00	0.00	76.67
Energy Cost	Rs / kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	245	0	0	6418	122	0	0	5272
Investment Cost	Rs.	200			4200	70			1050
Payback	Month	9.82	#DIV/0!	#DIV/0!	7.85	6.87	#DIV/0!	#DIV/0!	2.39

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Light to LED Lighting			Total
Block		O/D	O/D	O/D	**Outdoor**
Floor					
Location		Toilet	Room nearby Toilet	Power room	
Sub-Location		Gents			
Type of Lamp		FTL	FTL	FTL	**CFL/ FTL/ LED**
Capacity of Lamp	W	36	36	36	**36/ 40**
Number of Fixtures		3	4	2	
Number of Fittings		1	1	1	
Total Number of Lamps		3	4	2	**65**
Actual Power Consumption	kW	0.108	0.144	0.072	**2.605**
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	**6**
Annual Operating Days	Days/ Annum	300	300	300	**300**
Actual Annual Energy Consumption	kWh/ Annum	194.4	259.2	129.6	**4689**
Identification		FTL	FTL	FTL	**CFL/ FTL/ LED**
Suggestion		LED	LED	LED	**LED**
Suggested Capacity of Lamps	W	20	20	20	**12/ 20**
Expected Total Power Consumption	kW	0.06	0.08	0.04	**1.423**
Expected Annual Energy Consumption	kWh/ Annum	108	144	72	**2561.4**
Expected Annual Energy Savings	kWh/ Annum	86.4	115.2	57.6	**2127.6**
Percentage of Savings	%	44.44	44.44	44.44	**45.37**
Energy Cost	Rs./ kWh	8.49	8.49	8.49	**8.49**
Annual Monetary Savings	Rs./ Annum	734	978	489	**18063**
Investment Cost	Rs.	600	800	400	**10090**
Payback	Month	9.82	9.82	9.82	**6.70**

Savings Summary

Annual Energy Savings	*2127.6*	kWh/ Annum
Annual Monetary Savings	*18063*	Rs./ Annum
Investment Cost	*10090*	Rs.
Payback	*6.7*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver***.

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Outdoor
Present Average Power Consumption of Lightings	kW	3
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	16
Actual Annual Energy Consumption of Lighting	kWh/Year	4,689
Expected Annual Energy Savings using LES	kWh/Year	391
Energy Cost	Rs/kWh	8.5
Annual Savings	Rs./Annum	3,317
Capacity of Lighting Energy Saver	kVA	3
Investment Cost	Rs	2,683
Payback period	Months	10

Savings Summary

Annual Energy Savings	*391*	kWh/ Annum
Annual Monetary Savings	*3317*	Rs./ Annum
Investment Cost	*2683*	Rs.
Payback	*10*	Months

3.5.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan						Total
Block		O/D	O/D	O/D	O/D	O/D	O/D	
Floor								
Location		Training & Placement Cell	Training & Placement Cell	Cantee n	Security Main Gate	Room nearby Toilet	Power room	
Sub-Location			Supervisor room					
Type of Fan		Ceiling						Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60
Total Number of Fan	No's	1	1	2	1	3	1	9
Total Power Consumption	kW	0 06	0 06	0.12	0 06	0 18	0 06	0.54
Average Operating Hours	Oper Hours/ Day	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.36	0 36	0 72	0 36	1.08	0 36	3.24
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	108	108	216	108	324	108	972
Existing System		Ceiling						Ceiling
Suggestion		EE Super Fan						EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28
Expected Power Consumption	kW	0 028	0.028	0 056	0 028	0 084	0.028	0.252
Expected Energy Consumption	kWh/ Annum	50 4	50 4	100 8	50 4	151.2	50 4	453.6
Expected Energy Savings	kWh/ Annum	58	58	115	58	173	58	518.4
Savings Percentage	%	53.33	53 33	53.33	53 33	53 33	53 33	53.3
Energy Cost	Rs / kWh	8 49	8 49	8 49	8 49	8 49	8 49	8.49
Annual Monetary Savings	Rs / Annum	489	489	978	489	1467	489	4401
Investment	Rs	3300	3300	6600	3300	9900	3300	29700
Payback	Months	80 98	80 98	80.98	80 98	80.98	80 98	81.0

Savings Summary

Annual Energy Savings	*518*	kWh/ Annum
Annual Monetary Savings	*4401*	Rs./ Annum
Investment Cost	*29700*	Rs.
Payback	*81*	Months

3.5.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan				
Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan		Total
Block		O/D	O/D	**Outdoor**
Floor				
Location		Xerox room	Canteen	
Sub-Location				
Type of Fan		Exhaust Fan	Exhaust Fan	**Exhaust Fan**
Capacity of Fan	W	50	50	**50**
Total Number of Fan	No.'s	1	1	**2**
Total Power Consumption	kW	0.05	0.05	**0.10**
Average Operating Hours	Oper. Hours/ Day	6	6	**6**
Energy Consumption per Day	kWh/ Day	0.3	0.3	**0.6**
Annual Operating Days	Days/ Annum	300	300	**300**
Annual Energy Consumption	kWh/ Annum	90	90	**180**
Existing System		Exhaust Fan		**Exhaust Fan**
Suggestion		EE Exhaust Fan		**EE Exhaust Fan**
Suggested Capacity to be replaced	W	20	20	**20**
Expected Power Consumption	kW	0.02	0.02	**0.04**
Expected Energy Consumption	kWh/ Annum	36	36	**72**
Expected Energy Savings	kWh/ Annum	54	54	**108**
Savings Percentage	%	60.00	60.00	**60.0**
Energy Cost	Rs./ kWh	8.49	8.49	**8.49**
Annual Monetary Savings	Rs./ Annum	458	458	**917**
Investment	Rs.	3300	3300	**6600**
Payback	Months	86.38	86.38	**86.4**

Savings Summary		
Annual Energy Savings	*108*	kWh/ Annum
Annual Monetary Savings	*917*	Rs./ Annum
Investment Cost	*6600*	Rs.
Payback	*86.4*	Months

3.5.4 Air Conditioning

ECP 5: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's			
Description	Unit	AC Maintenance	Total
Block		O/D	Outdoor
Floor			
Location		Xerox room	
Sub-Location			
Type	Split/ Window	Split	
Make		Llyod	
Capacity - TR	TR	1.5	1.5
Star rate		2	
Quantity	No 's	2	2
EER			
Power Consumption - kW	kW	1.65	1.65
Total Power Consumption, kW	kW	3.3	3.3
Working hours	Hours/ Day	6	6
Annual Operating Days	Days/ Annum	300	300
Annual Energy Consumption	kWh/ Annum	5940	5940
Expected Power Consumption	kW	3.20	3.201
Expected Power Savings	kW	0.10	0.099
Savings Percentage	%	3.00	3
Expected Annual Energy Consumption	kWh/ Annum	5762	5761.8
Expected Annual Energy Savings	kWh/ Annum	178	178.2
Energy Cost	Rs./ kWh	8	8.49
Cost Saving Per annum	Rs / Annum	1,513	1513
Investment	Rs	Nil	Nil
Payback	Months	Immediate	Immediate

Savings Summary		
Annual Energy Savings	*178*	kWh/ Annum
Annual Monetary Savings	*1513*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 6: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations			
Description	**Unit**	**Set Temp. Reduction**	**Total**
Block		O/D	**Outdoor**
Floor			
Location		Xerox room	
Sub-Location			
Type	Split/ Window	Split	
Make		Llyod	
Capacity	TR	1.5	**1.5**
Star rate		2	
Quantity	No.'s	2	**2**
EER			
Power Consumption	kW	1.65	**1.65**
Total Power Consumption	kW	3.3	**3.3**
Working hours	Hour	6	**6**
Annual Working Days	Days/ Annum	300	**300**
Actual Energy Consumption	kWh/ Annum	5940	**5940**
Present Set Temperature	Deg. C	20	
Required Temperature	Deg. C	24	
Set Point @ Thermostat	Deg. C	22	
Expected Power Consumption	kW	3.10	**3.102**
Expected Power Savings	kW	0.20	**0.198**
Savings Percentage	%	6.00	**6**
Expected Annual Energy Consumption	kWh/ Annum	5584	**5583.6**
Expected Annual Energy Savings	kWh/ Annum	356	**356.4**
Energy Cost	Rs./ kWh	8	**8.49**
Cost Saving per Annum	Rs./ Annum	3,026	**3026**
Investment	Rs.	Nil	**Nil**
Payback	Months	Immediate	**Immediate**

Savings Summary		
Annual Energy Savings	*356*	kWh/ Annum
Annual Monetary Savings	*3026*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 7: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location			
Description	Unit	Star rated AC	Total
Block		O/D	Outdoor
Floor			
Location		Xerox room	
Sub-Location			
Type of AC	Type	Split	Split/ Window
Make		Llyod	
Rated Capacity of AC's	TR	1.5	1.5
Actual Star Rated		2	
No of AC		2	2
Energy Efficiency Ratio (EER)	EER		
Cooling Capacity	kCal/hr	4539	
Total Capacity of AC's	TR	3.0	3
Power Consumption of Actual AC	Watt	3247	3247
EER of 5 Star AC	EER	3.21	
Power Consumption of 5 Star AC	Watt	2828	2828
Estimated Power Savings	Watt	645.1	645
Expected Power Consumption	kW	2.2	2.18
Operating Hours	Hours/ Day	6	6.0
Annual Working Days	Days/Annum	300	300
Annual Actual Energy Consumption	kWh/Annum	5844	5844
Expected Annual Energy Consumption	kWh/Annum	4683	4683
Estimated Annual Energy Savings	kWh/Annum	1161	1161
Energy Cost	Rs./kWh	8.49	8.5
Annual Monetary Savings	Rs./Annum	9858	9858
Investment Cost	Rs.	45179	45179
Payback	Months	55	55.0

Savings Summary		
Annual Energy Savings	*1161*	kWh/ Annum
Annual Monetary Savings	*9858*	Rs./ Annum
Investment Cost	*45179*	Rs.
Payback	*55*	Months

3.5.5 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	3	1	3	3	1	0.202	1	8	6
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption/ Savings	kWh/ Annum	4,689	2,561	5,940	5,090	972	364	1,944	13,545	9,959
Capacity of Solar Panel Required	kW	3	1	3	3	1	0	1	8	6
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	6,252	3,415	7,920	6,786	1,296	485	2,592	18,060	13,278
Energy Cost (inside)	Rs / Annum	8	8	8	8	8	8	8	8	8
Expected Annual Monetary Savings (inside)	Rs / Annum	39,810	21,746	50,431	43,212	8,252	3,087	16,505	114,997	84,550
Expected Annual Energy Export	kWh/ Annum	1,563	854	1,980	1,697	324	121	648	4,515.0	3,320
Energy Cost for Export	Rs /kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs / Annum	25,008	13,661	31,680	27,146	5,184	1,939	10,368	72,240	53,114
Total Annual Monetary Savings	Rs / Annum	64,818	35,407	82,111	70,358	13,436	5,026	26,873	187,237	137,664
Investment Cost	Rs	218,820	119,532	277,200	237,524	45,360	16,968	90,720	632,100	464,744
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*13545*	kWh/ Annum
Annual Monetary Savings	*187237*	Rs./ Annum
Investment Cost	*632100*	Rs.
Payback	*3*	Year

3.6 Energy Conservation Proposals-Block I

3.6.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED Lighting							
Block		I	I	I	I	I	I	I	I
Floor		TF	TF	TF	TF	TF	TF	TF	TF
Location		I B.So (CDF)	II B So (CDF)	III B So (CDF)	Store	Lab	Corridor	Fashion Illustration Lab	Toilet
Sub-Location									
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	40	40	40	40	40	40	40
Number of Fixtures		4	3	3	1	1	5	4	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		4	3	3	1	1	5	4	2
Actual Power Consumption	kW	0.16	0.12	0.12	0.04	0.04	0.2	0.16	0.08
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	288	216	216	72	72	360	288	144
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.08	0.06	0.06	0.02	0.02	0.1	0.08	0.04
Expected Annual Energy Consumption	kWh/ Annum	144	108	108	36	36	180	144	72
Expected Annual Energy Savings	kWh/ Annum	144	108	108	36	36	180	144	72
Percentage of Savings	%	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs / Annum	1222.56	916.92	916.92	305.64	305.64	1528.2	1222.56	611.28
Investment Cost	Rs	800	600	600	200	200	1000	800	400
Payback	Month	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED Lighting								Total
Block		I	I	I	I	I	I	I	I	I
Floor		TF	TF	TF	TF	TF	TF	Fourth Floor	Fourth Floor	
Location		Textile Processing Lab	Draping Lab	Computer Lab	Toilet	Dept of Costume Design & Fashion	Steps towards 4th Floor	Sewing Lab	Beauty Care Lab	
Sub-Location										
Type of Lamp		FTL	FTL	FTL	FTL	FTL	CFL	FTL	FTL	CFL/ FTL/ LED
Capacity of Lamp	W	40	40	40	40	40	36	40	40	36/ 40
Number of Fixtures		3	2	3	1	4	1	31	9	
Number of Fittings		1	1	1	1	1	1	1	1	
Total Number of Lamps		3	2	3	1	4	1	31	9	77
Actual Power Consumption	kW	0.12	0.08	0.12	0.04	0.16	0.036	1.24	0.36	3.076
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	216	144	216	72	288	64.8	2232	648	5536.8
Identification		FTL	FTL	FTL	FTL	FTL	CFL	FTL	FTL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	12	12	12	12/ 20
Expected Total Power Consumption	kW	0.06	0.04	0.06	0.02	0.08	0.012	0.372	0.108	1.212
Expected Annual Energy Consumption	kWh/ Annum	108	72	108	36	144	21.6	669.6	194.4	2181.6
Expected Annual Energy Savings	kWh/ Annum	108	72	108	36	144	43.2	1562.4	453.6	3355.2
Percentage of Savings	%	50.00	50.00	50.00	50.00	50.00	66.67	70.00	70.00	60.60
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	917	611	917	306	1223	367	13265	3851	28486
Investment Cost	Rs	600	400	600	200	800	120	3720	1080	12120
Payback	Month	7.85	7.85	7.85	7.85	7.85	3.93	3.37	3.37	5.11

Savings Summary

Annual Energy Savings	*3355*	kWh/ Annum
Annual Monetary Savings	*28486*	Rs./ Annum
Investment Cost	*12128*	Rs.
Payback	*5.11*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver***.

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Block I
Present Average Power Consumption of Lightings	kW	3
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	18
Actual Annual Energy Consumption of Lighting	kWh/Year	5,537
Expected Annual Energy Savings using LES	kWh/Year	461
Energy Cost	Rs/kWh	8 5
Annual Savings	Rs./Annum	3,917
Capacity of Lighting Energy Saver	kVA	3
Investment Cost	Rs	3,168
Payback period	Months	10

Savings Summary

Annual Energy Savings	*461*	kWh/ Annum
Annual Monetary Savings	*2917*	Rs./ Annum
Investment Cost	*3168*	Rs.
Payback	*10*	Months

3.6.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan							
Block		I	I	I	I	I	I	I	I
Floor		TF	TF	TF	TF	TF	TF	TF	TF
Location		I B Sc (CDF)	II B Sc (CDF)	III B Sc (CDF)	Lab	Fashion Illustration Lab	Textile Processing Lab	Draping Lab	Computer Lab
Sub-Location									
Type of Fan		Ceiling							Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	3	3	3	1	5	3	1	2
Total Power Consumption	kW	0.18	0.18	0.18	0.06	0.3	0.18	0.06	0.12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	1.08	1.08	1.08	0.36	1.8	1.08	0.36	0.72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	324	324	324	108	540	324	108	216
Existing System		Ceiling							Ceiling
Suggestion		EE Super Fan							EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.084	0.084	0.084	0.028	0.14	0.084	0.028	0.056
Expected Energy Consumption	kWh/ Annum	151.2	151.2	151.2	50.4	252	151.2	50.4	100.8
Expected Energy Savings	kWh/ Annum	173	173	173	58	288	173	58	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	1467	1467	1467	489	2445	1467	489	978
Investment	Rs.	9900	9900	9900	3300	16500	9900	3300	6600
Payback	Months	80.98	80.98	80.98	80.98	80.98	80.98	80.98	80.98

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan			Total
Block		I	I	I	Block I
Floor		TF	Fourth Floor	Fourth Floor	
Location		Dept. of Costume Design & Fashion	Sewing Lab	Beauty Care Lab	
Sub-Location					
Type of Fan		Ceiling	Ceiling	Ceiling	Ceiling
Capacity of Fan	W	60	60	60	60
Total Number of Fan	No.'s	4	8	6	39
Total Power Consumption	kW	0.24	0.48	0.36	2.34
Average Operating Hours	Oper. Hours/ Day	6	6	6	6
Energy Consumption per Day	kWh/ Day	1.44	2.88	2.16	14.04
Annual Operating Days	Days/ Annum	300	300	300	300
Annual Energy Consumption	kWh/ Annum	432	864	648	4212
Existing System		Ceiling	Ceiling	Ceiling	Ceiling
Suggestion		EE Super Fan	EE Super Fan	EE Super Fan	EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28
Expected Power Consumption	kW	0.112	0.224	0.168	1.092
Expected Energy Consumption	kWh/ Annum	201.6	403.2	302.4	1965.6
Expected Energy Savings	kWh/ Annum	230	461	346	2246.4
Savings Percentage	%	53.33	53.33	53.33	53.3
Energy Cost	Rs./ kWh	8.49	8.49	8.49	8.49
Annual Monetary Savings	Rs./ Annum	1956	3912	2934	19072
Investment	Rs.	13200	26400	19800	128700
Payback	Months	80.98	80.98	80.98	81.0

Savings Summary

Annual Energy Savings	*2246*	kWh/ Annum
Annual Monetary Savings	*19072*	Rs./ Annum
Investment Cost	*128700*	Rs.
Payback	*81*	Months

3.6.3 Green Energy Utilization/ Solar Panel

ECP 4: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	3	1	0	0	2	1.092	1	6	3
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption/ Savings	kWh/ Annum	5,537	2,182	0	0	4,212	1,966	1,260	11,009	5,407
Capacity of Solar Panel Required	kW	3	1	0	0	2	1	1	6	3
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	7,382	2,909	0	0	5,616	2,621	1,680	14,678	7,210
Energy Cost (inside)	Rs./ Annum	8	8	8	8	8	8	8	8	8
Expected Annual Monetary Savings (inside)	Rs./ Annum	47,007	18,522	0	0	35,760	16,688	10,697	93,465	45,907
Expected Annual Energy Export	kWh/ Annum	1,846	727	0	0	1,404	655	420	3,669.6	1,802
Energy Cost for Export	Rs./kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs./ Annum	29,530	11,635	0	0	22,464	10,483	6,720	58,714	28,838
Total Annual Monetary Savings	Rs./ Annum	76,537	30,157	0	0	58,224	27,171	17,417	152,178	74,746
Investment Cost	Rs	258,384	101,808	0	0	196,560	91,728	58,800	513,744	252,336
Payback period	Year	3	3	#DIV/0!	#DIV/0!	3	3	3	3	3

Savings Summary

Annual Energy Savings	*11009*	kWh/ Annum
Annual Monetary Savings	*152178*	Rs./ Annum
Investment Cost	*513744*	Rs.
Payback	*3*	Year

CHAPTER - 4

SERVICE NUMBER 04-006-005-9 [Block A, Block B, Block C & Block D]

4. SERVICE NUMBER 04-006-005-9 [Block A, Block B, Block C & Block D]

4.1 Executive Summary-Service Number: 04-006-005-9 [Block A, Block B, Block C & Block D]

EXECUTIVE SUMMARY-VCW-Erode

Service Number: 04-006-005-9

Location	Sl. No	Energy Conservation Opportunities	Annual Savings		Investment	Payback
			kWh	Rs.	Rs.	Months
		Payback - Immediate				
Block A	1	Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's	446	3,836	Nil	Immediate
Block A	2	Optimize Set Temperature of Split AC in Stated Locations	891	7,672	Nil	Immediate
Block B	3	Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's	1,455	12,530	Nil	Immediate
Block B	4	Optimize Set Temperature of Split AC in Stated Locations	2,911	25,060	Nil	Immediate
Block D	5	Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's	356	3,069	Nil	Immediate
Block D	6	Optimize Set Temperature of Split AC in Stated Locations	713	6,137	Nil	Immediate
		Short Term Payback < 12 Months				
Block A	7	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified	5,053	43,503	16,610	4.6
Block B	8	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified	5,589	48,121	21,340	5.3
Block D	9	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified	4,999	43,038	23,530	6.6
Block C	10	Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified	2,714	23,371	13,400	6.9
Block A	11	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	692	5,956	4,750	9.6
Block B	12	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	825	7,107	5,668	9.6
Block C	13	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	427	3,678	2,933	9.6
Block D	14	Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver	1,432	12,326	9,830	9.6
		Long Term Payback > 12 Months				
Block A	15	Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location	2,903	24,993	112,947	54.2
Block B	16	Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location	9,483	81,645	368,960	54.2
Block D	17	Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location	2,322	19,995	90,358	54.2
Block A	18	Replace Conventional Fan to Energy Efficient type of Super Fan	2,477	21,325	141,900	79.8
Block B	19	Replace Conventional Fan to Energy Efficient type of Super Fan	3,514	30,252	201,300	79.8
Block C	20	Replace Conventional Fan to Energy Efficient type of Super Fan	2,765	23,805	158,400	79.8
Block D	21	Replace Conventional Fan to Energy Efficient type of Super Fan	5,242	45,130	300,300	79.8
Block A	22	Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan	54	465	3,300	85.2
Block B	23	Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan	216	1,860	13,200	85.2
Block C	24	Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan	432	3,720	26,400	85.2
Block D	25	Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan	486	4,184	29,700	85.2

4.1.1 Summary Of Savings

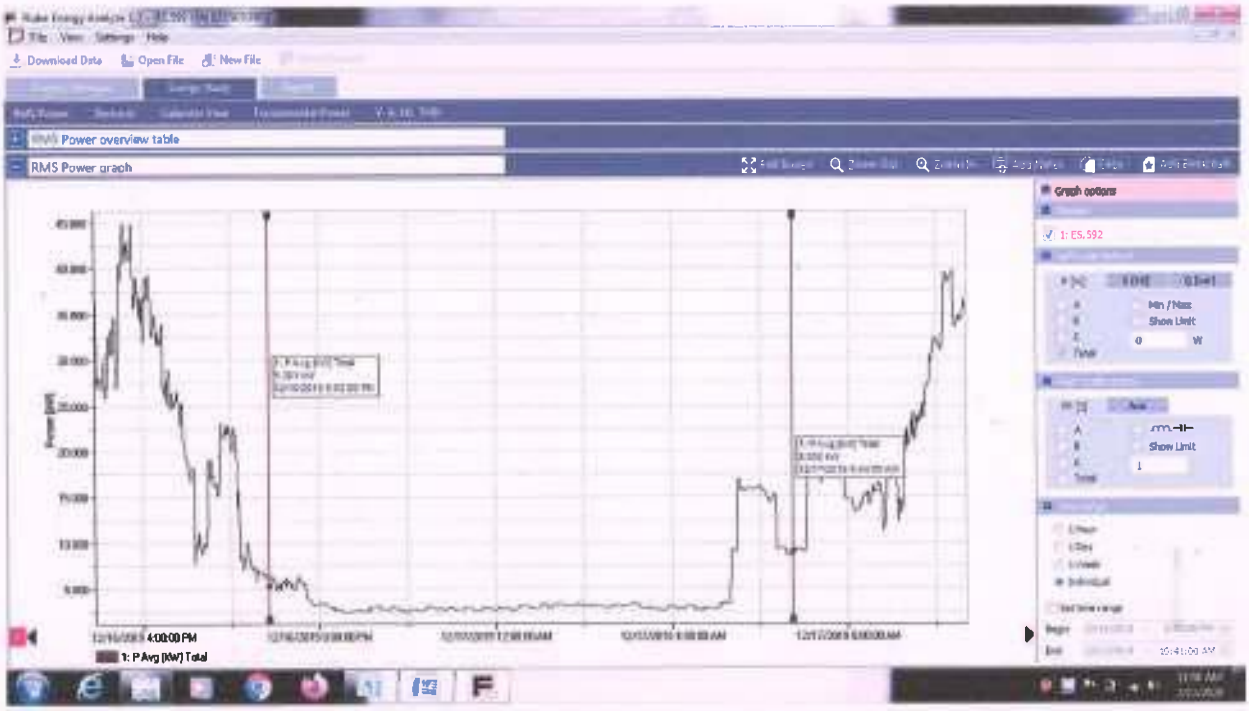
SUMMARY OF SAVINGS		Annual Savings kWh	Annual Savings Rs.	Investment Rs.	Payback Months
Summary	Annual Energy (kWh) Savings	58,395	502,779	1,544,826	36.9
	Annual Energy Consumption (kWh)-thru EB only	108,650			
	Annual Energy Bill (Rs.)	936,015			
	% of Energy Savings	53.75			

4.1.2 Green Energy Utilization

GREEN ENERGY UTILIZATION			Annual Savings kWh	Annual Savings Rs.	Investment Rs.	Payback Years
Block A	1	Install Solar Panel for the Specified Loads	30,838	429,979	1,439,088	3.3
Block B	2	Install Solar Panel for the Specified Loads	76,055	1,060,466	3,549,252	3.3
Block C	3	Install Solar Panel for the Specified Loads	21,074	293,847	983,472	3.3
Block D	4	Install Solar Panel for the Specified Loads	59,508	829,740	2,777,040	3.3
Total			187,475	2,614,032	8,748,852	3.3

4.1.3 Load Analysis

Load Pattern (Day & Night)



4.1.4 EB Bill Analysis

EB Bill

Service Number		04-006-005-09											Total
Name of Party		Secretary											
Tariff		LM 2B2											
Connected Load		110 kW											
MF		40											
Month		Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	
Energy Consumption	kWh	8696	6728	10172	11532	9084	6152	8212	12524	11392	9008	8608	6542	**108650**
Demand Consumption	kVAh	9044	7032	10580	11952	9084	6376	8504	12984	11780	9328	8936	6712	**112312**
Power Factor	PF	0 96	0 96	0 96	0.96	0.96	0 96	0.97	0.96	0 97	0.97	0 96	0 96	**0.963**
Maximum Demand	kVA	50	44	53 2	59 2	56	35.6	59.6	60 4	56 8	56 4	60	40	
Energy Consumption Charges	Rs	65220	50460	76290	86490	68130	46140	61590	93930	85440	67560	64560	48390	**814200**
E Tax	Rs.	3411	2655	3977	4505	3575	2415	3260	4880	4443	3549	3408	2539	**42614.9**
Fixed Charges	Rs	6600	6600	6600	6600	6600	6600	6600	6600	6600	6600	6600	6600	**79200**
Total Amount	Rs.	75231	59715	86867	97595	78305	55155	71450	105410	96483	77709	74568	57529	**936014.9**
Unit Charges	Rs./kWh	8.65	8 88	8.54	8 46	8 62	8 97	8 70	8 42	8.47	8 63	8 66	8 79	**8.61**

4.2 Energy Conservation Proposals-Block A

4.2.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting								
Block		A	A	A	A	A	A	A	A	A
Floor		GF	GF	GF	GF	GF	GF	GF	GF	GF
Location		Office	Record room	Store room	Secretary room	Secretary room	Principal room		Principal room	
Sub-Location						Toilet			Toilet	Bathroom
Type of Lamp		FTL	FTL	FTL	LED	CFL	LED	CFL	FTL	FTL
Capacity of Lamp	W	36	36	36	12	14	12	9	36	36
Number of Fixtures		12	2	2	4	1	5	2	1	1
Number of Fittings		1	1	1	1	1	1	3	1	1
Total Number of Lamps		12	2	2	4	1	5	6	1	1
Actual Power Consumption	kW	0.432	0.072	0.072	0.048	0.014	0.06	0.054	0.036	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	777.6	129.6	129.6	86.4	25.2	108	97.2	64.8	64.8
Identification		FTL	FTL	FTL	LED	CFL	LED	CFL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	12	5	12	5	20	20
Expected Total Power Consumption	kW	0.24	0.04	0.04	0.048	0.005	0.06	0.01	0.02	0.02
Expected Annual Energy Consumption	kWh/ Annum	432	72	72	86.4	9	108	18	36	36
Expected Annual Energy Savings	kWh/ Annum	345.6	57.6	57.6	0	16.2	0	79.2	28.8	28.8
Percentage of Savings	%	44.44	44.44	44.44	0.00	64.29	0.00	81.48	44.44	44.44
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs / Annum	2976	496	496	0	139	0	682	248	247.968
Investment Cost	Rs	2400	400	400		50		100	200	200
Payback	Month	9.68	9.68	9.68	#DIV/0!	4.30	#DIV/0!	1.76	9.68	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting							
Block		A	A	A	A	A	A	A	A
Floor		GF	GF	GF	GF	GF	FF	FF	FF
Location		Wide Corridor	Entrance Lobby		Toilet		Tissue Culture Lab	Research Lab I	
Sub-Location		Infront of office							
Type of Lamp		FTL	FTL	FTL	FTL	LED	FTL	FTL	FTL
Capacity of Lamp	W	36	40	36	36	18	36	40	36
Number of Fixtures		3	1	1	2	2	2	1	1
Number of Fittings		1	1	1	1	1	6	1	1
Total Number of Lamps		3	1	1	2	2	12	1	1
Actual Power Consumption	kW	0.108	0.04	0.036	0.072	0.036	0.432	0.04	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	194.4	72	64.8	129.6	64.8	777.6	72	64.8
Identification		FTL	FTL	FTL	FTL	LED	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	18	24	20	20
Expected Total Power Consumption	kW	0.06	0.02	0.02	0.04	0.036	0.048	0.02	0.02
Expected Annual Energy Consumption	kWh/ Annum	108	36	36	72	64.8	86.4	36	36
Expected Annual Energy Savings	kWh/ Annum	86.4	36	28.8	57.6	0	691.2	36	28.8
Percentage of Savings	%	44.44	50.00	44.44	44.44	0.00	88.89	50.00	44.44
Energy Cost	Rs / kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs / Annum	744	310	248	496	0	5951	310	248
Investment Cost	Rs	600	200	200	400		480	200	200
Payback	Month	9.68	7.74	9.68	9.68	#DIV/0!	0.97	7.74	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting							
Block		A	A	A	A	A	A	A	A
Floor		FF	FF	FF	FF	FF	FF	FF	FF
Location		Zoology Museum/ Dept. Library	Dept of Zoology	Balcony	Tissue Culture	III B Sc Botany	II B Sc Botany	Zoo Museum	Store
Sub-Location		Zoology Research Lab				Classroom F4	Classroom F5		
Type of Lamp		FTL	FTL		FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	36		36	36	36	36	36
Number of Fixtures		6	3		2	2	3	7	1
Number of Fittings		1	1		1	1	1	1	1
Total Number of Lamps		6	3		2	2	3	7	1
Actual Power Consumption	kW	0.24	0.108		0.072	0.072	0.108	0.252	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6		6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300		300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	432	194.4		129.6	129.6	194.4	453.6	64.8
Identification		FTL	FTL		FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED		LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20		20	20	20	20	20
Expected Total Power Consumption	kW	0.12	0.06		0.04	0.04	0.06	0.14	0.02
Expected Annual Energy Consumption	kWh/ Annum	216	108		72	72	108	252	36
Expected Annual Energy Savings	kWh/ Annum	216	86.4		57.6	57.6	86.4	201.6	28.8
Percentage of Savings	%	50.00	44.44		44.44	44.44	44.44	44.44	44.44
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	1860	744		496	496	744	1736	248
Investment Cost	Rs	1200	600		400	400	600	1400	200
Payback	Month	7.74	9.68		9.68	9.68	9.68	9.68	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting				Total
Block		A	A	A	A	I
Floor		FF	SF	SF	SF	
Location		Wide Corridor from Zoo Museum to Balcony	SCS Hall			
Sub-Location						
Type of Lamp		FTL	FTL	CFL	MHL	CFL/ FTL/ LED
Capacity of Lamp	W	36	36	9	150	36/ 40
Number of Fixtures		3	22	6	2	
Number of Fittings		1	2	2	1	
Total Number of Lamps		3	44	12	2	142
Actual Power Consumption	kW	0.108	1.584	0.108	0.3	4.612
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	194.4	2851.2	194.4	540	8301.6
Identification		FTL	FTL	CFL	MHL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	5	24	12/ 20
Expected Total Power Consumption	kW	0.06	0.44	0.03	0.048	1.805
Expected Annual Energy Consumption	kWh/ Annum	108	792	54	86.4	3249
Expected Annual Energy Savings	kWh/ Annum	86.4	2059.2	140.4	453.6	5052.6
Percentage of Savings	%	44.44	72.22	72 22	84.00	60.86
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	744	17730	1209	3905	43503
Investment Cost	Rs.	600	4400	300	480	16610
Payback	Month	9.68	2.98	2.98	1 47	4.58

Savings Summary

Annual Energy Savings	*5052*	kWh/ Annum
Annual Monetary Savings	*43503*	Rs./ Annum
Investment Cost	*16610*	Rs.
Payback	*4.58*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver***.

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver		
Description	**Units**	**Block A**
Present Average Power Consumption of Lightings	kW	5
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	28
Actual Annual Energy Consumption of Lighting	kWh/Year	8,302
Expected Annual Energy Savings using LES	kWh/Year	692
Energy Cost	Rs/kWh	8.6
Annual Savings	Rs./Annum	5,956
Capacity of Lighting Energy Saver	kVA	5
Investment Cost	Rs	4,750
Payback period	Months	10

Savings Summary		
Annual Energy Savings	*692*	kWh/ Annum
Annual Monetary Savings	*5956*	Rs./ Annum
Investment Cost	*4750*	Rs.
Payback	*10*	Months

4.2.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		A	A	A	A	A	A	A	A
Floor		GF	GF	GF	GF	GF	GF	GF	FF
Location		Office	Record room	Store room	Secretary room	Principal room	Principal room	Entrance Lobby	Tissue Culture Lab
Sub-Location							Bathroom		
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	12	2	2	2	2	1	1	1
Total Power Consumption	kW	0.72	0.12	0.12	0.12	0.12	0.06	0.06	0.06
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	4.32	0.72	0.72	0.72	0.72	0.36	0.36	0.36
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	1296	216	216	216	216	108	108	108
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.336	0.056	0.056	0.056	0.056	0.028	0.028	0.028
Expected Energy Consumption	kWh/ Annum	604.8	100.8	100.8	100.8	100.8	50.4	50.4	50.4
Expected Energy Savings	kWh/ Annum	691	115	115	115	115	58	58	58
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs / kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	5951	992	992	992	992	496	496	496
Investment	Rs	39600	6600	6600	6600	6600	3300	3300	3300
Payback	Months	79.85	79.85	79.85	79.85	79.85	79.85	79.85	79.85

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							Total
Block		A	A	A	A	A	A	A	
Floor		FF	FF	FF	FF	FF	FF	FF	
Location		Research Lab 1	Zoology Museum/ Dept. Library	Tissue Culture	III B Sc Botany	II B Sc Botany	Zoo Museum	Store	
Sub-Location			Zoology Research Lab		Classroom F4	Classroom F5			
Type of Fan		Ceiling							Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	5	2	3	3	4	1	43
Total Power Consumption	kW	0.12	0.3	0.12	0.18	0.18	0.24	0.06	2.58
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	1.8	0.72	1.08	1.08	1.44	0.36	15.48
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	540	216	324	324	432	108	4644
Existing System		Ceiling							Ceiling
Suggestion		EE Super Fan							EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.14	0.056	0.084	0.084	0.112	0.028	1.204
Expected Energy Consumption	kWh/ Annum	100.8	252	100.8	151.2	151.2	201.6	50.4	2167.2
Expected Energy Savings	kWh/ Annum	115	288	115	173	173	230	58	2476.8
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.3
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	992	2480	992	1488	1488	1984	496	21325
Investment	Rs.	6600	16500	6600	9900	9900	13200	3300	141900
Payback	Months	79.85	79.85	79.85	79.85	79.85	79.85	79.85	79.8

Savings Summary

Annual Energy Savings	*2476*	kWh/ Annum
Annual Monetary Savings	*21325*	Rs./ Annum
Investment Cost	*141900*	Rs.
Payback	*79.8*	Months

4.2.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan			
Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan	Total
Block		A	
Floor		GF	
Location		Principal room	
Sub-Location		Bathroom	
Type of Fan		Exhaust Fan	Exhaust Fan
Capacity of Fan	W	50	50
Total Number of Fan	No.'s	1	1
Total Power Consumption	kW	0.05	0.05
Average Operating Hours	Oper. Hours/ Day	6	6
Energy Consumption per Day	kWh/ Day	0.3	0.3
Annual Operating Days	Days/ Annum	300	300
Annual Energy Consumption	kWh/ Annum	90	90
Existing System		Exhaust Fan	Exhaust Fan
Suggestion		EE Exhaust Fan	EE Exhaust Fan
Suggested Capacity to be replaced	W	20	20
Expected Power Consumption	kW	0.02	0.02
Expected Energy Consumption	kWh/ Annum	36	36
Expected Energy Savings	kWh/ Annum	54	54
Savings Percentage	%	60.00	60.0
Energy Cost	Rs./ kWh	8.61	8.61
Annual Monetary Savings	Rs./ Annum	465	464.94
Investment	Rs.	3300	3300
Payback	Months	85.17	85.2

Savings Summary		
Annual Energy Savings	*54*	kWh/ Annum
Annual Monetary Savings	*465*	Rs./ Annum
Investment Cost	*2200*	Rs.
Payback	*85.17*	Months

4.2.4 Air Conditioning

ECP 5: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance				Total
Block		A	A	A	A	A
Floor		GF	GF	FF	FF	
Location		Secretary room	Principal room	Tissue Culture Lab	Balcony	
Sub-Location						
Type	Split/ Window	Split	Split	Split	Split	
Make				Llyod		
Capacity - TR	TR	1.5	1.5	1.5	1.5	6
Star rate				Conventional		
Quantity	No.'s	1	1	2	1	5
EER						
Power Consumption - kW	kW	1.65	1.65	1.65	1.65	6.6
Total Power Consumption, kW	kW	1.65	1.65	3.3	1.65	8.25
Working hours	Hours/ Day	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	2970	2970	5940	2970	14850
Expected Power Consumption	kW	1.60	1.60	3.20	1.60	8.0025
Expected Power Savings	kW	0 05	0.05	0.10	0.05	0.2475
Savings Percentage	%	3.00	3.00	3.00	3.00	3
Expected Annual Energy Consumption	kWh/ Annum	2881	2881	5762	2881	14405
Expected Annual Energy Savings	kWh/ Annum	89	89	178	89	446
Energy Cost	Rs./ kWh	9	9	9	9	8.61
Cost Saving Per annum	Rs./ Annum	767	767	1,534	767	3836
Investment	Rs	Nil	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Immediate	Immediate

Savings Summary

Annual Energy Savings	*446*	kWh/ Annum
Annual Monetary Savings	*3836*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 6: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations

Description	Unit	Set Temp. Reduction				Total
Block		A	A	A	A	A
Floor		GF	GF	FF	FF	
Location		Secretary room	Principal room	Tissue Culture Lab	Balcony	
Sub-Location						
Type	Split/ Window	Split	Split	Split	Split	
Make				Llyod		
Capacity	TR	1.5	1.5	1.5	1.5	6
Star rate				Conventional		
Quantity	No.'s	1	1	2	1	5
EER						
Power Consumption	kW	1.65	1.65	1.65	1.65	6.6
Total Power Consumption	kW	1.65	1.65	3.3	1.65	8.25
Working hours	Hour	6	6	6	6	6
Annual Working Days	Days/ Annum	300	300	300	300	300
Actual Energy Consumption	kWh/ Annum	2970	2970	5940	2970	14850
Present Set Temperature	Deg. C	20	20	20	20	
Required Temperature	Deg. C	24	24	24	24	
Set Point @ Thermostat	Deg. C	22	22	22	22	
Expected Power Consumption	kW	1.55	1.55	3.10	1.55	7.755
Expected Power Savings	kW	0.10	0.10	0.20	0.10	0.495
Savings Percentage	%	6.00	6.00	6.00	6.00	6
Expected Annual Energy Consumption	kWh/ Annum	2792	2792	5584	2792	13959
Expected Annual Energy Savings	kWh/ Annum	178	178	356	178	891
Energy Cost	Rs./ kWh	9	9	9	9	8.61
Cost Saving per Annum	Rs./ Annum	1,534	1,534	3,069	1,534	7672
Investment	Rs.	Nil	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Inumediate	Immediate

Savings Summary

Annual Energy Savings	*891*	kWh/ Annum
Annual Monetary Savings	*7672*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 7: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC				Total
Block		A	A	A	A	A
Floor		GF	GF	FF	FF	
Location		Secretary room	Principal room	Tissue Culture Lab	Balcony	
Sub-Location						
Type of AC	Type	Split	Split	Split	Split	Split/ Window
Make				Llyod		
Rated Capacity of AC's	TR	1.5	1.5	1.5	1.5	6.0
Actual Star Rated				Conventional		
No of AC		1	1	2	1	5
Energy Efficiency Ratio (EER)	EER					
Cooling Capacity	kCal/hr	4539	4539	4539	4539	18156
Total Capacity of AC's	TR	1.5	1.5	3.0	1.5	7.5
Power Consumption of Actual AC	Watt	1623	1623	3247	1623	8117
EER of 5 Star AC	EER	3.21	3.21	3.21	3.21	
Power Consumption of 5 Star AC	Watt	1414	1414	2828	1414	7070
Estimated Power Savings	Watt	322.5	322.5	645.1	322.5	1613
Expected Power Consumption	kW	1.1	1.1	2.2	1.1	5.5
Operating Hours	Hours/ Day	6	6	6	6	6.0
Annual Working Days	Days/Annum	300	300	300	300	300
Annual Actual Energy Consumption	kWh/Annum	2922	2922	5844	2922	14611
Expected Annual Energy Consumption	kWh/Annum	2342	2342	4683	2342	11708
Estimated Annual Energy Savings	kWh/Annum	581	581	1161	581	2903
Energy Cost	Rs./kWh	8.61	8.61	8.61	8.61	8.6
Annual Monetary Savings	Rs./Annum	4999	4999	9997	4999	24993
Investment Cost	Rs.	22589	22589	45179	22589	112947
Payback	Months	54	54	54	54	54.2

Savings Summary

Annual Energy Savings	*2903*	kWh/ Annum
Annual Monetary Savings	*24993*	Rs./ Annum
Investment Cost	*112947*	Rs.
Payback	*54.2*	Months

4.2.5 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	5	2	8	7	3	1 204	2	17	12
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	8,302	3,249	14,850	12,753	4,644	2,167	3,042	30,838	21,211
Capacity of Solar Panel Required	kW	5	2	9	7	3	1	2	18	12
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	11,069	4,332	19,800	17,004	6,192	2,890	4,056	41,117	28,282
Energy Cost (inside)	Rs / Annum	9	9	9	9	9	9	9	9	9
Expected Annual Monetary Savings (inside)	Rs / Annum	71,477	27,974	127,859	109,803	39,985	18,660	26,192	265,512	182,628
Expected Annual Energy Export	kWh/ Annum	2,767	1,083	4,950	4,251	1,548	722	1,014	10,279.2	7,070
Energy Cost for Export	Rs /kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs / Annum	44,275	17,328	79,200	68,016	24,768	11,558	16,224	164,467	113,126
Total Annual Monetary Savings	Rs / Annum	115,752	45,302	207,059	177,819	64,753	30,218	42,416	429,979	295,755
Investment Cost	Rs.	387,408	151,620	693,000	595,140	216,720	101,136	141,960	1,439,088	989,856
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*30838*	kWh/ Annum
Annual Monetary Savings	*429979*	Rs./ Annum
Investment Cost	*1439088*	Rs.
Payback	*3*	Year

4.3 Energy Conservation Proposals-Block B

4.3.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting							
Block		B	B	B	B	B	B	B	B
Floor		GF	GF	GF	GF	GF	GF	GF	GF
Location		UPS room	English Language Lab I	Dean Office room			IQAC	Wide Corridor	Corridor
Sub-Location				Renovation of Seminar Hall		Guest room		Infront of English Language Lab I to Dean office room	From Block A to Block C
Type of Lamp		FTL	FTL	CFL	CFL	LED	FTL	FTL	FTL
Capacity of Lamp	W	36	36	9	12	12	36	36	36
Number of Fixtures		1	15	9	18	22	2	5	1
Number of Fittings		1	2	3	1	1	1	1	1
Total Number of Lamps		1	30	27	18	22	2	5	1
Actual Power Consumption	kW	0.036	1.08	0.243	0.216	0.264	0.072	0.18	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	64.8	1944	437.4	388.8	475.2	129.6	324	64.8
Identification		FTL	FTL	CFL	CFL	LED	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	7	7	12	20	20	20
Expected Total Power Consumption	kW	0.02	0.3	0.063	0.126	0.264	0.04	0.1	0.02
Expected Annual Energy Consumption	kWh/ Annum	36	540	113.4	226.8	475.2	72	180	36
Expected Annual Energy Savings	kWh/ Annum	28.8	1404	324	162	0	57.6	144	28.8
Percentage of Savings	%	44.44	72.22	74.07	41.67	0.00	44.44	44.44	44.44
Energy Cost	Rs / kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs / Annum	248	12088	2790	1395	0	496	1240	248
Investment Cost	Rs	200	3000	630	1260		400	1000	200
Payback	Month	9.68	2.98	2.71	10.84	#DIV/0!	9.68	9.68	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting							
Block		B	B	B	B	B	B	B	B
Floor		GF	GF	GF	GF	FF	FF	FF	FF
Location		PG Research Dept of English				Botany Department			
Sub-Location		Communication Skill Center	English Language & Career Lab			Department Library	Staff room	B Sc Lab	I M Sc Lab
Type of Lamp		CFL	FTL	CFL	CFL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	12	36	12	18	36	36	36	36
Number of Fixtures		9	15	6	1	3	5	4	6
Number of Fittings		3	2	1	2	1	1	1	1
Total Number of Lamps		27	30	6	2	3	5	4	6
Actual Power Consumption	kW	0.324	1.08	0.072	0.036	0.108	0.18	0.144	0.216
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	583.2	1944	129.6	64.8	194.4	324	259.2	388.8
Identification		CFL	FTL	CFL	CFL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	12	20	5	7	20	20	20	20
Expected Total Power Consumption	kW	0.108	0.3	0.03	0.007	0.06	0.1	0.08	0.12
Expected Annual Energy Consumption	kWh/ Annum	194.4	540	54	12.6	108	180	144	216
Expected Annual Energy Savings	kWh/ Annum	388.8	1404	75.6	52.2	86.4	144	115.2	172.8
Percentage of Savings	%	66.67	72.22	58.33	80.56	44.44	44.44	44.44	44.44
Energy Cost	Rs / kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs / Annum	3348	12088	651	449	744	1240	992	1488
Investment Cost	Rs	1080	3000	300	70	600	1000	800	1200
Payback	Month	3.87	2.98	5.53	1.87	9.68	9.68	9.68	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting								
Block		B	B	B	B	B	B	B	B	B
Floor		FF	FF	SF	SF	SF	SF	SF	SF	
Location		Botany Department		Stationary room	Automatic Controller Office		Paper Valuation room 1	Paper Valuation room 2	Wide Corridor	
Sub-Location		II M.Sc Lab	Corrid or							
Type of Lamp		FTl	CFl	FTl	FTL	CFL	FTL	FTL	FTL	CFL/ FTL/ LED
Capacity of Lamp	W	36	14	36	36	18	36	36	36	36/ 40/ 14/ 18
Number of Fixtures		4	2	3	7	2	8	6	4	
Number of Fittings		1	1	1	1	1	1	1	1	
Total Number of Lamps		4	2	3	7	2	8	6	4	225
Actual Power Consumption	kW	0 144	0 028	0 108	0 252	0 036	0 288	0 216	0 144	5.503
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	259 2	50 4	194 4	453 6	64 8	518 4	388 8	259 2	9905.4
Identification		FTL	CFL	FTL	FTL	CFL	FTL	FTL	FTL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	5	20	20	5	20	20	20	12/ 20
Expected Total Power Consumption	kW	0.08	0 01	0 06	0 14	0 01	0 16	0 12	0.08	2.398
Expected Annual Energy Consumption	kWh/ Annum	144	18	108	252	18	288	216	144	4316.4
Expected Annual Energy Savings	kWh/ Annum	115 2	32 4	86 4	201 6	46 8	230 4	172.8	115 2	5589
Percentage of Savings	%	44 44	64 29	44 44	44 44	72 22	44 44	44 44	44 44	56.42
Energy Cost	Rs / kWh	8 61	8 61	8 61	8 61	8.61	8.61	8 61	8 61	8.61
Annual Monetary Savings	Rs / Annum	992	279	744	1736	403	1984	1488	992	48121
Investment Cost	Rs	800	100	600	1400	100	1600	1200	800	21340
Payback	Month	9 68	4 30	9 68	9.68	2.98	9 68	9 68	9.68	5.32

Savings Summary

Annual Energy Savings	*5589*	kWh/ Annum
Annual Monetary Savings	*48121*	Rs./ Annum
Investment Cost	*21340*	Rs.
Payback	*5.3*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver***.

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Block B
Present Average Power Consumption of Lightings	kW	6
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	33
Actual Annual Energy Consumption of Lighting	kWh/Year	9,905
Expected Annual Energy Savings using LES	kWh/Year	825
Energy Cost	Rs/kWh	8.6
Annual Savings	Rs./Annum	7,107
Capacity of Lighting Energy Saver	kVA	6
Investment Cost	Rs	5,668
Payback period	Months	10

Savings Summary

Annual Energy Savings	*825*	kWh/ Annum
Annual Monetary Savings	*7107*	Rs./ Annum
Investment Cost	*5668*	Rs.
Payback	*10*	Months

4.3.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		B	B	B	B	B	B	B	B
Floor		GF	GF	GF	GF	GF	FF	FF	FF
Location		UPS room	English Language Lab I	Dean office room	IQAC	PG Research Dept. of English	Botany Department		
Sub-Location				Guest room		English Language & Career Lab	Staff room	B.Sc Lab	I M.Sc Lab
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No 's	1	7	2	2	7	5	2	2
Total Power Consumption	kW	0 06	0 42	0 12	0 12	0 42	0 3	0 12	0 12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.36	2 52	0.72	0 72	2 52	1 8	0 72	0 72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	108	756	216	216	756	540	216	216
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0 028	0 196	0 056	0 056	0 196	0.14	0 056	0 056
Expected Energy Consumption	kWh/ Annum	50 4	352.8	100 8	100 8	352 8	252	100 8	100.8
Expected Energy Savings	kWh/ Annum	58	403	115	115	403	288	115	115
Savings Percentage	%	53.33	53 33	53 33	53.33	53 33	53 33	53.33	53 33
Energy Cost	Rs / kWh	8 61	8 61	8 61	8.61	8 61	8 61	8.61	8 61
Annual Monetary Savings	Rs / Annum	496	3472	992	992	3472	2480	992	992
Investment	Rs	3300	23100	6600	6600	23100	16500	6600	6600
Payback	Months	79 85	79.85	79 85	79 85	79 85	79.85	79 85	79 85

4.3.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan			Total
Block		B	B	B	**Block B**
Floor		FF	SF	SF	
Location		Botany Department	Stationary room	Automatic Controller Office	
Sub-Location		I M.Sc Lab			
Type of Fan		Exhaust Fan			**Exhaust Fan**
Capacity of Fan	W	50	50	50	**50**
Total Number of Fan	No 's	1	2	1	**4**
Total Power Consumption	kW	0.05	0.1	0.05	**0.2**
Average Operating Hours	Oper. Hours/ Day	6	6	6	**6**
Energy Consumption per Day	kWh/ Day	0 3	0.6	0.3	**1.2**
Annual Operating Days	Days/ Annum	300	300	300	**300**
Annual Energy Consumption	kWh/ Annum	90	180	90	**360**
Existing System		Exhaust Fan			**Exhaust Fan**
Suggestion		EE Exhaust Fan			**EE Exhaust Fan**
Suggested Capacity to be replaced	W	20	20	20	**20**
Expected Power Consumption	kW	0.02	0.04	0.02	**0.08**
Expected Energy Consumption	kWh/ Annum	36	72	36	**144**
Expected Energy Savings	kWh/ Annum	54	108	54	**216**
Savings Percentage	%	60.00	60.00	60.00	**60.0**
Energy Cost	Rs./ kWh	8.61	8.61	8.61	**8.61**
Annual Monetary Savings	Rs./ Annum	465	930	465	**1860**
Investment	Rs.	3300	6600	3300	**13200**
Payback	Months	85.17	85.17	85.17	**85.2**

Savings Summary

Annual Energy Savings	*216*	kWh/ Annum
Annual Monetary Savings	*1860*	Rs./ Annum
Investment Cost	*13200*	Rs.
Payback	*85.17*	Months

4.3.4 Air Conditioning

ECP 5: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance					Total
Block		B	B	B	B	B	B
Floor		GF	GF	GF	GF	SF	
Location		Dean Office room	Dean office	PG Research Dept. of English		Automatic	
Sub-Location		Renovation of	Guest room	Communication	English Language		
Type	Split/ Window	Split	Cazatte/	Split	Split	Split	
Make				Llyod	LG		
Capacity – TR	TR	2	1.5	2	2	2	9.5
Star rate					Conventional	3	
Quantity	No.'s	3	3	3	3	1	13
EER							
Power Consumption - kW	kW	2.2	1.65	2.2	2.2	2.2	10.45
Total Power Consumption, kW	kW	6.6	4.95	6.6	6.6	2.2	26.95
Working hours	Hours/ Day	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	11880	8910	11880	11880	3960	48510
Expected Power Consumption	kW	6.40	4.80	6.40	6.40	2.13	26.1415
Expected Power Savings	kW	0.20	0.15	0.20	0.20	0.07	0.8085
Savings Percentage	%	3.00	3.00	3.00	3.00	3.00	3
Expected Annual Energy	kWh/ Annum	11524	8643	11524	11524	3841	47054.7
Expected Annual Energy Savings	kWh/ Annum	356	267	356	356	119	1455.3
Energy Cost	Rs./ kWh	9	9	9	9	9	8.61
Cost Saving Per annum	Rs./ Annum	3,069	2,301	3,069	3,069	1,023	12530
Investment	Rs.	Nil	Nil	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Immediate	Immediate	Immediate

Savings Summary

Annual Energy Savings	*1455*	kWh/ Annum
Annual Monetary Savings	*12530*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan						Total
Block		B	B	B	B	B	B	
Floor		FF	SF	SF	SF	SF	SF	
Location		Botany Department	Stationary room	Automatic Controller Office	Paper Valuation room 1	Paper Valuation room 2	Wide Corridor	
Sub-Location		II M.Sc Lab						
Type of Fan		Ceiling						Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60
Total Number of Fan	No.'s	2	3	11	9	7	1	61
Total Power Consumption	kW	0.12	0.18	0.66	0.54	0.42	0.06	3.66
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	1.08	3.96	3.24	2.52	0.36	21.96
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	324	1188	972	756	108	6588
Existing System		Ceiling						Ceiling
Suggestion		EE Super Fan						EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.084	0.308	0.252	0.196	0.028	1.708
Expected Energy Consumption	kWh/ Annum	100.8	151.2	554.4	453.6	352.8	50.4	3074.4
Expected Energy Savings	kWh/ Annum	115	173	634	518	403	58	3513.6
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.3
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	992	1488	5455	4463	3472	496	30252
Investment	Rs.	6600	9900	36300	29700	23100	3300	201300
Payback	Months	79.85	79.85	79.85	79.85	79.85	79.85	79.8

Savings Summary

Annual Energy Savings	*3513*	kWh/ Annum
Annual Monetary Savings	*30152*	Rs./ Annum
Investment Cost	*201300*	Rs.
Payback	*79.8*	Months

ECP 6: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations

Description	Unit	Set Temp. Reduction					Total
Block		B	B	B	B	B	B
Floor		GF	GF	GF	GF	SF	
Location		Dean office room		PG Research Dept. of English		Automatic	
Sub-Location		Renovation of	Guest room	Communicatio	English		
Type	Split/ Window	Split	Cazatte/ Split	Split	Split	Split	
Make				Llyod	LG		
Capacity	TR	2	1.5	2	2	2	9.5
Star rate					Conventional	3	
Quantity	No.'s	3	3	3	3	1	13
EER							
Power Consumption	kW	2.2	1.65	2.2	2.2	2.2	10.45
Total Power Consumption	kW	6.6	4.95	6.6	6.6	2.2	26.95
Working hours	Hour	6	6	6	6	6	6
Annual Working Days	Days/ Annum	300	300	300	300	300	300
Actual Energy Consumption	kWh/ Annum	11880	8910	11880	11880	3960	48510
Present Set Temperature	Deg. C	20	20	20	20	20	
Required Temperature	Deg. C	24	24	24	24	24	
Set Point @ Thermostat	Deg C	22	22	22	22	22	
Expected Power Consumption	kW	6.20	4.65	6.20	6.20	2.07	25.333
Expected Power Savings	kW	0.40	0.30	0.40	0.40	0.13	1.617
Savings Percentage	%	6.00	6.00	6.00	6.00	6.00	6
Expected Annual Energy Consumption	kWh/ Annum	11167	8375	11167	11167	3722	45599.4
Expected Annual Energy Savings	kWh/ Annum	713	535	713	713	238	2910.6
Energy Cost	Rs./ kWh	9	9	9	9	9	8.61
Cost Saving per Annum	Rs./ Annum	6,137	4,603	6,137	6,137	2,046	25060
Investment	Rs.	Nil	Nil	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Immediate	Immediate	Immediate

Savings Summary

Annual Energy Savings	*2910*	kWh/ Annum
Annual Monetary Savings	*25060*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 7: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC					Total
Block		B	B	B	B	B	B
Floor		GF	GF	GF	GF	SF	
Location		Dean Office room		PG Research Dept. of English		Automatic Controller	
Sub-Location		Renovation of	Guest	Communication	English		
Type of AC	Type	Split	Cazatte/	Split	Split	Split	Split/
Make				Llyod	LG		
Rated Capacity of AC's	TR	2	1.5	2	2	2	9.5
Actual Star Rated					Conventional	3	
No of AC		3	3	3	3	1	13
Energy Efficiency Ratio (EER)	EER						
Cooling Capacity	kCal/hr	6052	4539	6052	6052	6052	28747
Total Capacity of AC's	TR	6.0	4.5	6.0	6.0	2.0	25
Power Consumption of Actual AC	Watt	6494	4870	6494	6494	2165	26516
EER of 5 Star AC	EER	3.21	3.21	3.21	3.21	3.21	
Power Consumption of 5 Star AC	Watt	5656	4242	5656	5656	1885	23095
Estimated Power Savings	Watt	1290.2	967.6	1290.2	1290.2	430.1	5268
Expected Power Consumption	kW	4.4	3.3	4.4	4.4	1.5	18
Operating Hours	Hours/ Day	6	6	6	6	6	6.0
Annual Working Days	Days/Annum	300	300	300	300	300	300
Annual Actual Energy Consumption	kWh/Annum	11689	8766	11689	11689	3896	47729
Expected Annual Energy Consumption	kWh/Annum	9366	7025	9366	9366	3122	38246
Estimated Annual Energy Savings	kWh/Annum	2322	1742	2322	2322	774	9483
Energy Cost	Rs./kWh	8.61	8.61	8.61	8.61	8.61	8.6
Annual Monetary Savings	Rs./Annum	19995	14996	19995	19995	6665	81645
Investment Cost	Rs.	90358	67768	90358	90358	30119	368960
Payback	Months	54	54	54	54	54	54.2

Savings Summary

Annual Energy Savings	*9483*	kWh/ Annum
Annual Monetary Savings	*81645*	Rs./ Annum
Investment Cost	*368960*	Rs.
Payback	*54.2*	Months

4.3.5 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	6	2	27	23	4	1 708	6	42	33
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	9,905	4,316	48,510	41,682	6,588	3,074	11,052	76,055	60,125
Capacity of Solar Panel Required	kW	6	3	28	24	4	2	6	44	35
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	13,207	5,755	64,680	55,576	8,784	4,099	14,736	101,407	80,166
Energy Cost (inside)	Rs./ Annum	9	9	9	9	9	9	9	9	9.
Expected Annual Monetary Savings (inside)	Rs./ Annum	85,285	37,164	417,671	358,882	56,723	26,471	95,158	654,837	517,675
Expected Annual Energy Export	kWh/ Annum	3,302	1,439	16,170	13,894	2,196	1,025	3,684	25,351.8	20,042
Energy Cost for Export	Rs./kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs./ Annum	52,829	23,021	258,720	222,304	35,136	16,397	58,944	405,629	320,666
Total Annual Monetary Savings	Rs./ Annum	138,114	60,185	676,391	581,186	91,859	42,867	154,102	1,060,466	838,340
Investment Cost	Rs.	462,252	201,432	2,263,800	1,945,160	307,440	143,472	515,760	3,549,252	2,805,824
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*76055*	kWh/ Annum
Annual Monetary Savings	*1060466*	Rs./ Annum
Investment Cost	*3549252*	Rs.
Payback	*3*	Year

4.4 Energy Conservation Proposals-Block C

4.4.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations of Auditorium.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting							
Block		C	C	C	C	C	C	C	C
Floor		GF	GF	GF	GF	GF	GF	GF	GF
Location		Chemistry Research Lab	Store room	Ancillary Chemistry Lab		Classroom G4	Toilet	Hall	Class room T8
Sub-Location					Preparation room	Preparation room		Class room T7	
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	36	36	36	36
Number of Fixtures		3	2	7	1	2	5	4	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		3	2	7	1	2	5	4	2
Actual Power Consumption	kW	0 108	0 072	0 252	0 036	0 072	0.18	0 144	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	194 4	129.6	453.6	64 8	129 6	324	259 2	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0 06	0 04	0 14	0 02	0 04	0 1	0.08	0 04
Expected Annual Energy Consumption	kWh/ Annum	108	72	252	36	72	180	144	72
Expected Annual Energy Savings	kWh/ Annum	86.4	57 6	201.6	28 8	57.6	144	115 2	57 6
Percentage of Savings	%	44 44	44.44	44 44	44.44	44.44	44 44	44.44	44 44
Energy Cost	Rs./ kWh	8.61	8 61	8 61	8.61	8 61	8 61	8 61	8 61
Annual Monetary Savings	Rs / Annum	744	496	1736	248	496	1240	992	496
Investment Cost	Rs	600	400	1400	200	400	1000	800	400
Payback	Month	9 68	9.68	9 68	9 68	9 68	9.68	9.68	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting							
Block		C	C	C	C	C	C	C	C
Floor		GF	GF	FF	FF	FF	FF	FF	FF
Location		Class room T9	Verandah	Research Lab II	Classroom F1	Classroom F2	Classroom F3	Wide Corridor	Steps towards SF from FF
Sub-Location							From Classroom to Research Lab		Near Classroom
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	36	36	36	36
Number of Fixtures		2	3	2	2	2	4	3	1
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	3	2	2	2	4	3	1
Actual Power Consumption	kW	0.072	0.108	0.072	0.072	0.072	0.144	0.108	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	194.4	129.6	129.6	129.6	259.2	194.4	64.8
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.06	0.04	0.04	0.04	0.08	0.06	0.02
Expected Annual Energy Consumption	kWh/ Annum	72	108	72	72	72	144	108	36
Expected Annual Energy Savings	kWh/ Annum	57.6	86.4	57.6	57.6	57.6	115.2	86.4	28.8
Percentage of Savings	%	44.44	44.44	44.44	44.44	44.44	44.44	44.44	44.44
Energy Cost	Rs / kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs / Annum	496	744	496	496	496	992	744	248
Investment Cost	Rs.	400	600	400	400	400	800	600	200
Payback	Month	9.68	9.68	9.68	9.68	9.68	9.68	9.68	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lighting to LED Lighting						
Block		C	C	C	C	C	C	C
Floor		SF	SF	SF	SF	SF	SF	
Location		Computer Lab	Class room S1	Class room S2	Wide Corridor	Werranda towards Block A from Block C	Class room S3	
Sub-Location					Infront of Classrooms			
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Capacity of Lamp	W	36	36	36	36	40	36	36/ 40
Number of Fixtures		12	2	2	3	1	2	
Number of Fittings		2	1	1	1	1	1	
Total Number of Lamps		24	2	2	3	1	2	79
Actual Power Consumption	kW	0.864	0.072	0.072	0.108	0.04	0.072	2.848
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	1555 2	129.6	129.6	194 4	72	129 6	5126.4
Identification		FTL	FTL	FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	12/ 20
Expected Total Power Consumption	kW	0 24	0.04	0.04	0.06	0.02	0 04	1.34
Expected Annual Energy Consumption	kWh/ Annum	432	72	72	108	36	72	2412
Expected Annual Energy Savings	kWh/ Annum	1123 2	57.6	57 6	86 4	36	57.6	2714.4
Percentage of Savings	%	72 22	44 44	44 44	44 44	50.00	44 44	52.95
Energy Cost	Rs./ kWh	8 61	8.61	8.61	8 61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	9671	496	496	744	310	496	23371
Investment Cost	Rs.	2400	400	400	600	200	400	13400
Payback	Month	2 98	9.68	9 68	9.68	7 74	9.68	6.88

Savings Summary

Annual Energy Savings	*2714*	kWh/ Annum
Annual Monetary Savings	*23371*	Rs./ Annum
Investment Cost	*13400*	Rs.
Payback	*6.88*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver.***

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Block C
Present Average Power Consumption of Lightings	kW	3
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	17
Actual Annual Energy Consumption of Lighting	kWh/Year	5,126
Expected Annual Energy Savings using LES	kWh/Year	427
Energy Cost	Rs/kWh	8.6
Annual Savings	Rs./Annum	3,678
Capacity of Lighting Energy Saver	kVA	3
Investment Cost	Rs	2,933
Payback period	Months	10

Savings Summary

Annual Energy Savings	*427*	kWh/ Annum
Annual Monetary Savings	*3678*	Rs./ Annum
Investment Cost	*2933*	Rs.
Payback	*10*	Months

4.4.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		C	C	C	C	C	C	C	C
Floor		GF	GF	GF	GF	GF	FF	FF	FF
Location		Chemistry Research Lab	Classroom G4	Hall	Class room T8	Class room T9	Research Lab II	Classroom F1	Classroom F2
Sub-Location			Preparation room	Class room T7					
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No 's	2	3	5	3	3	3	3	3
Total Power Consumption	kW	0.12	0.18	0.3	0.18	0.18	0.18	0.18	0.18
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	1.08	1.8	1.08	1.08	1.08	1.08	1.08
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	324	540	324	324	324	324	324
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.084	0.14	0.084	0.084	0.084	0.084	0.084
Expected Energy Consumption	kWh/ Annum	100.8	151.2	252	151.2	151.2	151.2	151.2	151.2
Expected Energy Savings	kWh/ Annum	115	173	288	173	173	173	173	173
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs / kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs / Annum	992	1488	2480	1488	1488	1488	1488	1488
Investment	Rs	6600	9900	16500	9900	9900	9900	9900	9900
Payback	Months	79.85	79.85	79.85	79.85	79.85	79.85	79.85	79.85

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan					Total
Block		C	C	C	C	C	Block C
Floor		FF	SF	SF	SF	SF	
Location		Classroom F3	Computer Lab	Class room S1	Class room S2	Class room S3	
Sub-Location							
Type of Fan		Ceiling					Ceiling
Capacity of Fan	W	60	60	60	60	60	60
Total Number of Fan	No.'s	5	9	3	3	3	48
Total Power Consumption	kW	0.3	0.54	0.18	0.18	0.18	2.88
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	1.8	3.24	1.08	1.08	1.08	17.28
Annual Operating Days	Days/ Annum	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	540	972	324	324	324	5184
Existing System		Ceiling					Ceiling
Suggestion		EE Super Fan					EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28
Expected Power Consumption	kW	0.14	0.252	0.084	0.084	0.084	1.344
Expected Energy Consumption	kWh/ Annum	252	453.6	151.2	151.2	151.2	2419.2
Expected Energy Savings	kWh/ Annum	288	518	173	173	173	2764.8
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.3
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	2480	4463	1488	1488	1488	23805
Investment	Rs.	16500	29700	9900	9900	9900	158400
Payback	Months	79.85	79.85	79.85	79.85	79.85	79.8

Savings Summary

Annual Energy Savings	*2764*	kWh/ Annum
Annual Monetary Savings	*23805*	Rs./ Annum
Investment Cost	*158400*	Rs.
Payback	*79.8*	Months

4.4.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan			Total
Block		C	C	C	**Block C**
Floor		GF	GF	GF	
Location		Ancillary Chemistry Lab		Toilet	
Sub-Location			Preparation room		
Type of Fan		Exhaust Fan			**Exhaust Fan**
Capacity of Fan	W	50	50	50	**50**
Total Number of Fan	No.'s	4	2	2	**8**
Total Power Consumption	kW	0.2	0.1	0.1	**0.4**
Average Operating Hours	Oper. Hours/ Day	6	6	6	**6**
Energy Consumption per Day	kWh/ Day	1.2	0.6	0.6	**2.4**
Annual Operating Days	Days/ Annum	300	300	300	**300**
Annual Energy Consumption	kWh/ Annum	360	180	180	**720**
Existing System		Exhaust Fan			**Exhaust Fan**
Suggestion		EE Exhaust Fan			**EE Exhaust Fan**
Suggested Capacity to be replaced	W	20	20	20	**20**
Expected Power Consumption	kW	0.08	0.04	0.04	**0.16**
Expected Energy Consumption	kWh/ Annum	144	72	72	**288**
Expected Energy Savings	kWh/ Annum	216	108	108	**432**
Savings Percentage	%	60.00	60.00	60.00	**60.0**
Energy Cost	Rs./ kWh	8.61	8.61	8.61	**8.61**
Annual Monetary Savings	Rs./ Annum	1860	930	930	**3720**
Investment	Rs.	13200	6600	6600	**26400**
Payback	Months	85.17	85.17	85.17	**85.2**

Savings Summary

Annual Energy Savings	*432*	kWh/ Annum
Annual Monetary Savings	*3720*	Rs./ Annum
Investment Cost	*26400*	Rs.
Payback	*85.2*	Months

4.4.4 Green Energy Utilization/ Solar Panel

ECP 5: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	3	1			5	2.548	3	12	7
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	5,126	2,412	0	0	9,828	4,586	6,120	21,074	13,118
Capacity of Solar Panel Required	kW	3	1	0	0	6	3	4	12	8
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	6,835	3,216	0	0	13,104	6.115	8,160	28,099	17,491
Energy Cost (inside)	Rs./ Annum	9	9	9	9	9	9	9	9	9
Expected Annual Monetary Savings (inside)	Rs./ Annum	44,138	20,767	0	0	84,619	39,489	52,693	181,451	112,949
Expected Annual Energy Export	kWh/ Annum	1,709	804	0	0	3,276	1,529	2,040	7,024.8	4,373
Energy Cost for Export	Rs/kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs./ Annum	27,341	12,864	0	0	52,416	24,461	32,640	112,397	69,965
Total Annual Monetary Savings	Rs./ Annum	71,479	33,631	0	0	137,035	63,950	85,333	293,847	182,914
Investment Cost	Rs.	239,232	112,560	0	0	458,640	214,032	285,600	983,472	612,192
Payback period	Year	3	3	#DIV/0!	#DIV/0!	3	3	3	3	3

Savings Summary

Annual Energy Savings	*21074*	kWh/ Annum
Annual Monetary Savings	*293847*	Rs./ Annum
Investment Cost	*983472*	Rs.
Payback	*3*	Year

4.5 Energy Conservation Proposals-Block D

4.5.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED								
Block		D	D	D	D	D	D	D	D	D
Floor		GF	FF	FF	FF	FF	FF	FF	SF	SF
Location		Chemistry Department	Dept of Physics (Aided)					Dept of Maths (Aided)	Dept of Zoology	Dept of Zoology
Sub-Location			Staff		Computer Lab	Physics Lab	M Phil Physics Research Lab	Staff room	Staff room	
Type of Lamp		FTL	LED	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	20	36	40	36	36	36	40	36
Number of Fixtures		2	5	2	2	13	5	5	4	2
Number of Fittings		6	1	1	1	1	1	1	1	1
Total Number of Lamps		12	5	2	2	13	5	5	4	2
Actual Power Consumption	kW	0.432	0.1	0.072	0.08	0.468	0.18	0.18	0.16	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	777.6	180	129.6	144	842.4	324	324	288	129.6
Identification		FTL	LED	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	24	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.048	0.1	0.04	0.04	0.26	0.1	0.1	0.08	0.04
Expected Annual Energy Consumption	kWh/ Annum	86.4	180	72	72	468	180	180	144	72
Expected Annual Energy Savings	kWh/ Annum	691.2	0	57.6	72	374.4	144	144	144	57.6
Percentage of Savings	%	88.89	0.00	44.44	50.00	44.44	44.44	44.44	50.00	44.44
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	5951.232	0	495.936	619.92	3223.584	1239.84	1239.84	1239.84	495.936

Investment Cost	Rs.	480		400	400	2600	1000	1000	800	400
Payback	Month	0.97	#DIV/0!	9.68	7.74	9.68	9.68	9.68	7.74	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		D	D	D	D	D	D	D	D
Floor		SF	SF	SF	SF	SF	SF	SF	TF
Location		Dept. of Zoology				Computer Lab VIII		Computer Lab VIII	II MLISc [T1]
Sub-Location		Zoology Lab		Digital Lab		UPS room			
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	36	40	36	40	36	36	40
Number of Fixtures		12	5	3	3	2	2	12	1
Number of Fittings		1	1	1	1	1	1	2	1
Total Number of Lamps		12	5	3	3	2	2	24	1
Actual Power Consumption	kW	0.48	0.18	0.12	0.108	0.08	0.072	0.864	0.04
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	864	324	216	194.4	144	129.6	1555.2	72
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.24	0.1	0.06	0.06	0.04	0.04	0.24	0.02
Expected Annual Energy Consumption	kWh/ Annum	432	180	108	108	72	72	432	36
Expected Annual Energy Savings	kWh/ Annum	432	144	108	86.4	72	57.6	1123.2	36
Percentage of Savings	%	50.00	44.44	50.00	44.44	50.00	44.44	72.22	50.00
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	3720	1240	930	744	620	496	9671	310
Investment Cost	Rs.	2400	1000	600	600	400	400	2400	200
Payback	Month	7.74	9.68	7.74	9.68	7.74	9.68	2.98	7.74

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights to the Specified Location

Description	Unit	Conventional Lights to LED							
Block		D	D	D	D	D	D	D	D
Floor		IV	IV	III	TF	TF	TF	TF	TF
Location		Dept. of Library & Information Science	Dept. of Tamil						
Sub-Location			Staff room	III B.A Tamil Literature [T2]	III B.A Tamil Literature [T3]		I B.A Tamil Literature [T4]	II B Com (P.A) [T5]	II MCA (CS) [T6]
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	40	40	36	36	36	36
Number of Fixtures		2	4	1	1	1	4	3	3
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	4	1	1	1	4	3	3
Actual Power Consumption	kW	0.072	0.144	0.04	0.04	0.036	0.144	0.108	0.108
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	259.2	72	72	64.8	259.2	194.4	194.4
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.08	0.02	0.02	0.02	0.08	0.06	0.06
Expected Annual Energy Consumption	kWh/ Annum	72	144	36	36	36	144	108	108
Expected Annual Energy Savings	kWh/ Annum	57.6	115.2	36	36	28.8	115.2	86.4	86.4
Percentage of Savings	%	44.44	44.44	50.00	50.00	44.44	44.44	44.44	44.44
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	496	992	310	310	248	992	744	744
Investment Cost	Rs.	400	800	200	200	200	800	600	600
Payback	Month	9.68	9.68	7.74	7.74	9.68	9.68	9.68	9.68

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED									
Block		D	D	D	D	D	D	D	D	D	D
Floor		GF	GF	GF	GF	GF	GF	GF	GF	GF	
Location		NCC room	Chemistry Lab	Chemistry Lab	Major Chemistry Lab	Chemistry store room	HOD room	Staff room	Wide Corridor		
Sub-Location				Physical Refugee room					Infront of Chemistry Lab		
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL	CFL	CFL/ FTL/ LED
Capacity of Lamp	W	36	36	40	36	36	36	36	36	18	36/ 40
Number of Fixtures		2	12	1	1	2	1	3	1	1	
Number of Fittings		2	1	1	1	1	1	1	1	1	
Total Number of Lamps		2	12	1	1	2	1	3	1	1	145
Actual Power Consumption	kW	0.072	0.432	0.04	0.036	0.072	0.036	0.108	0.036	0.018	5.33
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	777.6	72	64.8	129.6	64.8	194.4	64.8	32.4	9414
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL	CFL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20	5	12/ 20
Expected Total Power Consumption	kW	0.04	0.24	0.02	0.02	0.04	0.02	0.06	0.02	0.005	2.465
Expected Annual Energy Consumption	kWh/ Annum	72	432	36	36	72	36	108	36	9	4415
Expected Annual Energy Savings	kWh/ Annum	57.6	345.6	36	28.8	57.6	28.8	86.4	28.8	23.4	4999
Percentage of Savings	%	44.44	44.44	50.00	44.44	44.44	44.44	44.44	44.44	72.22	53.10
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	496	2976	310	248	496	248	744	248	201	43038
Investment Cost	Rs.	400	2400	200	200	400	200	600	200	50	23530
Payback	Month	9.68	9.68	7.74	9.68	9.68	9.68	9.68	9.68	2.58	6.56

Savings Summary

Annual Energy Savings	*4999*	kWh/ Annum
Annual Monetary Savings	*43038*	Rs./ Annum
Investment Cost	*23530*	Rs.
Payback	*6.56*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver.***

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Block D
Present Average Power Consumption of Lightings	kW	10
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	57
Actual Annual Energy Consumption of Lighting	kWh/Year	17,179
Expected Annual Energy Savings using LES	kWh/Year	1,432
Energy Cost	Rs/kWh	8.6
Annual Savings	Rs./Annum	12,326
Capacity of Lighting Energy Saver	kVA	10
Investment Cost	Rs	9,830
Payback period	Months	10

Savings Summary

Annual Energy Savings	*1432*	kWh/ Annum
Annual Monetary Savings	*12326*	Rs./ Annum
Investment Cost	*9830*	Rs.
Payback	*10*	Months

4.5.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan							
Block		D	D	D	D	D	D	D	D
Floor		FF	FF	FF	FF	FF	SF	SF	SF
Location		Dept of Physics (Aided)				Dept of Maths (Aided)	Dept. of Zoology		
Sub-Location		Staff	Computer Lab	Physics Lab	M.Phil Physics Research Lab	Staff room	Staff room	Zoology Lab	Digital Lab
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	8	3	13	3	7	7	10	4
Total Power Consumption	kW	0.48	0.18	0.78	0.18	0.42	0.42	0.6	0.24
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	2.88	1.08	4.68	1.08	2.52	2.52	3.6	1.44
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	864	324	1404	324	756	756	1080	432
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.224	0.084	0.364	0.084	0.196	0.196	0.28	0.112
Expected Energy Consumption	kWh/ Annum	403.2	151.2	655.2	151.2	352.8	352.8	504	201.6
Expected Energy Savings	kWh/ Annum	461	173	749	173	403	403	576	230
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	3967	1488	6447	1488	3472	3472	4959	1984
Investment	Rs.	26400	9900	42900	9900	23100	23100	33000	13200
Payback	Months	79.85	79.85	79.85	79.85	79.85	79.85	79.85	79.85

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan							
Block		D	D	D	D	D	D	D	D
Floor		SF	TF	TF	TF	TF	TF	TF	TF
Location		Computer Lab VIII	II MLISc [T1]	Dept of Library & Information Science	Dept of Tamil				
Sub-Location		UPS room			Staff room	III B A Tamil Literature [T2]	III B A Tamil Literature [T3]	I B A Tamil Literature [T4]	II B Com (P A) [T5]
Type of Fan		Ceiling	Ceiling	Ceiling	Ceiling	Ceiling	Ceiling	Ceiling	Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	1	2	6	3	3	3	3
Total Power Consumption	kW	0.12	0.06	0.12	0.36	0.18	0.18	0.18	0.18
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	0.36	0.72	2.16	1.08	1.08	1.08	1.08
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	108	216	648	324	324	324	324
Existing System		Ceiling	Ceiling	Ceiling	Ceiling	Ceiling	Ceiling	Ceiling	Ceiling
Suggestion		EE Super Fan	EE Super Fan	EE Super Fan	EE Super Fan	EE Super Fan	EE Super Fan	EE Super Fan	EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.028	0.056	0.168	0.084	0.084	0.084	0.084
Expected Energy Consumption	kWh/ Annum	100.8	50.4	100.8	302.4	151.2	151.2	151.2	151.2
Expected Energy Savings	kWh/ Annum	115	58	115	346	173	173	173	173
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	992	496	992	2976	1488	1488	1488	1488
Investment	Rs.	6600	3300	6600	19800	9900	9900	9900	9900
Payback	Months	79.85	79.85	79.85	79.85	79.85	79.85	79.85	79.85

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan								Total
Block		D	D	D	D	D	D	D	D	Block D
Floor		TF	GF	GF	GF	GF	GF	GF	GF	
Location		Dept. of Tamil	NCC room	Chemistry Lab	Chemistry Lab	Major Chemistry Lab	Chemistry store room	HOD room	Staff room	
Sub-Location		II MCA (CS) [T6]			Physical Balance room					
Type of Fan		Ceiling								Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60	60	60
Total Number of Fan	No's	5	1	1	1	1	1	1	2	91
Total Power Consumption	kW	0.3	0.06	0.06	0.06	0.06	0.06	0.06	0.12	5.46
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	1.8	0.36	0.36	0.36	0.36	0.36	0.36	0.72	32.76
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	540	108	108	108	108	108	108	216	9828
Existing System		Ceiling								Ceiling
Suggestion		EE Super Fan								EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.14	0.028	0.028	0.028	0.028	0.028	0.028	0.056	2.548
Expected Energy Consumption	kWh/ Annum	252	50.4	50.4	50.4	50.4	50.4	50.4	100.8	4586
Expected Energy Savings	kWh/ Annum	288	58	58	58	58	58	58	115	5242
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.3
Energy Cost	Rs./ kWh	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61	8.61
Annual Monetary Savings	Rs./ Annum	2480	496	496	496	496	496	496	992	45130
Investment	Rs.	16500	3300	3300	3300	3300	3300	3300	6600	300300
Payback	Months	79.85	79.85	79.85	79.85	79.85	79.85	79.85	79.85	79.8

Savings Summary

Annual Energy Savings	*5242*	kWh/ Annum
Annual Monetary Savings	*45130*	Rs./ Annum
Investment Cost	*300300*	Rs.
Payback	*79.8*	Months

4.5.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan					
Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan			Total
Block		D	D	D	**Block D**
Floor		GF	GF	GF	
Location		Chemistry Lab	Chemistry Lab	Major Chemistry Lab	
Sub-Location			Physical Balance room		
Type of Fan		Exhaust Fan	Exhaust Fan	Exhaust Fan	**Exhaust Fan**
Capacity of Fan	W	50	50	50	**50**
Total Number of Fan	No.'s	4	4	1	**9**
Total Power Consumption	kW	0.2	0.2	0.05	**0.45**
Average Operating Hours	Oper. Hours/ Day	6	6	6	**6**
Energy Consumption per Day	kWh/ Day	1.2	1.2	0.3	**2.7**
Annual Operating Days	Days/ Annum	300	300	300	**300**
Annual Energy Consumption	kWh/ Annum	360	360	90	**810**
Existing System		Exhaust Fan	Exhaust Fan	Exhaust Fan	**Exhaust Fan**
Suggestion		EE Exhaust Fan	EE Exhaust Fan	EE Exhaust Fan	**EE Exhaust Fan**
Suggested Capacity to be replaced	W	20	20	20	**20**
Expected Power Consumption	kW	0.08	0.08	0.02	**0.18**
Expected Energy Consumption	kWh/ Annum	144	144	36	**324**
Expected Energy Savings	kWh/ Annum	216	216	54	**486**
Savings Percentage	%	60.00	60.00	60.00	**60.0**
Energy Cost	Rs./ kWh	8.61	8.61	8.61	**8.61**
Annual Monetary Savings	Rs./ Annum	1860	1860	465	**4184.46**
Investment	Rs.	13200	13200	3300	**29700**
Payback	Months	85.17	85.17	85.17	**85.2**

Savings Summary		
Annual Energy Savings	*486*	kWh/ Annum
Annual Monetary Savings	*4184*	Rs./ Annum
Investment Cost	*29700*	Rs.
Payback	*85.17*	Months

4.5.4 Air Conditioning

ECP 5: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance	Total
Block		D	D
Floor		SF	
Location		Computer Lab VIII	
Sub-Location			
Type	Split/ Window	Window	
Make		Ogeneral	
Capacity - TR	TR	1.5	1.5
Star rate		Conventional	
Quantity	No.'s	4	4
EER			
Power Consumption - kW	kW	1.65	1.65
Total Power Consumption, kW	kW	6.6	6.6
Working hours	Hours/ Day	6	6
Annual Operating Days	Days/ Annum	300	300
Annual Energy Consumption	kWh/ Annum	11880	11880
Expected Power Consumption	kW	6.40	6.402
Expected Power Savings	kW	0.20	0.198
Savings Percentage	%	3.00	3
Expected Annual Energy Consumption	kWh/ Annum	11524	11523.6
Expected Annual Energy Savings	kWh/ Annum	356	356.4
Energy Cost	Rs./ kWh	9	8.61
Cost Saving Per annum	Rs./ Annum	3,069	3068
Investment	Rs.	Nil	Nil
Payback	Months	Immediate	Immediate

Savings Summary

Annual Energy Savings	*356.4*	kWh/ Annum
Annual Monetary Savings	*3068*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 6: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations

Description	Unit	Set Temp. Reduction	Total
Block		D	**D**
Floor		SF	
Location		Computer Lab VIII	
Sub-Location			
Type	Split/ Window	Window	
Make		Ogeneral	
Capacity	TR	1.5	**1.5**
Star rate		Conventional	
Quantity	No.'s	4	**4**
EER			
Power Consumption	kW	1.65	**1.65**
Total Power Consumption	kW	6.6	**6.6**
Working hours	Hour	6	**6**
Annual Working Days	Days/ Annum	300	**300**
Actual Energy Consumption	kWh/ Annum	11880	**11880**
Present Set Temperature	Deg. C	20	
Required Temperature	Deg. C	24	
Set Point @ Thermostat	Deg. C	22	
Expected Power Consumption	kW	6.20	**6.204**
Expected Power Savings	kW	0.40	**0.396**
Savings Percentage	%	6.00	**6**
Expected Annual Energy Consumption	kWh/ Annum	11167	**11167.2**
Expected Annual Energy Savings	kWh/ Annum	713	**712.8**
Energy Cost	Rs./ kWh	9	**8.61**
Cost Saving per Annum	Rs./ Annum	6,137	**6137**
Investment	Rs.	Nil	**Nil**
Payback	Months	Immediate	**Immediate**

Savings Summary

Annual Energy Savings	*712.8*	kWh/ Annum
Annual Monetary Savings	*6137*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 7: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC	Total
Block		D	D
Floor		SF	
Location		Computer Lab VIII	
Sub-Location			
Type of AC	Type	Window	Split/ Window
Make		Ogeneral	
Rated Capacity of AC's	TR	1.5	1.5
Actual Star Rated		Conventional	
No of AC		4	4
Energy Efficiency Ratio (EER)	EER		
Cooling Capacity	kCal/hr	4539	
Total Capacity of AC's	TR	6.0	6
Power Consumption of Actual AC	Watt	6494	6494
EER of 5 Star AC	EER	3.21	
Power Consumption of 5 Star AC	Watt	5656	5656
Estimated Power Savings	Watt	1290.2	1290
Expected Power Consumption	kW	4.4	4.37
Operating Hours	Hours/ Day	6	6.0
Annual Working Days	Days/Annum	300	300
Annual Actual Energy Consumption	kWh/Annum	11689	11689
Expected Annual Energy Consumption	kWh/Annum	9366	9366
Estimated Annual Energy Savings	kWh/Annum	2322	2322
Energy Cost	Rs./kWh	8.61	8.6
Annual Monetary Savings	Rs./Annum	19995	19995
Investment Cost	Rs.	90358	90358
Payback	Months	54	54.2

Savings Summary

Annual Energy Savings	*2322*	kWh/ Annum
Annual Monetary Savings	*19995*	Rs./ Annum
Investment Cost	*90358*	Rs.
Payback	*54.2*	Months

4.5.5 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	5	2	7	6	5	2.548	16	33	26
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	9,414	4,415	11,880	10,186	9,828	4,586	28,386	59,508	47,573
Capacity of Solar Panel Required	kW	5	3	7	6	6	3	17	35	28
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	12,552	5,887	15,840	13,581	13,104	6,115	37,848	79,344	63,431
Energy Cost (inside)	Rs./ kWh	9	9	9	9	9	9	9	9	9
Expected Annual Monetary Savings (inside)	Rs./ Annum	81,055	38,017	102,287	87,698	84,619	39,489	244,403	512,364	409,607
Expected Annual Energy Export	kWh/ Annum	3,138	1,472	3,960	3,395	3,276	1,529	9,462	19,836	15,858
Energy Cost for Export	Rs./kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs./ Annum	50,208	23,549	63,360	54,323	52,416	24,461	151,392	317,376	253,725
Total Annual Monetary Savings	Rs./ Annum	131,263	61,565	165,647	142,021	137,035	63,950	395,795	829,740	663,332
Investment Cost	Rs	439,320	206,052	554,400	475,328	458,640	214,032	1,324,680	2,777,040	2,220,092
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*59508*	kWh/ Annum
Annual Monetary Savings	*829740*	Rs./ Annum
Investment Cost	*2777040*	Rs.
Payback	*3*	Year

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5. SERVICE NUMBER 04-006-013-248 [Block E]

5.1 Energy Conservation Proposals-Block E

5.1.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		E	E	E	E	E	E	E	E
Floor		GF	GF	GF	GF	GF	GF	GF	GF
Location		Department of English	Corridor	PG Research Dept of English	Library fl/ MCA Library	Main Library			
Sub-Location				Library		Left	Right	Bathroom	Corridor
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	CFL	FTL
Capacity of Lamp	W	36	36	36	36	36	36	12	36
Number of Fixtures		7	1	1	6	23	38	1	5
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		7	1	1	6	23	38	1	5
Actual Power Consumption	kW	0.252	0.036	0.036	0.216	0.828	1.368	0.012	0.18
Average Glowing Hours of Lamps	Hours/Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	453.6	64.8	64.8	388.8	1490.4	2462.4	21.6	324
Identification		FTL	FTL	FTL	FTL	FTL	FTL	CFL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	5	20
Expected Total Power Consumption	kW	0.14	0.02	0.02	0.12	0.46	0.76	0.005	0.1
Expected Annual Energy Consumption	kWh/ Annum	252	36	36	216	828	1368	9	180
Expected Annual Energy Savings	kWh/ Annum	201.6	28.8	28.8	172.8	662.4	1094.4	12.6	144
Percentage of Savings	%	44.44	44.44	44.44	44.44	44.44	44.44	58.33	44.44
Energy Cost	Rs./ kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs./ Annum	1820	260	260	1560	5981	9882	114	1300
Investment Cost	Rs	1400	200	200	1200	4600	7600	50	1000
Payback	Month	9.23	9.23	9.23	9.23	9.23	9.23	5.27	9.23

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		E	E	E	E	E	E	E	E
Floor		GF	FF	FF	FF	FF	FF	FF	FF
Location		Library	M Phil & Ph D History	I MA English Literature	II MA English Literature	Corrid or	UPS (Library)	Research (English)	III BA English Literature
Sub-Location		Entrance/ Portico		Class F1	Class F2			Class F3	Class F4
Type of Lamp		Induction Lamp	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	40	36	36	36
Number of Fixtures		1	1	3	3	1	1	2	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		1	1	3	3	1	1	2	2
Actual Power Consumption	kW	0 036	0.036	0 108	0 108	0 04	0 036	0.072	0 072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	64 8	64 8	194 4	194 4	72	64 8	129 6	129 6
Identification		Induction Lamp	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.02	0 02	0 06	0.06	0.02	0 02	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	36	36	108	108	36	36	72	72
Expected Annual Energy Savings	kWh/ Annum	28 8	28 8	86 4	86.4	36	28 8	57 6	57 6
Percentage of Savings	%	44 44	44 44	44 44	44 44	50 00	44.44	44 44	44.44
Energy Cost	Rs / kWh	9 03	9 03	9.03	9 03	9 03	9 03	9 03	9 03
Annual Monetary Savings	Rs / Annum	260	260	780	780	325	260	520	520
Investment Cost	Rs	200	200	600	600	200	200	400	400
Payback	Month	9 23	9 23	9 23	9 23	7 38	9 23	9 23	9 23

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		E	E	E	E	E	E	E	E
Floor		FF	FF	FF	FF	FF	FF	FF	FF
Location		II MA History	I MA History	PG & Research Dept. of History	Math Lab & Research Centre	Dept. of Commerce	Dept. of Tamil	I M.Com	
Sub-Location		Class F5	Class F6					Class F7	
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	40	36	40	40	40	36
Number of Fixtures		2	2	4	20	3	3	1	1
Number of Fittings		1	1	1	2	1	1	1	1
Total Number of Lamps		2	2	4	40	3	3	1	1
Actual Power Consumption	kW	0.072	0.072	0.16	1.44	0.12	0.12	0.04	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	129.6	288	2592	216	216	72	64.8
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.04	0.08	0.4	0.06	0.06	0.02	0.02
Expected Annual Energy Consumption	kWh/ Annum	72	72	144	720	108	108	36	36
Expected Annual Energy Savings	kWh/ Annum	57.6	57.6	144	1872	108	108	36	28.8
Percentage of Savings	%	44.44	44.44	50.00	72.22	50.00	50.00	50.00	44.44
Energy Cost	Rs / kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs / Annum	520	520	1300	16904	975	975	325	260
Investment Cost	Rs	400	400	800	4000	600	600	200	200
Payback	Month	9.23	9.23	7.38	2.84	7.38	7.38	7.38	9.23

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		E	E	E	E	E	E	E	E
Floor		FF	FF	FF	FF	FF	SF	SF	SF
Location		II M Com	I B Com (P A)	Bathroom	Corridor	History Museum	I BA English Literature	II BA English Literature	II MA English Literature
Sub-Location		Class F8	Class F9	Staff			Class S1	Class S2	Class S3
Type of Lamp		FTL	FTL	FTL	FTL		FTL	FTL	FTL
Capacity of Lamp	W	40	36	36	36		36	36	36
Number of Fixtures		2	2	2	8		4	4	3
Number of Fittings		1	1	1	1		1	1	1
Total Number of Lamps		2	2	2	8		4	4	3
Actual Power Consumption	kW	0 08	0.072	0 072	0.288		0 144	0 144	0 108
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6		6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300		300	300	300
Actual Annual Energy Consumption	kWh/ Annum	144	129 6	129 6	518.4		259 2	259 2	194 4
Identification		FTL	FTL	FTL	FTL		FTL	FTL	FTL
Suggestion		LED	LED	LED	LED		LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20		20	20	20
Expected Total Power Consumption	kW	0 04	0 04	0.04	0 16		0.08	0.08	0 06
Expected Annual Energy Consumption	kWh/ Annum	72	72	72	288		144	144	108
Expected Annual Energy Savings	kWh/ Annum	72	57 6	57.6	230.4		115 2	115 2	86.4
Percentage of Savings	%	50.00	44 44	44 44	44 44		44 44	44 44	44 44
Energy Cost	Rs./ kWh	9 03	9 03	9 03	9 03	9 03	9 03	9 03	9.03
Annual Monetary Savings	Rs./ Annum	650	520	520	2081		1040	1040	780
Investment Cost	Rs.	400	400	400	1600		800	800	600
Payback	Month	7 38	9 23	9 23	9 23		9 23	9 23	9 23

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		E	E	E	E	E	E	E	E
Floor		SF	SF	SF	SF	SF	SF	SF	SF
Location		Corridor	I MA English Literature (SF)	I BA History	II BA History	III BA History	I B Sc Maths	II B Sc Maths	III B Sc Maths
Sub-Location			Class S4	Class S5	Class S6	Class S7	Class S8	Class S9	Class S10
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	36	36	36	36
Number of Fixtures		4	2	2	2	2	2	2	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		4	2	2	2	2	2	2	2
Actual Power Consumption	kW	0.144	0.072	0.072	0.072	0.072	0.072	0.072	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	259.2	129.6	129.6	129.6	129.6	129.6	129.6	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.08	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	144	72	72	72	72	72	72	72
Expected Annual Energy Savings	kWh/ Annum	115.2	57.6	57.6	57.6	57.6	57.6	57.6	57.6
Percentage of Savings	%	44.44	44.44	44.44	44.44	44.44	44.44	44.44	44.44
Energy Cost	Rs./ kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs./ Annum	1040	520	520	520	520	520	520	520
Investment Cost	Rs.	800	400	400	400	400	400	400	400
Payback	Month	9.23	9.23	9.23	9.23	9.23	9.23	9.23	9.23

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		E	E	E	E	E	E	E	E
Floor		SF	SF	SF	SF	SF	SF	SF	TF
Location		Corridor	I B Com	II B Com	III B Com	III BCA	Rest room	I M.Sc CS (Self)	I B Com (Co-op)
Sub-Location		Class S10	Class S11	Class S12	Class S13	Class S14	Student	Student	Class T1
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	36	36	36	36
Number of Fixtures		9	2	2	2	2	2	3	4
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		9	2	2	2	2	2	3	4
Actual Power Consumption	kW	0 324	0 072	0 072	0 072	0 072	0.072	0 108	0 144
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	583 2	129 6	129 6	129 6	129 6	129 6	194 4	259 2
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0 18	0 04	0 04	0 04	0 04	0.04	0 06	0.08
Expected Annual Energy Consumption	kWh/ Annum	324	72	72	72	72	72	108	144
Expected Annual Energy Savings	kWh/ Annum	259 2	57 6	57 6	57 6	57 6	57 6	86 4	115 2
Percentage of Savings	%	44.44	44 44	44 44	44 44	44 44	44 44	44 44	44 44
Energy Cost	Rs / kWh	9 03	9 03	9 03	9 03	9 03	9 03	9 03	9 03
Annual Monetary Savings	Rs / Annum	2341	520	520	520	520	520	780	1040
Investment Cost	Rs	1800	400	400	400	400	400	600	800
Payback	Month	9 23	9 23	9 23	9 23	9.23	9 23	9 23	9 23

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		E	E	E	E	E	E	E	E
Floor		TF	TF	TF	TF	TF	TF	TF	TF
Location		II B Com (Co-op)	Dept. of Co-operative	III B Com (Co-op)	I BBA (CA)	II BBA (CA)	III BBA (CA)	Dept. of Management	I B Sc Computer Science A
Sub-Location		Class T2	Class T3	Class T4	Class T5	Class T6	Class T7		Class T8
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	40	40	40	40
Number of Fixtures		4	2	2	2	2	2	2	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		4	2	2	2	2	2	2	2
Actual Power Consumption	kW	0.144	0.072	0.072	0.072	0.08	0.08	0.08	0.08
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	259.2	129.6	129.6	129.6	144	144	144	144
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.08	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	144	72	72	72	72	72	72	72
Expected Annual Energy Savings	kWh/ Annum	115.2	57.6	57.6	57.6	72	72	72	72
Percentage of Savings	%	44.44	44.44	44.44	44.44	50.00	50.00	50.00	50.00
Energy Cost	Rs./ kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs./ Annum	1040	520	520	520	650	650	650	650
Investment Cost	Rs	800	400	400	400	400	400	400	400
Payback	Month	9.23	9.23	9.23	9.23	7.38	7.38	7.38	7.38

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		E	E	E	E	E	E	E	E
Floor		TF	TF	TF	TF	TF	TF	TF	TF
Location		II B Sc Computer Science A	III B Sc Computer Science A	Corrid or	I B Sc Computer Science (SF B)		I M.Sc Computer Science (SF B)		I M.Sc Maths B
Sub-Location		Class T9	Class T10		Class T11		Class T12		Class T13
Type of Lamp		FTL	FTL	FTL	FTL	LED	FTL	LED	FTL
Capacity of Lamp	W	40	36	40	36	20	40	20	36
Number of Fixtures		2	2	7	1	1	1	1	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	2	7	1	1	1	1	2
Actual Power Consumption	kW	0 08	0 072	0 28	0 036	0 02	0 04	0 02	0 072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	144	129 6	504	64 8	36	72	36	129 6
Identification		FTL	FTL	FTL	FTL	LED	FTL	LED	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0 04	0 04	0 14	0 02	0 02	0 02	0.02	0 04
Expected Annual Energy Consumption	kWh/ Annum	72	72	252	36	36	36	36	72
Expected Annual Energy Savings	kWh/ Annum	72	57 6	252	28 8	0	36	0	57.6
Percentage of Savings	%	50 00	44.44	50 00	44 44	0 00	50.00	0.00	44 44
Energy Cost	Rs / kWh	9 03	9 03	9 03	9.03	9 03	9 03	9 03	9 03
Annual Monetary Savings	Rs / Annum	650	520	2276	260	0	325	0	520
Investment Cost	Rs	400	400	1400	200		200		400
Payback	Month	7 38	9 23	7 38	9 23		7 38		9.23

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED				Total
Block		E	E	E	E	E
Floor		TF	TF	TF	TF	
Location		Rest room	I M.Sc Maths A	II M.Sc Maths A		
Sub-Location			Class T14	Class T15		
Type of Lamp		FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Capacity of Lamp	W	36	36	36	40	36/ 40
Number of Fixtures		3	2	1	1	
Number of Fittings		1	1	1	1	
Total Number of Lamps		3	2	1	1	263
Actual Power Consumption	kW	0.108	0.072	0.036	0.04	9.544
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	194.4	129.6	64.8	72	17179.2
Identification		FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	12/ 20
Expected Total Power Consumption	kW	0.06	0.04	0.02	0.02	4.845
Expected Annual Energy Consumption	kWh/ Annum	108	72	36	36	8721
Expected Annual Energy Savings	kWh/ Annum	86.4	57.6	28.8	36	8458.2
Percentage of Savings	%	44.44	44.44	44.44	50.00	49.24
Energy Cost	Rs./ kWh	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs./ Annum	780	520	260	325	76378
Investment Cost	Rs.	600	400	200	200	48050
Payback	Month	9.23	9.23	9.23	7.38	7.55

Savings Summary

Annual Energy Savings	*8458*	kWh/ Annum
Annual Monetary Savings	*76378*	Rs./ Annum
Investment Cost	*48050*	Rs.
Payback	*7.55*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver***.

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Block E
Present Average Power Consumption of Lightings	kW	10
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	57
Actual Annual Energy Consumption of Lighting	kWh/Year	17,179
Expected Annual Energy Savings using LES	kWh/Year	1,432
Energy Cost	Rs/kWh	9.0
Annual Savings	Rs./Annum	12,927
Capacity of Lighting Energy Saver	kVA	10
Investment Cost	Rs	9,830
Payback period	Months	9

Savings Summary

Annual Energy Savings	*1432*	kWh/ Annum
Annual Monetary Savings	*12927*	Rs./ Annum
Investment Cost	*9830*	Rs.
Payback	*9*	Months

5.1.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		E	E	E	E	E	E	E	E
Floor		GF	GF	GF	GF	GF	FF	FF	FF
Location		Department of English	PG Research Dept. of English	Library II/ MCA Library	Main Library		M Phil & Ph.D History	I MA English Literature	II MA English Literature
Sub-Location			Library		Left	Right		Class F1	Class F2
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	12	1	5	22	24	2	2	3
Total Power Consumption	kW	0.72	0.06	0.3	1.32	1.44	0.12	0.12	0.18
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	4.32	0.36	1.8	7.92	8.64	0.72	0.72	1.08
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	1296	108	540	2376	2592	216	216	324
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.336	0.028	0.14	0.616	0.672	0.056	0.056	0.084
Expected Energy Consumption	kWh/ Annum	604.8	50.4	252	1108.8	1209.6	100.8	100.8	151.2
Expected Energy Savings	kWh/ Annum	691	58	288	1267	1382	115	115	173
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs./ Annum	6242	520	2601	11443	12483	1040	1040	1560
Investment	Rs	39600	3300	16500	72600	79200	6600	6600	9900
Payback	Months	76.14	76.14	76.14	76.14	76.14	76.14	76.14	76.14

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		E	E	E	E	E	E	E	E
Floor		FF	FF	FF	FF	FF	FF	FF	FF
Location		Research (English)	III BA English Literature	II MA History	I MA History	PG & Research Dept of History	Math Lab & Research Centre	Dept. of Commerce	Dept of Tamil
Sub-Location		Class F3	Class F4	Class F5	Class F6				
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	3	3	2	2	6	8	6	5
Total Power Consumption	kW	0.18	0.18	0.12	0.12	0.36	0.48	0.36	0.3
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	1.08	1.08	0.72	0.72	2.16	2.88	2.16	1.8
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	324	324	216	216	648	864	648	540
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.084	0.084	0.056	0.056	0.168	0.224	0.168	0.14
Expected Energy Consumption	kWh/ Annum	151.2	151.2	100.8	100.8	302.4	403.2	302.4	252
Expected Energy Savings	kWh/ Annum	173	173	115	115	346	461	346	288
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs / kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs / Annum	1560	1560	1040	1040	3121	4161	3121	2601
Investment	Rs	9900	9900	6600	6600	19800	26400	19800	16500
Payback	Months	76.14	76.14	76.14	76.14	76.14	76.14	76.14	76.14

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		E	E	E	E	E	E	E	E
Floor		FF	FF	FF	SF	SF	SF	SF	SF
Location		I M.Com	II M Com	I B Com (P.A)	I BA English Literature	II BA English Literature	II MA English Literature	I MA English Literature (SF)	I BA History
Sub-Location		Class F7	Class F8	Class F9	Class S1	Class S2	Class S3	Class S4	Class S5
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	2	2	4	5	3	3	2
Total Power Consumption	kW	0.12	0.12	0.12	0.24	0.3	0.18	0.18	0.12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	0.72	0.72	1.44	1.8	1.08	1.08	0.72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	216	216	432	540	324	324	216
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.056	0.056	0.112	0.14	0.084	0.084	0.056
Expected Energy Consumption	kWh/ Annum	100.8	100.8	100.8	201.6	252	151.2	151.2	100.8
Expected Energy Savings	kWh/ Annum	115	115	115	230	288	173	173	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs / kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs / Annum	1040	1040	1040	2081	2601	1560	1560	1040
Investment	Rs.	6600	6600	6600	13200	16500	9900	9900	6600
Payback	Months	76.14	76.14	76.14	76.14	76.14	76.14	76.14	76.14

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		E	E	E	E	E	E	E	E
Floor		SF	SF	SF	SF	SF	SF	SF	SF
Location		II BA History	III BA History	I B Sc Maths	II B.Sc Maths	III B.Sc Maths	I B.Com	II B.Com	III B Com
Sub-Location		Class S6	Class S7	Class S8	Class S9	Class S10	Class S11	Class S12	Class S13
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No.'s	2	2	2	2	2	2	2	2
Total Power Consumption	kW	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Average Operating Hours	Oper Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	216	216	216	216	216	216	216
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056
Expected Energy Consumption	kWh/ Annum	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8
Expected Energy Savings	kWh/ Annum	115	115	115	115	115	115	115	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs / kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs / Annum	1040	1040	1040	1040	1040	1040	1040	1040
Investment	Rs.	6600	6600	6600	6600	6600	6600	6600	6600
Payback	Months	76.14	76.14	76.14	76.14	76.14	76.14	76.14	76.14

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		E	E	E	E	E	E	E	E
Floor		SF	SF	TF	TF	TF	TF	TF	TF
Location		III BCA	I M.Sc CS (Self)	I B.Com (Co-op)	II B.Com (Co-op)	Dept. of Co-operative	III B.Com (Co-op)	I BBA (CA)	II BBA (CA)
Sub-Location		Class S14	Student	Class T1	Class T2	Class T3	Class T4	Class T5	Class T6
Type of Fan		Ceiling							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	3	5	4	3	3	2	2
Total Power Consumption	kW	0.12	0.18	0.3	0.24	0.18	0.18	0.12	0.12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	1.08	1.8	1.44	1.08	1.08	0.72	0.72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	324	540	432	324	324	216	216
Existing System		Ceiling							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.084	0.14	0.112	0.084	0.084	0.056	0.056
Expected Energy Consumption	kWh/ Annum	100.8	151.2	252	201.6	151.2	151.2	100.8	100.8
Expected Energy Savings	kWh/ Annum	115	173	288	230	173	173	115	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs / Annum	1040	1560	2601	2081	1560	1560	1040	1040
Investment	Rs.	6600	9900	16500	13200	9900	9900	6600	6600
Payback	Months	76.14	76.14	76.14	76.14	76.14	76.14	76.14	76.14

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan									Total
Block		E	E	E	E	E	E	E	E	E	Block E
Floor		TF	TF	TF	TF	TF	TF	TF	TF	TF	
Location		III BBA (CA)	Dept of [illegible]	I B Sc Computer Science A	II B.Sc Computer Science A	III B Sc Computer Science A	I M Sc Computer Science (SF B)	I M Sc Maths B	I M.Sc Maths A	II M Sc Maths A	
Sub-Location		Class T7		Class T8	Class T9	Class T10	Class T12	Class T13	Class T14	Class T15	
Type of Fan		Ceiling									Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	3	2	2	2	2	2	2	2	188
Total Power Consumption	kW	0.12	0.18	0.12	0.12	0.12	0.12	0.12	0.12	0.12	11.28
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6	6	6
Energy [illegible] per Day	kWh/ Day	0.72	1.08	0.72	0.72	0.72	0.72	0.72	0.72	0.72	67.68
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	324	216	216	216	216	216	216	216	20304
Existing System		Ceiling									Ceiling
Suggestion		EE Super Fan									EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.084	0.056	0.056	0.056	0.056	0.056	0.056	0.056	5.264
Expected Energy Consumption	kWh/ Annum	100.8	151.2	100.8	100.8	100.8	100.8	100.8	100.8	100.8	9475
Expected Energy Savings	kWh/ Annum	115	173	115	115	115	115	115	115	115	10829
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.3
Energy Cost	Rs./ kWh	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs./ Annum	1040	1560	1040	1040	1040	1040	1040	1040	1040	97784
Investment	Rs.	6600	9900	6600	6600	6600	6600	6600	6600	6600	620400
Payback	Months	76.14	76.14	76.14	76.14	76.14	76.14	76.14	76.14	76.14	76.1

Savings Summary

Annual Energy Savings	*10829*	kWh/ Annum
Annual Monetary Savings	*97784*	Rs./ Annum
Investment Cost	*620400*	Rs.
Payback	*76.1*	Months

5.1.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan						
Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan				Total
Block		E	E	E	E	Block E
Floor		FF	FF	SF	TF	
Location		UPS (Library)	Math Lab & Research Centre	Rest room	Rest room	
Sub-Location				Student		
Type of Fan		Exhaust Fan	Exhaust Fan	Exhaust Fan	Exhaust Fan	Exhaust Fan
Capacity of Fan	W	50	50	50	50	50
Total Number of Fan	No 's	1	1	1	1	4
Total Power Consumption	kW	0.05	0.05	0.05	0.05	0.2
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.3	0.3	0.3	0.3	1.2
Annual Operating Days	Days/ Annum	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	90	90	90	90	360
Existing System		Exhaust Fan	Exhaust Fan	Exhaust Fan	Exhaust Fan	Exhaust Fan
Suggestion		EE Exhaust Fan	EE Exhaust Fan	EE Exhaust Fan	EE Exhaust Fan	EE Exhaust Fan
Suggested Capacity to be replaced	W	20	20	20	20	20
Expected Power Consumption	kW	0.02	0.02	0.02	0.02	0.08
Expected Energy Consumption	kWh/ Annum	36	36	36	36	144
Expected Energy Savings	kWh/ Annum	54	54	54	54	216
Savings Percentage	%	60.00	60.00	60.00	60.00	60.0
Energy Cost	Rs./ kWh	9.03	9.03	9.03	9.03	9.03
Annual Monetary Savings	Rs./ Annum	488	488	488	488	1950
Investment	Rs.	3300	3300	3300	3300	13200
Payback	Months	81.21	81.21	81.21	81.21	81.2

Savings Summary		
Annual Energy Savings	*216*	kWh/ Annum
Annual Monetary Savings	*1950*	Rs./ Annum
Investment Cost	*13200*	Rs.
Payback	*81.2*	Months

5.1.4 Air Conditioning

ECP 5: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance	Total
Block		E	E
Floor		FF	
Location		Math Lab & Research Centre	
Sub-Location			
Type	Split/ Window	Split	
Make		LG	
Capacity - TR	TR	2	2
Star rate		2	
Quantity	No.'s	5	5
EER		2.8	
Power Consumption - kW	kW	2.2	2.2
Total Power Consumption. kW	kW	11	11.0
Working hours	Hours/ Day	6	6
Annual Operating Days	Days/ Annum	300	300
Annual Energy Consumption	kWh/ Annum	19800	19800
Expected Power Consumption	kW	10 67	10.67
Expected Power Savings	kW	0 33	0.33
Savings Percentage	%	3 00	3
Expected Annual Energy Consumption	kWh/ Annum	19206	19206
Expected Annual Energy Savings	kWh/ Annum	594	594
Energy Cost	Rs./ kWh	9.03	9.0
Cost Saving Per annum	Rs./ Annum	5,364	5363
Investment	Rs.	Nil	Nil
Payback	Months	Immediate	Immediate

Savings Summary

Annual Energy Savings	*594*	kWh/ Annum
Annual Monetary Savings	*5363*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 6: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations

Description	Unit	Set Temp. Reduction	Total
Block		E	**E**
Floor		FF	
Location		Math Lab & Research Centre	
Sub-Location			
Type	Split/ Window	Split	
Make		LG	
Capacity	TR	2	**2**
Star rate		2	
Quantity	No.'s	5	**5**
EER		2.8	
Power Consumption	kW	2.2	**2.2**
Total Power Consumption	kW	11	**11**
Working hours	Hour	6	**6**
Annual Working Days	Days/ Annum	300	**300**
Actual Energy Consumption	kWh/ Annum	19800	**19800**
Present Set Temperature	Deg. C	20	
Required Temperature	Deg. C	24	
Set Point @ Thermostat	Deg. C	22	
Expected Power Consumption	kW	10.34	**10.34**
Expected Power Savings	kW	0.66	**0.66**
Savings Percentage	%	6.00	**6**
Expected Annual Energy Consumption	kWh/ Annum	18612	**18612**
Expected Annual Energy Savings	kWh/ Annum	1188	**1188**
Energy Cost	Rs./ kWh	9.03	**9.0**
Cost Saving per Annum	Rs / Annum	10,728	**10727**
Investment	Rs.	Nil	**Nil**
Payback	Months	Immediate	**Immediate**

Savings Summary

Annual Energy Savings	*1188*	kWh/ Annum
Annual Monetary Savings	*10727*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 7: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC	Total
Block		E	E
Floor		FF	
Location		Math Lab & Research Centre	
Sub-Location			
Type of AC	Type	Split	Split/ Window
Make		LG	
Rated Capacity of AC's	TR	2	2
Actual Star Rated		2	
No of AC		5	5
Energy Efficiency Ratio (EER)	EER	2.8	
Cooling Capacity	kCal/hr	6052	
Total Capacity of AC's	TR	10.0	10
Power Consumption of Actual AC	Watt	10823	10823
EER of 5 Star AC	EER	3.21	
Power Consumption of 5 Star AC	Watt	9427	9427
Estimated Power Savings	Watt	2150.3	2150
Expected Power Consumption	kW	7.3	7.28
Operating Hours	Hours/ Day	6	6.0
Annual Working Days	Days/Annum	300	300
Annual Actual Energy Consumption	kWh/Annum	19481	19481
Expected Annual Energy Consumption	kWh/Annum	15611	15611
Estimated Annual Energy Savings	kWh/Annum	3870	3870
Energy Cost	Rs./kWh	9.03	9.0
Annual Monetary Savings	Rs./Annum	34950	34950
Investment Cost	Rs.	150596	150596
Payback	Months	52	51.7

Savings Summary

Annual Energy Savings	*3870*	kWh/ Annum
Annual Monetary Savings	*34950*	Rs./ Annum
Investment Cost	*150596*	Rs.
Payback	*51.7*	Months

5.1.5 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	10	5	11	9	11	5.264	21	53	41
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	17,179	8,721	19,800	16,974	20,304	9,475	38,160	95,443	73,330
Capacity of Solar Panel Required	kW	10	5	12	10	12	6	22	56	43
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	22,906	11,628	26,400	22,632	27,072	12,634	50,880	127,258	97,774
Energy Cost (inside)	Rs./ Annum	9	9	9	9	9	9	9	9	9
Expected Annual Monetary Savings (inside)	Rs./ Annum	155,128	78,751	178,794	153,275	183,345	85,561	344,585	861,852	662,172
Expected Annual Energy Export	kWh/ Annum	5,726	2,907	6,600	5,658	6,768	3,158	12,720	31,814.4	24,643
Energy Cost for Export	Rs./kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs./ Annum	91,622	46,512	105,600	90,528	108,288	50,534	203,520	509,030	391,094
Total Annual Monetary Savings	Rs./ Annum	246,751	125,263	284,394	243,803	291,633	136,095	548,105	1,370,882	1,053,266
Investment Cost	Rs	801,696	406,980	924,000	792,120	947,520	442,176	1,780,800	4,454,016	3,422,076
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*95443*	kWh/ Annum
Annual Monetary Savings	*1370882*	Rs./ Annum
Investment Cost	*4454016*	Rs.
Payback	*3*	Year

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SERVICE NUMBER 04-006-013-247 [Block F, Block G]

6. SERVICE NUMBER 04-006-013-247 [Block F, Block G]

6.1 Energy Conservation Proposals-Block F

6.1.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED								
Block		F	F	F	F	F	F	F	F	F
Floor		GF	GF	GF	GF	GF	GF	GF	GF	GF
Location		Food Processing Store	II B Sc N &	III B Sc N &	Dept of Nutrition &	Dept. of Food &		Corrid	II M Sc Food &	
Sub-Location			Class G1	Class G2	Staff room				Class G3	
Type of Lamp			FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W		40	36	36	40	36	36	40	36
Number of Fixtures			4	2	5	1	1	6	1	1
Number of Fittings		1	1	1	1	1	1	1	1	1
Total Number of Lamps		0	4	2	5	1	1	6	1	1
Actual Power Consumption	kW	0	0 16	0 072	0 18	0 04	0 036	0 216	0 04	0 036
Average Glowing Hours of	Hours/ Day	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/	300	300	300	300	300	300	300	300	300
Actual Annual Energy	kWh/	0	288	129 6	324	72	64 8	388 8	72	64 8
Identification		0	FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20	20
Expected Total Power	kW	0	0 08	0 04	0.1	0 02	0 02	0 12	0 02	0 02
Expected Annual Energy	kWh/	0	144	72	180	36	36	216	36	36
Expected Annual Energy Savings	kWh/	0	144	57 6	144	36	28 8	172 8	36	28 8
Percentage of Savings	%	#DIV/0!	50 00	44 44	44 44	50 00	44 44	44 44	50 00	44 44
Energy Cost	Rs / kWh	9 17	9 17	9 17	9 17	9 17	9 17	9 17	9 17	9 17
Annual Monetary Savings	Rs / Annum	0	1320	528	1320	330	264	1585	330	264
Investment Cost	Rs	0	800	400	1000	200	200	1200	200	200
Payback	Month	#DIV/0!	7 27	9 09	9 09	7 27	9.09	9 09	7 27	9 09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		GF	GF	GF	GF	GF	GF	GF	GF
Location		I M Sc Food & Nutrition		ICMR Funded Research Project	Dept. of Biochemistry	Microbiology Lab	Trainers Training Center	Advanced Nutrition Lab	I B Sc Nutrition & Dietics
Sub-Location		Class G4							Class G5
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	36	36	36	36	40	36	36
Number of Fixtures		1	1	3	2	1	2	7	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		1	1	3	2	3	2	7	2
Actual Power Consumption	kW	0.04	0.036	0.108	0.072	0.108	0.08	0.252	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	72	64.8	194.4	129.6	194.4	144	453.6	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.02	0.02	0.06	0.04	0.06	0.04	0.14	0.04
Expected Annual Energy Consumption	kWh/ Annum	36	36	108	72	108	72	252	72
Expected Annual Energy Savings	kWh/ Annum	36	28.8	86.4	57.6	86.4	72	201.6	57.6
Percentage of Savings	%	50.00	44.44	44.44	44.44	44.44	50.00	44.44	44.44
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	330	264	792	528	792	660	1849	528
Investment Cost	Rs	200	200	600	400	600	400	1400	400
Payback	Month	7.27	9.09	9.09	9.09	9.09	7.27	9.09	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED								
Block		F	F	F	F	F	F	F	F	F
Floor		GF	GF	GF	GF	GF	GF	GF	GF	GF
Location		Biochemistry Lab					Foods Lab		Trainers Training Center	
Sub-Location				Balance room	Biochemistry Store room	Nutrition Store room				
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	40	40	36	40	40	36	40	36
Number of Fixtures		6	4	2	1	1	5	5	1	2
Number of Fittings		1	1	1	1	1	1	1	1	1
Total Number of Lamps		6	4	2	1	1	5	5	1	2
Actual Power Consumption	kW	0.216	0.16	0.08	0.036	0.04	0.2	0.18	0.04	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	388.8	288	144	64.8	72	360	324	72	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.12	0.08	0.04	0.02	0.02	0.1	0.1	0.02	0.04
Expected Annual Energy Consumption	kWh/ Annum	216	144	72	36	36	180	180	36	72
Expected Annual Energy Savings	kWh/ Annum	172.8	144	72	28.8	36	180	144	36	57.6
Percentage of Savings	%	44.44	50.00	50.00	44.44	50.00	50.00	44.44	50.00	44.44
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	1585	1320	660	264	330	1651	1320	330	528
Investment Cost	Rs	1200	800	400	200	200	1000	1000	200	400
Payback	Month	9.09	7.27	7.27	9.09	7.27	7.27	9.09	7.27	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		GF	GF	GF	FF	FF	FF	FF	FF
Location		Food Analysis Lab	Room		UPS room	Computer Science Lab IV	Computer Science Lab V	Computer Science Lab IV/ V	Connecting Block H & F
Sub-Location								Server room	Corridor
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	40	36	36	36	36	36
Number of Fixtures		9	5	1	1	9	9	3	1
Number of Fittings		1	1	1	1	2	2	2	1
Total Number of Lamps		9	5	1	1	18	18	6	1
Actual Power Consumption	kW	0.324	0.18	0.04	0.036	0.648	0.648	0.216	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	583.2	324	72	64.8	1166.4	1166.4	388.8	64.8
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.18	0.1	0.02	0.02	0.18	0.18	0.06	0.02
Expected Annual Energy Consumption	kWh/ Annum	324	180	36	36	324	324	108	36
Expected Annual Energy Savings	kWh/ Annum	259.2	144	36	28.8	842.4	842.4	280.8	28.8
Percentage of Savings	%	44.44	44.44	50.00	44.44	72.22	72.22	72.22	44.44
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	2377	1320	330	264	7725	7725	2575	264
Investment Cost	Rs.	1800	1000	200	200	1800	1800	600	200
Payback	Month	9.09	9.09	7.27	9.09	2.80	2.80	2.80	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		FF	FF	FF	FF	FF	FF	FF	FF
Location		Computer Science Lab VI	Computer Science Lab VII	Computer Science Lab VI/ VII	UPS room	Lab Assistant Staff room	Computer Science Lab III/ Internet Lab	Computer Science Lab I	
Sub-Location				Server room				UPS room	Lobby
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	36	36	36	36
Number of Fixtures		9	12	3	1	2	6	1	1
Number of Fittings		2	2	2	1	1	2	1	1
Total Number of Lamps		18	24	6	1	2	12	1	1
Actual Power Consumption	kW	0.648	0.864	0.216	0.036	0.072	0.432	0.036	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	1166.4	1555.2	388.8	64.8	129.6	777.6	64.8	64.8
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.18	0.24	0.06	0.02	0.04	0.12	0.02	0.02
Expected Annual Energy Consumption	kWh/ Annum	324	432	108	36	72	216	36	36
Expected Annual Energy Savings	kWh/ Annum	842.4	1123.2	280.8	28.8	57.6	561.6	28.8	28.8
Percentage of Savings	%	72.22	72.22	72.22	44.44	44.44	72.22	44.44	44.44
Energy Cost	Rs./kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	7725	10300	2575	264	528	5150	264	264
Investment Cost	Rs.	1800	2400	600	200	400	1200	200	200
Payback	Month	2.80	2.80	2.80	9.09	9.09	2.80	9.09	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		FF	FF	FF	FF	FF	FF	FF	FF
Location		Computer Science Lab I		Computer Science Lab II	Dept. of Computer Application	Dept. of Computer Technology	Corrid or	III B Sc Computer Science	II B Sc Computer Science
Sub-Location		Research Dept. of CS	Research Dept. of CS					Class F10	Class F11
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	36	36	36	36
Number of Fixtures		4	12	9	4	3	6	2	2
Number of Fittings		2	2	2	1	1	1	1	1
Total Number of Lamps		8	24	18	4	3	6	2	2
Actual Power Consumption	kW	0.288	0.864	0.648	0.144	0.108	0.216	0.072	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	518.4	1555.2	1166.4	259.2	194.4	388.8	129.6	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.08	0.24	0.18	0.08	0.06	0.12	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	144	432	324	144	108	216	72	72
Expected Annual Energy Savings	kWh/ Annum	374.4	1123.2	842.4	115.2	86.4	172.8	57.6	57.6
Percentage of Savings	%	72.22	72.22	72.22	44.44	44.44	44.44	44.44	44.44
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	3433	10300	7725	1056	792	1585	528	528
Investment Cost	Rs	800	2400	1800	800	600	1200	400	400
Payback	Month	2.80	2.80	2.80	9.09	9.09	9.09	9.09	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		FF	FF	SF	SF	SF	SF	SF	SF
Location		I B Sc Computer Science	Toilet	I BCA	II MCA	II BCA	I B Com (CA)-A		II B Com (CA)-A
Sub-Location		Class F12		Class S16	Class S17	Class S18	Class S19		Class S20
Type of Lamp		FTL		FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36		36	36	36	40	36	36
Number of Fixtures		2		2	2	2	1	1	2
Number of Fittings		1		1	1	1	1	1	1
Total Number of Lamps		2		2	2	2	1	1	2
Actual Power Consumption	kW	0.072		0.072	0.072	0.072	0.04	0.036	0.072
Average Glowing Hours of Lamps	Hours/ Day	6		6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300		300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6		129.6	129.6	129.6	72	64.8	129.6
Identification		FTL		FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED		LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20		20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04		0.04	0.04	0.04	0.02	0.02	0.04
Expected Annual Energy Consumption	kWh/ Annum	72		72	72	72	36	36	72
Expected Annual Energy Savings	kWh/ Annum	57.6		57.6	57.6	57.6	36	28.8	57.6
Percentage of Savings	%	44.44		44.44	44.44	44.44	50.00	44.44	44.44
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	528		528	528	528	330	264	528
Investment Cost	Rs	400		400	400	400	200	200	400
Payback	Month	9.09		9.09	9.09	9.09	7.27	9.09	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		SF	SF	SF	SF	SF	SF	SF	SF
Location		III B.Com (CA)-A	I B.Com (CA)-B	II B.Com (CA)-B	I B.Com-B	I B.Com-A	II B.Com-B		III B.Com-A [SF]
Sub-Location		Class S21	Class S22	Class S23	Class S24	Class S25	Class S26		Class 27
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	40	40	40	40	40	36	40
Number of Fixtures		2	2	2	2	2	1	1	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	2	2	2	2	1	1	2
Actual Power Consumption	kW	0.072	0.08	0.08	0.08	0.08	0.04	0.036	0.08
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	144	144	144	144	72	64.8	144
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.04
Expected Annual Energy Consumption	kWh/ Annum	72	72	72	72	72	36	36	72
Expected Annual Energy Savings	kWh/ Annum	57.6	72	72	72	72	36	28.8	72
Percentage of Savings	%	44.44	50.00	50.00	50.00	50.00	50.00	44.44	50.00
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	528	660	660	660	660	330	264	660
Investment Cost	Rs	400	400	400	400	400	200	200	400
Payback	Month	9.09	7.27	7.27	7.27	7.27	7.27	9.09	7.27

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		SF	SF	SF	SF	SF	SF	SF	SF
Location		III B.Com (CA)-B		II B.Com	Corridor	Dept. of Professional Accounting	III B.Com B	I M.Sc Physics	
Sub-Location		Class 28		Class 29			Class S30	Class S31	
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	36	40	40	36	40	40	36
Number of Fixtures		1	1	2	2	1	4	1	1
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		1	1	2	2	1	4	1	1
Actual Power Consumption	kW	0.04	0.036	0.08	0.08	0.036	0.16	0.04	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	72	64.8	144	144	64.8	288	72	64.8
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.02	0.02	0.04	0.04	0.02	0.08	0.02	0.02
Expected Annual Energy Consumption	kWh/ Annum	36	36	72	72	36	144	36	36
Expected Annual Energy Savings	kWh/ Annum	36	28.8	72	72	28.8	144	36	28.8
Percentage of Savings	%	50.00	44.44	50.00	50.00	44.44	50.00	50.00	44.44
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	330	264	660	660	264	1320	330	264
Investment Cost	Rs	200	200	400	400	200	800	200	200
Payback	Month	7.27	9.09	7.27	7.27	9.09	7.27	7.27	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		SF	SF	SF	SF	SF	TF	TF	TF
Location		Dept. of e-Commerce	II M Sc Physics	Dept. of Commerce (CA)	Room	Toilet	III B Sc Computer Science (SF B)	III B Sc (C.T)	I B Sc (C.T)
Sub-Location			Class S32	Class S32			Class T16	Class T17	Class T18
Type of Lamp		FTL	FTL	FTL	FTL		FTL	FTL	FTL
Capacity of Lamp	W	36	40	36	40		40	36	40
Number of Fixtures		3	2	2	2		2	2	2
Number of Fittings		1	1	1	1		1	1	1
Total Number of Lamps		3	2	2	2		2	2	2
Actual Power Consumption	kW	0.108	0.08	0.072	0.08		0.08	0.072	0.08
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6		6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300		300	300	300
Actual Annual Energy Consumption	kWh/ Annum	194.4	144	129.6	144		144	129.6	144
Identification		FTL	FTL	FTL	FTL		FTL	FTL	FTL
Suggestion		LED	LED	LED	LED		LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20		20	20	20
Expected Total Power Consumption	kW	0.06	0.04	0.04	0.04		0.04	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	108	72	72	72		72	72	72
Expected Annual Energy Savings	kWh/ Annum	86.4	72	57.6	72		72	57.6	72
Percentage of Savings	%	44.44	50.00	44.44	50.00		50.00	44.44	50.00
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	792	660	528	660		660	528	660
Investment Cost	Rs	600	400	400	400		400	400	400
Payback	Month	9.09	7.27	9.09	7.27		7.27	9.09	7.27

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		TF	TF	TF	TF	TF	TF	TF	TF
Location		II B Sc (C.T)	II M.Sc Maths 3	I B.Sc IT	II B.Sc IT	III B.Sc IT		I B Sc Physics (SF)	II B.Sc Physics (SF)
Sub-Location		Class T19	Class T20	Class T21	Class T22	Class T23		Class T24	Class T25
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	40	36	36	36	40	36	40
Number of Fixtures		2	2	2	2	1	1	2	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	2	2	2	1	1	2	2
Actual Power Consumption	kW	0.08	0.08	0.072	0.072	0.036	0.04	0.072	0.08
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	144	144	129.6	129.6	64.8	72	129.6	144
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.04	0.04	0.04	0.02	0.02	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	72	72	72	72	36	36	72	72
Expected Annual Energy Savings	kWh/ Annum	72	72	57.6	57.6	28.8	36	57.6	72
Percentage of Savings	%	50.00	50.00	44.44	44.44	44.44	50.00	44.44	50.00
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	660	660	528	528	264	330	528	660
Investment Cost	Rs	400	400	400	400	200	200	400	400
Payback	Month	7.27	7.27	9.09	9.09	9.09	7.27	9.09	7.27

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		F	F	F	F	F	F	F	F
Floor		TF	TF	TF	TF	TF	TF	TF	TF
Location		III B Sc Physics (SF)	I M Com	II M Com (SF)	III B.Com e-Commerce		II M.Com CA	I B.Com e-Commerce	II B.Com e-Commerce
Sub-Location		Class T26	Class T27	Class T28	Class T29		Class T30	Class T31	Class T32
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	40	40	40	36	40	40	40
Number of Fixtures		2	2	2	1	1	2	2	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	2	2	1	1	2	2	2
Actual Power Consumption	kW	0.08	0.08	0.08	0.04	0.036	0.08	0.08	0.08
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	144	144	144	72	64.8	144	144	144
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.04	0.04	0.02	0.02	0.04	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	72	72	72	36	36	72	72	72
Expected Annual Energy Savings	kWh/ Annum	72	72	72	36	28.8	72	72	72
Percentage of Savings	%	50.00	50.00	50.00	50.00	44.44	50.00	50.00	50.00
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	660	660	660	330	264	660	660	660
Investment Cost	Rs	400	400	400	200	200	400	400	400
Payback	Month	7.27	7.27	7.27	7.27	9.09	7.27	7.27	7.27

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED			Total
Block		F	F	F	F
Floor		TF	TF	TF	
Location		I B.Com C.S	Room	Toilet	
Sub-Location		Class T33			
Type of Lamp		FTL			CFL/ FTL/ LED
Capacity of Lamp	W	36			36/ 40
Number of Fixtures		2			
Number of Fittings		1			
Total Number of Lamps		2			344
Actual Power Consumption	kW	0.072			12.676
Average Glowing Hours of Lamps	Hours/ Day	6			6
Annual Operating Days	Days/ Annum	300			300
Actual Annual Energy Consumption	kWh/ Annum	129.6			22816.8
Identification		FTL			CFL/ FTL/ LED
Suggestion		LED			LED
Suggested Capacity of Lamps	W	20			12/ 20
Expected Total Power Consumption	kW	0.04			5.36
Expected Annual Energy Consumption	kWh/ Annum	72			9648
Expected Annual Energy Savings	kWh/ Annum	57.6			13168.8
Percentage of Savings	%	44.44			57.72
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	528			120758
Investment Cost	Rs.	400			53600
Payback	Month	9.09			5.33

Savings Summary

Annual Energy Savings	*13168*	kWh/ Annum
Annual Monetary Savings	*120758*	Rs./ Annum
Investment Cost	*53600*	Rs.
Payback	*5.33*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver.***

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver		
Description	**Units**	**Block F**
Present Average Power Consumption of Lightings	kW	13
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	76
Actual Annual Energy Consumption of Lighting	kWh/Year	22,817
Expected Annual Energy Savings using LES	kWh/Year	1,901
Energy Cost	Rs/kWh	9 2
Annual Savings	Rs /Annum	17,436
Capacity of Lighting Energy Saver	kVA	13
Investment Cost	Rs	13,056
Payback period	Months	9

Savings Summary		
Annual Energy Savings	*1901*	kWh/ Annum
Annual Monetary Savings	*17436*	Rs./ Annum
Investment Cost	*13056*	Rs.
Payback	*9*	Months

6.1.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block									
Floor		GF	GF	GF	GF	GF	GF	GF	GF
Location		[illegible]	[illegible]	Dept. of Nutrition & Dietics	IFM.Sc Food & Nutrition	II M.Sc Food & Nutrition	ICMR Funded Research Project	Dept. of Biochemistry	Tejaswi Training Center
Sub-Location		Class 02	Class 02	Staff room	Class G3	Class G4			
Type of Fan		Ceiling Fan							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	Nos	1	1	1	1	1	1	1	1
Total Power Consumption	kW	0.06	0.06	0.1	0.06	0.06	0.06	0.06	0.06
Average Operating Hours	Oper. Hours/ Day	4	4	4	4	4	4	4	4
Energy Consumption per Day	kWh/ Day	0.72	0.72	1.2	0.72	0.72	0.72	1.68	0.36
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	216	360	216	216	216	504	108
Existing System		Ceiling Fan							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.056	0.07	0.056	0.056	0.056	0.056	0.028
Expected Energy Consumption	kWh/ Annum	100.8	100.8	252	100.8	100.8	100.8	235.2	50.4
Expected Energy Savings	kWh/ Annum	115.2	115.2	288	115.2	115.2	115.2	172	58
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81
Annual Monetary Savings	Rs./ Annum	1016	1016	2544	1016	1016	1016	1520	508
Investment	Rs.	1680	1680	2800	1680	1680	1680	2800	1400
Payback	Months	19.85	19.85	13.22	19.85	19.85	19.85	22.11	33.07

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan								
Block		F	F	F	F	F	F	F	F	F
Floor		GF	GF	GF	GF	GF	GF	FF	FF	FF
Location		1B Sc Nutrition & Dietics		Biochemistry Lab	Foods Lab	Food Analysis Lab	Room	UPS room		Lab Assistant Staff room
Sub-Location		Class G5		Biochemistry Store room						
Type of Fan		Ceiling Fan								
Capacity of Fan	W	60	60	60	60	60	60	60	60	60
Total Number of Fan	No 's	2	2	1	2	2	3	2	2	2
Total Power Consumption	kW	0.12	0.12	0.06	0.12	0.12	0.18	0.12	0.12	0.12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	0.72	0.36	0.72	0.72	1.08	0.72	0.72	0.72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	216	108	216	216	324	216	216	216
Existing System		Ceiling Fan								
Suggestion		EE Super Fan								
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.056	0.028	0.056	0.056	0.084	0.056	0.056	0.056
Expected Energy Consumption	kWh/ Annum	100.8	100.8	50.4	100.8	100.8	151.2	100.8	100.8	100.8
Expected Energy Savings	kWh/ Annum	115	115	58	115	115	173	115	115	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	1056	1056	528	1056	1056	1585	1056	1056	1056
Investment	Rs.	6600	6600	3300	6600	6600	9900	6600	6600	6600
Payback	Months	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97

Replace Conventional Fan to Energy Efficient type of Super Fan									
Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		F	F	F	F	F	F	F	F
Floor		FF	FF	FF	FF	FF	FF	FF	FF
Location		Computer Science Lab 1		Dept. of Computer Application	Dept. of Computer Technology	Corridor	III B.Sc Computer Science	II B Sc Computer Science	I B Sc Computer Science
Sub-Location		UPS room	Lobby				Class F10	Class F11	Class F12
Type of Fan		Ceiling Fan							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No.'s	1	1	5	4	4	2	2	2
Total Power Consumption	kW	0.06	0.06	0.3	0.24	0.24	0.12	0.12	0.12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.36	0.36	1.8	1.44	1.44	0.72	0.72	0.72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	108	108	540	432	432	216	216	216
Existing System		Ceiling Fan							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power C[illegible]	kW	0.028	0.028	0.14	0.112	0.112	0.056	0.056	0.056
Expected Energy Consumption	kWh/ Annum	50.4	50.4	252	201.6	201.6	100.8	100.8	100.8
Expected Energy Savings	kWh/ Annum	58	58	288	230	230	115	115	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	528	528	2641	2113	2113	1056	1056	1056
Investment	Rs.	3300	3300	16500	13200	13200	6600	6600	6600
Payback	Months	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97

Replace Conventional Fan to Energy Efficient type of Super Fan													
Description	Unit	Conventional Ceiling Fan to EE Super Fan											
Block		I	I	II	II	I	II	II	I	I	II	I	II
Floor		SF	SF	SF	SF	SF	SF	SF	SF	SF	SF	SF	SF
Location		I BCA	II MCA	II BCA	I B.Com (CA)-A	II B Com (CA)-A	III B.Com (CA)-A	I B Com (CA)-B	II B.Com (CA)-B	I B.Com-B	I B.Com-A	II B.Com-B	II B.Com-D
Sub-Location		Class S16	Class S17	Class S18	Class S19	Class S20	Class S21	Class S22	Class S23	Class S24	Class S25	Class S26	
Type of Fan		Ceiling Fan											
Capacity of Fan	W	60	60	60	60	60	60	60	60	60	60	60	60
Total Number of Fan	No.'s	3	4	3	2	3	3	2	2	2	2	3	2
Total Power Consumption	kW	0.18	0.24	0.18	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	1.08	1.44	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Annual Operting Days	Days/ Annum	300	300	300	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	324	432	216	216	216	216	216	216	216	216	216	216
Existing System		Ceiling Fan											
Suggestion		EE Super Fan											
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.084	0.112	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056
Expected Energy Consumption	kWh/ Annum	151.2	201.6	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8	100.8
Expected Energy Savings	kWh/ Annum	173	230	115	115	115	115	115	115	115	115	115	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	1585	2113	1056	1056	1056	1056	1056	1056	1056	1056	1056	1056
Investment	Rs.	9900	13200	6600	6600	6600	6600	6600	6600	6600	6600	6600	6600
Payback	Months	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97

Replace Conventional Fan to Energy Efficient type of Super Fan									
Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		F	F	F	F	F	F	F	F
Floor		SF	SF	SF	SF	SF	SF	SF	SF
Location		III B Com-A [SF]	III B Com (CA)-B	II B Com	Dept of Professional Accounting	III B Com B	I M Sc Physics	I M Sc Physics	Dept of e-Commerce
Sub-Location		Class 27	Class 28	Class 29		Class S30	Class S31		
Type of Fan		Ceiling Fan							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No.'s	2	2	2	2	3	3	2	3
Total Power Consumption	kW	0.12	0.12	0.12	0.12	0.18	0.18	0.12	0.18
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	0.72	0.72	0.72	1.08	1.08	0.72	1.08
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	216	216	216	324	324	216	324
Existing System		Ceiling Fan							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.056	0.056	0.056	0.084	0.084	0.056	0.084
Expected Energy Consumption	kWh/ Annum	100.8	100.8	100.8	100.8	151.2	151.2	100.8	151.2
Expected Energy Savings	kWh/ Annum	115	115	115	115	173	173	115	173
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	1056	1056	1056	1056	1585	1585	1056	1585
Investment	Rs.	6600	6600	6600	6600	9900	9900	6600	9900
Payback	Months	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		F	F	F	F	F	F	F	F
Floor		SF	SF	TF	TF	TF	TF	TF	TF
Location		II M Sc Physics	Dept. of Commerce (CA)	III B Sc Computer Science (SF B)	III B Sc (C T)	I B Sc (C T)	II B Sc (C T)	II M Sc Maths 3	I B Sc IT
Sub-Location		Class S32	Class S32	Class T16	Class T17	Class T18	Class T19	Class T20	Class T21
Type of Fan		Ceiling Fan							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	4	2	2	2	2	2	2
Total Power Consumption	kW	0.12	0.24	0.12	0.12	0.12	0.12	0.12	0.12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	1.44	0.72	0.72	0.72	0.72	0.72	0.72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	432	216	216	216	216	216	216
Existing System		Ceiling Fan							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.112	0.056	0.056	0.056	0.056	0.056	0.056
Expected Energy Consumption	kWh/ Annum	100.8	201.6	100.8	100.8	100.8	100.8	100.8	100.8
Expected Energy Savings	kWh/ Annum	115	230	115	115	115	115	115	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	1056	2113	1056	1056	1056	1056	1056	1056
Investment	Rs	6600	13200	6600	6600	6600	6600	6600	6600
Payback	Months	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97

Replace Conventional Fan to Energy Efficient type of Super Fan									
Description	Unit	Conventional Ceiling Fan to EE Super Fan							
Block		F	F	F	F	F	F	F	F
Floor		TF	TF	TF	TF	TF	TF	TF	TF
Location		II B Sc IT	III B Sc IT	I B Sc Physics (SF)	II B Sc Physics (SF)	III B Sc Physics (SF)	I M Com	II M Com (SF)	III B Com e-Commerce
Sub-Location		Class T22	Class T23	Class T24	Class T25	Class T26	Class T27	Class T28	Class T29
Type of Fan		Ceiling Fan							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	2	2	2	2	2	2	3
Total Power Consumption	kW	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.18
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	0.72	0.72	0.72	0.72	0.72	0.72	1.08
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	216	216	216	216	216	216	324
Existing System		Ceiling Fan							
S[illegible]		EE Super Fan							
S[illegible] Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.084
Expected Energy Consumption	kWh/ Annum	100.8	100.8	100.8	100.8	100.8	100.8	100.8	151.2
Expected Energy Savings	kWh/ Annum	115	115	115	115	115	115	115	173
Savings P[illegible]	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	1056	1056	1056	1056	1056	1056	1056	1585
Investment	Rs	6600	6600	6600	6600	6600	6600	6600	9900
Payback	Months	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Ceiling Fan to EE Super Fan				Total
Block		F	F	F	F	**Block F**
Floor		TF	TF	TF	TF	
Location		II M.Com CA	I B.Com e-Commerce	II B.Com e-Commerce	I B.Com C.S	
Sub-Location		Class T30	Class T31	Class T32	Class T33	
Type of Fan		Ceiling Fan				**Ceiling Fan**
Capacity of Fan	W	60	60	60	60	**60**
Total Number of Fan	No.'s	3	3	2	3	**150**
Total Power Consumption	kW	0.18	0.18	0.12	0.18	**9.0**
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	**6**
Energy Consumption per Day	kWh/ Day	1.08	1.08	0.72	1.08	**54**
Annual Operating Days	Days/ Annum	300	300	300	300	**300**
Annual Energy Consumption	kWh/ Annum	324	324	216	324	**16200**
Existing System		Ceiling Fan				**Ceiling**
Suggestion		EE Super Fan				**EE Super Fan**
Suggested Capacity to be replaced	W	28	28	28	28	**28**
Expected Power Consumption	kW	0.084	0.084	0.056	0.084	**4.2**
Expected Energy Consumption	kWh/ Annum	151.2	151.2	100.8	151.2	**7560**
Expected Energy Savings	kWh/ Annum	173	173	115	173	**8640**
Savings Percentage	%	53.33	53.33	53.33	53.33	**53.3**
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	**9.17**
Annual Monetary Savings	Rs./ Annum	1585	1585	1056	1585	**79228.8**
Investment	Rs.	9900	9900	6600	9900	**495000**
Payback	Months	74.97	74.97	74.97	74.97	**75.0**

Savings Summary

Annual Energy Savings	*8640*	kWh/ Annum
Annual Monetary Savings	*79228*	Rs./ Annum
Investment Cost	*495000*	Rs.
Payback	*75*	Months

6.1.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan								Total
Block		F	F	F	F	F	F	F	F	Block F
Floor		GF	GF	GF	GF	GF	FF	SF	SF	
Location		Advanced	Biochemistry Lab	Foods Lab	Trainers Training Center	Food Analysis	UPS room	Dept. of Commerce (CA)	Toilet	
Sub-Location								Class S32		
Type of Fan		Conventional Exhaust Fan								Conv. Exhaust
Capacity of Fan	W	50	50	50	50	50	50	50	50	50
Total Number of Fan	No's	4	2	4	1	4	1	2	1	19
Total Power Consumption	kW	0.2	0.1	0.2	0.05	0.2	0.05	0.1	0.05	0.95
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	1.2	0.6	1.2	0.3	1.2	0.3	0.6	0.3	5.7
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	360	180	360	90	360	90	180	90	1710
Existing System		Conventional Exhaust Fan								Conv. Exhaust
Suggestion		EE Exhaust Fan								EE Exhaust Fan
Suggested Capacity to be replaced	W	20	20	20	20	20	20	20	20	20
Expected Power Consumption	kW	0.08	0.04	0.08	0.02	0.08	0.02	0.04	0.02	0.38
Expected Energy Consumption	kWh/ Annum	144	72	144	36	144	36	72	36	684
Expected Energy Savings	kWh/ Annum	216	108	216	54	216	54	108	54	1026
Savings Percentage	%	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.0
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	1981	990	1981	495	1981	495	990	495	9408.42
Investment	Rs.	13200	6600	13200	3300	13200	3300	6600	3300	62700
Payback	Months	79.97	79.97	79.97	79.97	79.97	79.97	79.97	79.97	80.0

Savings Summary

Annual Energy Savings	*1026*	kWh/ Annum
Annual Monetary Savings	*9408*	Rs./ Annum
Investment Cost	*62700*	Rs.
Payback	*80*	Months

6.1.4 Air Conditioning

ECP 5: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance					
Block		F	F	F	F	F	F
Floor		GF	FF	FF	FF	FF	FF
Location		Foods Lab	Computer Science Lab IV	Computer Science Lab V	Computer Science Lab IV/ V	Computer Science Lab VI	Computer Science Lab VII
Sub-Location					Server room		
Type	Split/ Window	Split	Window	Window	Window	Window	Window
Make			OGeneral	OGeneral			
Capacity - TR	TR	1 5	1 5	1 5	1 5	1 5	1.5
Star rate							
Quantity	No 's	1	6	4	1	3	4
EER							
Power Consumption - kW	kW	1 65	1 65	1 65	1 65	1 65	1 65
Total Power Consumption, kW	kW	1 65	9 9	6 6	1 65	4 95	6 6
Working hours	Hours/ Day	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	2970	17820	11880	2970	8910	11880
Expected Power Consumption	kW	1 60	9 60	6 40	1 60	4 80	6 40
Expected Power Savings	kW	0 05	0.30	0 20	0 05	0 15	0 20
Savings Percentage	%	3 00	3 00	3.00	3 00	3 00	3 00
Expected Annual Energy Consumption	kWh/ Annum	2881	17285	11524	2881	8643	11524
Expected Annual Energy Savings	kWh/ Annum	89	535	356	89	267	356
Energy Cost	Rs / kWh	9	9	9	9	9	9
Cost Saving Per annum	Rs./ Annum	817	4,902	3,268	817	2,451	3,268
Investment	Rs	Nil	Nil	Nil	Nil	Nil	Nil
Payback	Months	Immediat e	Immediate	Immediate	Immediate	Immediate	Immediate

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance					Total
Block		F	F	F	F	F	F
Floor		FF	FF	FF	FF	FF	
Location		Computer Science Lab VI/ VII	Computer Science Lab III/ Internet Lab	Computer Science Lab I	Computer Science Lab I	Computer Science Lab II	
Sub-Location		Server room		Research Dept. of CS	Research Dept. of CS		
Type	Split/ Window	Window	Window	Window	Window	Window	
Make			OGeneral			OGeneral	
Capacity - TR	TR	1.5	1.5	1.5	1.5	1.5	16.5
Star rate							
Quantity	No.'s	1	2	2	7	2	33
EER							
Power Consumption - kW	kW	1.65	1.65	1.65	1.65	1.65	18.15
Total Power Consumption, kW	kW	1.65	3.3	3.3	11.55	3.3	54.45
Working hours	Hours/ Day	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	2970	5940	5940	20790	5940	98010
Expected Power Consumption	kW	1.60	3.20	3.20	11.20	3.20	52.8
Expected Power Savings	kW	0.05	0.10	0.10	0.35	0.10	1.63
Savings Percentage	%	3.00	3.00	3.00	3.00	3.00	3
Expected Annual Energy Consumption	kWh/ Annum	2881	5762	5762	20166	5762	95070
Expected Annual Energy Savings	kWh/ Annum	89	178	178	624	178	2940
Energy Cost	Rs / kWh	9	9	9	9	9	9.17
Cost Saving Per annum	Rs / Annum	817	1,634	1,634	5,719	1,634	26963
Investment	Rs	Nil	Nil	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Immediate	Immediate	Immediate

Savings Summary

Annual Energy Savings	*2940*	kWh/ Annum
Annual Monetary Savings	*26963*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 6: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations

Description	Unit	Set Temp. Reduction					
Block		F	F	F	F	F	F
Floor		GF	FF	FF	FF	FF	FF
Location		Foods Lab	Computer Science Lab IV	Computer Science Lab V	Computer Science Lab IV/ V	Computer Science Lab VI	Computer Science Lab VII
Sub-Location					Server room		
Type	Split/ Window	Split	Window	Window	Window	Window	Window
Make			OGeneral	OGeneral			
Capacity	TR	1.5	1.5	1.5	1.5	1.5	1.5
Star rate							
Quantity	No 's	1	6	4	1	3	4
EER							
Power Consumption	kW	1.65	1.65	1.65	1.65	1.65	1.65
Total Power Consumption	kW	1.65	9.9	6.6	1.65	4.95	6.6
Working hours	Hour	6	6	6	6	6	6
Annual Working Days	Days/ Annum	300	300	300	300	300	300
Actual Energy Consumption	kWh/ Annum	2970	17820	11880	2970	8910	11880
Present Set Temperature	Deg. C	20	20	20	20	20	20
Required Temperature	Deg. C	24	24	24	24	24	24
Set Point @ Thermostat	Deg. C	22	22	22	22	22	22
Expected Power Consumption	kW	1.55	9.31	6.20	1.55	4.65	6.20
Expected Power Savings	kW	0.10	0.59	0.40	0.10	0.30	0.40
Savings Percentage	%	6.00	6.00	6.00	6.00	6.00	6.00
Expected Annual Energy Consumption	kWh/ Annum	2792	16751	11167	2792	8375	11167
Expected Annual Energy Savings	kWh/ Annum	178	1069	713	178	535	713
Energy Cost	Rs./ kWh	9	9	9	9	9	9
Cost Saving per Annum	Rs./ Annum	1,634	9,805	6,536	1,634	4,902	6,536
Investment	Rs.	Nil	Nil	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Immediate	Immediate	Immediate

Optimize Set Temperature of Split AC in Stated Locations

Description	Unit	Set Temp. Reduction					Total
Block		F	F	F	F	F	F
Floor		FF	FF	FF	FF	FF	
Location		Computer Science Lab VI/ VII	Computer Science Lab III/ Internet Lab	Computer Science Lab I	Computer Science Lab I	Computer Science Lab II	
Sub-Location		Server room		Research Dept. of CS	Research Dept. of CS		
Type	Split/ Window	Window	Window	Window	Window	Window	
Make			OGeneral			OGeneral	
Capacity	TR	1.5	1.5	1.5	1.5	1.5	16.5
Star rate							
Quantity	No 's	1	2	2	7	2	33
EER							
Power Consumption	kW	1.65	1.65	1.65	1.65	1.65	18.15
Total Power Consumption	kW	1.65	3.3	3.3	11.55	3.3	54.45
Working hours	Hour	6	6	6	6	6	6
Annual Working Days	Days/ Annum	300	300	300	300	300	300
Actual Energy Consumption	kWh/ Annum	2970	5940	5940	20790	5940	98010
Present Set Temperature	Deg. C	20	20	20	20	20	
Required Temperature	Deg. C	24	24	24	24	24	
Set Point @ Thermostat	Deg. C	22	22	22	22	22	
Expected Power Consumption	kW	1.55	3.10	3.10	10.86	3.10	51.183
Expected Power Savings	kW	0.10	0.20	0.20	0.69	0.20	3.267
Savings Percentage	%	6.00	6.00	6.00	6.00	6.00	6
Expected Annual Energy Consumption	kWh/ Annum	2792	5584	5584	19543	5584	92129
Expected Annual Energy Savings	kWh/ Annum	178	356	356	1247	356	5881
Energy Cost	Rs / kWh	9	9	9	9	9	9.17
Cost Saving per Annum	Rs./ Annum	1,634	3,268	3,268	11,439	3,268	53925
Investment	Rs	Nil	Nil	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Immediate	Immediate	Immediate

Savings Summary

Annual Energy Savings	*5881*	kWh/ Annum
Annual Monetary Savings	*53925*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 7: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC					
Block		F	F	F	F	F	F
Floor		GF	FF	FF	FF	FF	FF
Location		Foods Lab	Computer Science Lab IV	Computer Science Lab V	Computer Science Lab IV/ V	Computer Science Lab VI	Computer Science Lab VII
Sub-Location					Server room		
Type of AC	Type	Split	Window	Window	Window	Window	Window
Make			OGeneral	OGeneral			
Rated Capacity of AC's	TR	1.5	1 5	1.5	1 5	1.5	1.5
Actual Star Rated							
No of AC		1	6	4	1	3	4
Energy Efficiency Ratio (EER)	EER						
Cooling Capacity	kCal/hr	4539	4539	4539	4539	4539	4539
Total Capacity of AC's	TR	1.5	9.0	6.0	1.5	4.5	6 0
Power Consumption of Actual AC	Watt	1623	9741	6494	1623	4870	6494
EER of 5 Star AC	EER	3 21	3.21	3.21	3.21	3 21	3 21
Power Consumption of 5 Star AC	Watt	1414	8484	5656	1414	4242	5656
Estimated Power Savings	Watt	322.5	1935.2	1290 2	322.5	967.6	1290 2
Expected Power Consumption	kW	1.1	6.5	4.4	1.1	3 3	4 4
Operating Hours	Hours/ Day	6	6	6	6	6	6
Annual Working Days	Days/Annum	300	300	300	300	300	300
Annual Actual Energy Consumption	kWh/Annum	2922	17533	11689	2922	8766	11689
Expected Annual Energy Consumption	kWh/Annum	2342	14050	9366	2342	7025	9366
Estimated Annual Energy Savings	kWh/Annum	581	3483	2322	581	1742	2322
Energy Cost	Rs /kWh	9.17	9.17	9.17	9.17	9.17	9 17
Annual Monetary Savings	Rs /Annum	5324	31943	21295	5324	15971	21295
Investment Cost	Rs	22589	135536	90358	22589	67768	90358
Payback	Months	51	51	51	51	51	51

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC					Total
Block		F	F	F	F	F	F
Floor		FF	FF	FF	FF	FF	
Location		Computer Science Lab VI/ VII	Computer Science Lab III/ Internet Lab	Computer Science Lab I	Computer Science Lab I	Computer Science Lab II	
Sub-Location		Server room		Research Dept. of CS	Research Dept. of CS		
Type of AC	Type	Window	Window	Window	Window	Window	Split/ Window
Make			OGeneral			OGeneral	
Rated Capacity of AC's	TR	1.5	1.5	1.5	1.5	1.5	16.5
Actual Star Rated							
No of AC		1	2	2	7	2	33
Energy Efficiency Ratio (EER)	EER						
Cooling Capacity	kCal/hr	4539	4539	4539	4539	4539	
Total Capacity of AC's	TR	1.5	3.0	3.0	10.5	3.0	49.70
Power Consumption of Actual AC	Watt	1623	3247	3247	11364	3247	53573
EER of 5 Star AC	EER	3 21	3.21	3.21	3.21	3.21	
Power Consumption of 5 Star AC	Watt	1414	2828	2828	9898	2828	46662
Estimated Power Savings	Watt	322.5	645.1	645.1	2257.8	645 1	10644
Expected Power Consumption	kW	1.1	2.2	2.2	7.6	2.2	36
Operating Hours	Hours/ Day	6	6	6	6	6	6.0
Annual Working Days	Days/Annum	300	300	300	300	300	300
Annual Actual Energy Consumption	kWh/Annum	2922	5844	5844	20455	5844	96431
Expected Annual Energy Consumption	kWh/Annum	2342	4683	4683	16391	4683	77273
Estimated Annual Energy Savings	kWh/Annum	581	1161	1161	4064	1161	19159
Energy Cost	Rs./kWh	9.17	9.17	9.17	9.17	9.17	9.2
Annual Monetary Savings	Rs./Annum	5324	10648	10648	37267	10648	175686
Investment Cost	Rs.	22589	45179	45179	158126	45179	745450
Payback	Months	51	51	51	51	51	50.9

Savings Summary

Annual Energy Savings	*19159*	kWh/ Annum
Annual Monetary Savings	*175686*	Rs./ Annum
Investment Cost	*745450*	Rs.
Payback	*50.9*	Months

6.1.5 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	13	5	54	47	9	4.200	51	128	108
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	22,817	9,648	98,010	83,994	16,200	7,560	92,592	229,619	193,794
Capacity of Solar Panel Required	kW	13	6	57	49	9	4	54	134	113
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	30,422	12,864	130,680	111,992	21,600	10,080	123,456	306,158	258,392
Energy Cost (inside)	Rs./ Annum	9	9	9	9	9	9	9	9	9
Expected Annual Monetary Savings (inside)	Rs / Annum	209,230	88,472	898,752	770,225	148,554	69,325	849,069	2,105,604	1,777,091
Expected Annual Energy Export	kWh/ Annum	7,606	3,216	32,670	27,998	5,400	2,520	30,864	76,539.6	64,598
Energy Cost for Export	Rs /kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs / Annum	121,690	51,456	522,720	447,968	86,400	40,320	493,824	1,224,634	1,033,568
Total Annual Monetary Savings	Rs / Annum	330,920	139,928	1,421,472	1,218,193	234,954	109,645	1,342,893	3,330,238	2,810,659
Investment Cost	Rs.	1,064,784	450,240	4,573,800	3,919,720	756,000	352,800	4,320,960	10,715,544	9,043,720
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*229619*	kWh/ Annum
Annual Monetary Savings	*3330238*	Rs./ Annum
Investment Cost	*10715544*	Rs.
Payback	*3*	Year

6.2 Energy Conservation Proposals-Block G

6.2.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit								
Block		G	G	G	G	G	G	G	G
Floor		GF	GF	GF	GF	GF	GF	GF	GF
Location		Games room office			Gym		Table Tennis	Boxing	Bathroom & Restroom
Sub-Location			Bathroom						
Type of Lamp		FTL	FTL	CFL	FTL	MHL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	12	36	100	36	36	36
Number of Fixtures		2	1	1	4	4	2	1	1
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	1	1	4	4	2	1	1
Actual Power Consumption	kW	0.072	0.036	0.012	0.144	0.4	0.072	0.036	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	64.8	21 6	259 2	720	129.6	64 8	64.8
Identification		FTL	FTL	CFL	FTL	MHL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	5	20	24	20	20	20
Expected Total Power Consumption	kW	0.04	0.02	0.005	0.08	0.096	0.04	0.02	0.02
Expected Annual Energy Consumption	kWh/ Annum	72	36	9	144	172.8	72	36	36
Expected Annual Energy Savings	kWh/ Annum	57.6	28.8	12.6	115.2	547.2	57.6	28.8	28.8
Percentage of Savings	%	44.44	44.44	58.33	44.44	76 00	44.44	44.44	44.44
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	528	264	116	1056	5018	528	264	264
Investment Cost	Rs.	400	200	50	800	960	400	200	200
Payback	Month	9 09	9.09	5.19	9.09	2.30	9.09	9 09	9 09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit								
Block		G	G	G	G	G	G	G	G
Floor		GF	GF	GF	GF	GF	GF	GF	GF
Location		Games room office			Gym		Table Tennis	Boxing	Bathroom & Restroom
Sub-Location			Bathroom						
Type of Lamp		FTL	FTL	CFL	FTL	MHL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	12	36	100	36	36	36
Number of Fixtures		2	1	1	4	4	2	1	1
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	1	1	4	4	2	1	1
Actual Power Consumption	kW	0.072	0.036	0.012	0.144	0.4	0.072	0.036	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	64.8	21.6	259.2	720	129.6	64.8	64.8
Identification		FTL	FTL	CFL	FTL	MHL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	5	20	24	20	20	20
Expected Total Power Consumption	kW	0.04	0.02	0.005	0.08	0.096	0.04	0.02	0.02
Expected Annual Energy Consumption	kWh/ Annum	72	36	9	144	172.8	72	36	36
Expected Annual Energy Savings	kWh/ Annum	57.6	28.8	12.6	115.2	547.2	57.6	28.8	28.8
Percentage of Savings	%	44.44	44.44	58.33	44.44	76.00	44.44	44.44	44.44
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	528	264	116	1056	5018	528	264	264
Investment Cost	Rs.	400	200	50	800	960	400	200	200
Payback	Month	9.09	9.09	5.19	9.09	2.30	9.09	9.09	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		G	G	G	G	G	G	G	G
Floor		FF	FF	FF	FF	FF	SF	SF	SF
Location		PG Physics Lab					I M.Com (CA)	I B.Sc Biochemistry	II B.Sc Biochemistry
Sub-Location		Dark room	Research Lab	Research Lab		BG room		Class S33	Class S34
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	40	36	36	36	40	40
Number of Fixtures		1	1	7	1	1	2	2	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		1	1	7	1	1	2	2	2
Actual Power Consumption	kW	0.036	0.036	0.28	0.036	0.036	0.072	0.08	0.08
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	64.8	64.8	504	64.8	64.8	129.6	144	144
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.02	0.02	0.14	0.02	0.02	0.04	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	36	36	252	36	36	72	72	72
Expected Annual Energy Savings	kWh/ Annum	28.8	28.8	252	28.8	28.8	57.6	72	72
Percentage of Savings	%	44.44	44.44	50.00	44.44	44.44	44.44	50.00	50.00
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	264	264	2311	264	264	528	660	660
Investment Cost	Rs.	200	200	1400	200	200	400	400	400
Payback	Month	9.09	9.09	7.27	9.09	9.09	9.09	7.27	7.27

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED								
Block		G	G	G	G	G	G	G	G	G
Floor		SF	SF	SF	SF	SF	SF	SF	SF	SF
Location		PG & Research Dept. of Commerce (SF)	Dept. of Physics	Corridor	I BA English Literature A		II BA English Literature (A)	III BA English Literature (SF A)	Class S38	
Sub-Location					Class S35		Class S36	Class S37		
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	40	40	40	36	40	40	40	36
Number of Fixtures		2	2	2	1	1	2	2	1	1
Number of Fittings		1	1	1	1	1	1	1	1	1
Total Number of Lamps		2	2	2	1	1	2	2	1	1
Actual Power Consumption	kW	0.08	0.08	0.08	0.04	0.036	0.08	0.08	0.04	0.036
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	144	144	144	72	64.8	144	144	72	64.8
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.04	0.04	0.02	0.02	0.04	0.04	0.02	0.02
Expected Annual Energy Consumption	kWh/ Annum	72	72	72	36	36	72	72	36	36
Expected Annual Energy Savings	kWh/ Annum	72	72	72	36	28.8	72	72	36	28.8
Percentage of Savings	%	50.00	50.00	50.00	50.00	44.44	50.00	50.00	50.00	44.44
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs./ Annum	660	660	660	330	264	660	660	330	264
Investment Cost	Rs	400	400	400	200	200	400	400	200	200
Payback	Month	7.27	7.27	7.27	7.27	9.09	7.27	7.27	7.27	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		G	G	G	G	G	G	G	G
Floor		SF	SF	SF	SF	SF	SF	SF	SF
Location		I BA English Literature (SF B)	Rest room	Rest room	Connecting Block	Corrido r	Dept of English		II BA English Literature (SF B)
Sub-Location		Class S39	Students	Staff					Class S40
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	40	40	36	40	36	36
Number of Fixtures		2	3	1	1	4	2	2	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	3	1	1	4	2	2	2
Actual Power Consumption	kW	0.072	0.108	0.04	0.04	0.144	0.08	0.072	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	194.4	72	72	259.2	144	129.6	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.06	0.02	0.02	0.08	0.04	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	72	108	36	36	144	72	72	72
Expected Annual Energy Savings	kWh/ Annum	57.6	86.4	36	36	115.2	72	57.6	57.6
Percentage of Savings	%	44.44	44.44	50.00	50.00	44.44	50.00	44.44	44.44
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	528	792	330	330	1056	660	528	528
Investment Cost	Rs	400	600	200	200	800	400	400	400
Payback	Month	9.09	9.09	7.27	7.27	9.09	7.27	9.09	9.09

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							Total
Block		G	G	G	G	G	G	G	G
Floor		SF	TF	TF	TF	TF	TF	TF	
Location		Lift	II M.Com Corporateship	II B.Com (C S)	III B Com (C S)	Dept. of Corporateship		I M.Com (C S)	
Sub-Location				Class T34	Class T35			Class T36	
Type of Lamp		CFL	FTL	FTL	FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Capacity of Lamp	W	14	40	40	40	40	36	40	36/ 40
Number of Fixtures		4	1	2	2	2	1	1	
Number of Fittings		1	1	1	1	1	1	1	
Total Number of Lamps		4	1	2	2	2	1	1	77
Actual Power Consumption	kW	0.056	0.04	0.08	0.08	0.08	0.036	0.04	3.056
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	100.8	72	144	144	144	64.8	72	5500.8
Identification		CFL	FTL	FTL	FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	5	20	20	20	20	20	20	12/ 20
Expected Total Power Consumption	kW	0.02	0.02	0.04	0.04	0.04	0.02	0.02	1.481
Expected Annual Energy Consumption	kWh/ Annum	36	36	72	72	72	36	36	2665.8
Expected Annual Energy Savings	kWh/ Annum	64.8	36	72	72	72	28.8	36	2835
Percentage of Savings	%	64.29	50.00	50.00	50.00	50.00	44.44	50.00	51.54
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	594	330	660	660	660	264	330	25997
Investment Cost	Rs.	200	200	400	400	400	200	200	14810
Payback	Month	4.04	7.27	7.27	7.27	7.27	9.09	7.27	6.84

Savings Summary

Annual Energy Savings	*2835*	kWh/ Annum
Annual Monetary Savings	*25997*	Rs./ Annum
Investment Cost	*14810*	Rs.
Payback	*6.84*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver.***

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver		
Description	**Units**	**Block G**
Present Average Power Consumption of Lightings	kW	3
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	18
Actual Annual Energy Consumption of Lighting	kWh/Year	5,501
Expected Annual Energy Savings using LES	kWh/Year	458
Energy Cost	Rs/kWh	9.2
Annual Savings	Rs./Annum	4,204
Capacity of Lighting Energy Saver	kVA	3
Investment Cost	Rs	3,148
Payback period	Months	9

Savings Summary		
Annual Energy Savings	*458*	kWh/ Annum
Annual Monetary Savings	*4204*	Rs./ Annum
Investment Cost	*3148*	Rs.
Payback	*9*	Months

6.2.2 Ceiling Fan

ECP 3: Replace Conventional Fan to Energy Efficient type of Super Fan

Present Condition:

At Present, Conventional type of ceiling fan is available.

Proposed System:

It is recommended to ***Replace Conventional Fan to Energy Efficient type of Super Fan.***

Backup Calculation:

Replace Conventional Fan to Energy Efficient type of Super Fan									
Description	Unit	Conventional Fan to EE Super Fan							
Block		G	G	G	G	G	G	G	G
Floor		GF	GF	GF	FF	FF	FF	SF	SF
Location		Games room office	Gym	Table Tennis	PG Physics Lab			I M.Com (CA)	I B Sc Biochemistry
Sub-Location					Research Lab	Research Lab	BG room		Class S33
Type of Fan		Ceiling Fan							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No 's	2	3	2	1	9	1	2	2
Total Power Consumption	kW	0 12	0 18	0 12	0 06	0 54	0 06	0 12	0 12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0 72	1 08	0 72	0 36	3 24	0 36	0.72	0 72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	324	216	108	972	108	216	216
Existing System		Ceiling Fan							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0 056	0 084	0 056	0 028	0 252	0 028	0 056	0 056
Expected Energy Consumption	kWh/ Annum	100 8	151 2	100 8	50.4	453 6	50 4	100 8	100 8
Expected Energy Savings	kWh/ Annum	115	173	115	58	518	58	115	115
Savings Percentage	%	53 33	53 33	53.33	53 33	53 33	53.33	53 33	53 33
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9 17
Annual Monetary Savings	Rs / Annum	1056	1585	1056	528	4754	528	1056	1056
Investment	Rs	6600	9900	6600	3300	29700	3300	6600	6600
Payback	Months	74 97	74 97	74 97	74 97	74 97	74 97	74 97	74 97

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan							
Block		G	G	G	G	G	G	G	G
Floor		SF	SF	SF	SF	SF	SF	SF	SF
Location		II B.Sc Biochemistry	PG & Research Dept. of Commerce (SF)	Dept. of Physics	I BA English Literature A	II BA English Literature (A)	III BA English Literature (SF A)	Class S38	I BA English Literature (SF B)
Sub-Location		Class S34			Class S35	Class S36	Class S37		Class S39
Type of Fan		Ceiling Fan							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No's	2	4	3	2	2	2	1	2
Total Power Consumption	kW	0.12	0.24	0.18	0.12	0.12	0.12	0.06	0.12
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0.72	1.44	1.08	0.72	0.72	0.72	0.36	0.72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	432	324	216	216	216	108	216
Existing System		Ceiling Fan							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0.112	0.084	0.056	0.056	0.056	0.028	0.056
Expected Energy Consumption	kWh/ Annum	100.8	201.6	151.2	100.8	100.8	100.8	50.4	100.8
Expected Energy Savings	kWh/ Annum	115	230	173	115	115	115	58	115
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33
Energy Cost	Rs / kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	1056	2113	1585	1056	1056	1056	528	1056
Investment	Rs	6600	13200	9900	6600	6600	6600	3300	6600
Payback	Months	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97

Replace Conventional Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan								Total
Block		G	G	G	G	G	G	G	G	Block G
Floor		SF	SF	SF	TF	TF	TF	TF	TF	
Location		Dept. of English	II BA English Literature (SF B)	Lift	II M.Com Corporateship	II B.Com (C.S)	III B.Com (C.S)	Dept. of Corporateship	I M.Com (C S)	
Sub-Location			Class S40			Class T34	Class T35		Class T36	
Type of Fan		Ceiling Fan								Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60	60	60
Total Number of Fan	No.'s	9	2	1	3	3	3	5	3	69
Total Power Consumption	kW	0.54	0.12	0.06	0.18	0.18	0.18	0.3	0.18	4.14
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	3.24	0.72	0.36	1.08	1.08	1.08	1.8	1.08	24.84
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	972	216	108	324	324	324	540	324	7452
Existing System		Ceiling Fan								Ceiling
Suggestion		EE Super Fan								EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.252	0.056	0.028	0.084	0.084	0.084	0.14	0.084	1.93
Expected Energy Consumption	kWh/ Annum	453.6	100.8	50.4	151.2	151.2	151.2	252	151.2	3478
Expected Energy Savings	kWh/ Annum	518	115	58	173	173	173	288	173	3974
Savings Percentage	%	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.33	53.3
Energy Cost	Rs./ kWh	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17	9.17
Annual Monetary Savings	Rs / Annum	4754	1056	528	1585	1585	1585	2641	1585	36445
Investment	Rs	29700	6600	3300	9900	9900	9900	16500	9900	227700
Payback	Months	74.97	74.97	74.97	74.97	74.97	74.97	74.97	74.97	75.0

Savings Summary

Annual Energy Savings	*3974*	kWh/ Annum
Annual Monetary Savings	*36445*	Rs./ Annum
Investment Cost	*227700*	Rs.
Payback	*75*	Months

6.2.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan			
Description	**Unit**	**Conventional Exhaust Fan to EE Exhaust Fan**	**Total**
Block		G	**Block G**
Floor		SF	
Location		Rest room	
Sub-Location		Student	
Type of Fan		Exhaust Fan	**Exhaust Fan**
Capacity of Fan	W	50	**50**
Total Number of Fan	No.'s	3	**3**
Total Power Consumption	kW	0.15	**0.15**
Average Operating Hours	Oper. Hours/ Day	6	**6**
Energy Consumption per Day	kWh/ Day	0.9	**0.9**
Annual Operating Days	Days/ Annum	300	**300**
Annual Energy Consumption	kWh/ Annum	270	**270**
Existing System		Exhaust Fan	**Exhaust Fan**
Suggestion		EE Exhaust Fan	**EE Exhaust Fan**
Suggested Capacity to be replaced	W	20	**20**
Expected Power Consumption	kW	0.06	**0.06**
Expected Energy Consumption	kWh/ Annum	108	**108**
Expected Energy Savings	kWh/ Annum	162	**162**
Savings Percentage	%	60 00	**60.0**
Energy Cost	Rs./ kWh	9.17	**9.17**
Annual Monetary Savings	Rs./ Annum	1486	**1486**
Investment	Rs.	9900	**9900**
Payback	Months	79.97	**80.0**

Savings Summary		
Annual Energy Savings	*162*	kWh/ Annum
Annual Monetary Savings	*1486*	Rs./ Annum
Investment Cost	*9900*	Rs.
Payback	*80*	Months

6.2.4 Green Energy Utilization/ Solar Panel

ECP 5: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	3	1	0	0	4	1.930	3	10	6
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	5,501	2,666	0	0	7,452	3,474	5,490	18,443	11,630
Capacity of Solar Panel Required	kW	3	2	0	0	4	2	3	11	7
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	7,334	3,554	0	0	9,936	4,632	7,320	24,590	15,506
Energy Cost (inside)	Rs./ Annum	9	9	9	9	9	9	9	9	9
Expected Annual Monetary Savings (inside)	Rs./ Annum	50,442	24,445	0	0	68,335	31,857	50,343	169,120	106,645
Expected Annual Energy Export	kWh/ Annum	1,834	889	0	0	2,484	1,158	1,830	6,147.6	3,877
Energy Cost for Export	Rs./kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs / Annum	29,338	14,218	0	0	39,744	18,528	29,280	98,362	62,026
Total Annual Monetary Savings	Rs./ Annum	79,780	38,663	0	0	108,079	50,385	79,623	267,482	168,671
Investment Cost	Rs.	256,704	124,404	0	0	347,760	162,120	256,200	860,664	542,724
Payback period	Year	3	3	#DIV/0!	#DIV/0!	3	3	3	3	3

Savings Summary

Annual Energy Savings	*18443*	kWh/ Annum
Annual Monetary Savings	*267482*	Rs./ Annum
Investment Cost	*860664*	Rs.
Payback	*3*	Year

CHAPTER - 7

SERVICE NUMBER 04-006-005-08 [Block H]

7. SERVICE NUMBER 04-006-005-08 [Block H]

7.1 Energy Conservation Proposals-Block H

7.1.1 Lighting

ECP 1: Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Present Condition:

At Vellalar College for Women, **Conventional Lights of CFL/ FTL/ MHL is available in the stated location.**

Proposed System:

It is recommended to ***Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations.***

Backup Calculation:

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		H	H	H	H	H	H	H	H
Floor		GF	GF	GF	GF	GF	FF	FF	FF
Location		Non Residence	III B.Sc		Corrid	Central Research	Physics (UG SF)	Physics (UG SF)	
Sub-Location			Class G6				Store room	Lab	
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	40	36	36	36	36	40	36
Number of Fixtures		16	3	1	4	23	2	11	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		16	3	1	4	23	2	11	2
Actual Power Consumption	kW	0.576	0.12	0.036	0.144	0.828	0.072	0.44	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/	300	300	300	300	300	300	300	300
Actual Annual Energy	kWh/	1036.8	216	64 8	259.2	1490.4	129.6	792	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power	kW	0.32	0.06	0.02	0.08	0.46	0.04	0.22	0.04
Expected Annual Energy	kWh/	576	108	36	144	828	72	396	72
Expected Annual Energy Savings	kWh/	460.8	108	28.8	115.2	662.4	57.6	396	57.6
Percentage of Savings	%	44.44	50.00	44.44	44.44	44.44	44.44	50.00	44.44
Energy Cost	Rs./ kWh	9.31	9.31	9.31	9 31	9.31	9.31	9.31	9.31
Annual Monetary Savings	Rs./ Annum	4290	1005	268	1073	6167	536	3687	536
Investment Cost	Rs.	3200	600	200	800	4600	400	2200	400
Payback	Month	8.95	7.16	8.95	8.95	8.95	8.95	7.16	8.95

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations									
Description	Unit	Conventional Lights to LED							
Block		H	H	H	H	H	H	H	H
Floor		FF	FF	FF	FF	TF	TF	TF	TF
Location		Physics (UG SF) Lab	Computer Science Lab FF	Dept. of Computer Science		I B Sc Maths A	II B Sc Maths (SF A)	III B Sc Maths (SF A)	M.Phil
Sub-Location		BG room			HOD	Class T37	Class T38	Class T39	Class T40
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	40	40	36	36	36	36	36	36
Number of Fixtures		2	9	5	1	2	2	2	2
Number of Fittings		1	2	1	2	1	1	1	1
Total Number of Lamps		2	18	5	2	2	2	2	2
Actual Power Consumption	kW	0.08	0.72	0.18	0.072	0.072	0.072	0.072	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	144	1296	324	129.6	129.6	129.6	129.6	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.18	0.1	0.02	0.04	0.04	0.04	0.04
Expected Annual Energy Consumption	kWh/ Annum	72	324	180	36	72	72	72	72
Expected Annual Energy Savings	kWh/ Annum	72	972	144	93.6	57.6	57.6	57.6	57.6
Percentage of Savings	%	50.00	75.00	44.44	72.22	44.44	44.44	44.44	44.44
Energy Cost	Rs / kWh	9.31	9.31	9.31	9.31	9.31	9.31	9.31	9.31
Annual Monetary Savings	Rs / Annum	670	9049	1341	871	536	536	536	536
Investment Cost	Rs	400	1800	1000	200	400	400	400	400
Payback	Month	7.16	2.39	8.95	2.75	8.95	8.95	8.95	8.95

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED							
Block		H	H	H	H	H	H	H	H
Floor		TF	TF	TF	TF	TF	TF	TF	Fourth Floor
Location		III BA English Literature SF B	Rest room	Corridor	Connecting Block	PG Dept of Maths (SF)	PG Dept of Computer Science	Steps towards 4th Floor	I B.Sc Maths SF B
Sub-Location		Class T41	Students						Class F1
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	36	36	36	36	36	36
Number of Fixtures		2	4	3	1	7	6	1	2
Number of Fittings		1	1	1	1	1	1	1	1
Total Number of Lamps		2	4	3	1	7	6	1	2
Actual Power Consumption	kW	0.072	0.144	0.108	0.036	0.252	0.216	0.036	0.072
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	259.2	194.4	64.8	453.6	388.8	64.8	129.6
Identification		FTL	FTL	FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.08	0.06	0.02	0.14	0.12	0.02	0.04
Expected Annual Energy Consumption	kWh/ Annum	72	144	108	36	252	216	36	72
Expected Annual Energy Savings	kWh/ Annum	57.6	115.2	86.4	28.8	201.6	172.8	28.8	57.6
Percentage of Savings	%	44.44	44.44	44.44	44.44	44.44	44.44	44.44	44.44
Energy Cost	Rs / kWh	9.31	9.31	9.31	9.31	9.31	9.31	9.31	9.31
Annual Monetary Savings	Rs / Annum	536	1073	804	268	1877	1609	268	536
Investment Cost	Rs.	400	800	600	200	1400	1200	200	400
Payback	Month	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED					
Block		H	H	H	H	H	H
Floor		Fourth Floor	Fourth Floor	Fourth Floor	Fourth Floor	Fourth Floor	Fourth Floor
Location		II B.Sc Maths SF B	III B Sc Maths SF B	Hindi room	I B.Sc Maths (CA)	Rest room	II B Sc Maths CA
Sub-Location		Class F2	Class F3	Class F4	Class F5	Student	Class F6
Type of Lamp		FTL	FTL	FTL	FTL	FTL	FTL
Capacity of Lamp	W	36	36	40	36	36	36
Number of Fixtures		2	2	2	2	4	4
Number of Fittings		1	1	1	1	1	1
Total Number of Lamps		2	2	2	2	4	4
Actual Power Consumption	kW	0.072	0.072	0.08	0.072	0.144	0.144
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	129.6	144	129.6	259.2	259.2
Identification		FTL	FTL	FTL	FTL	FTL	FTL
Suggestion		LED	LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	20	20
Expected Total Power Consumption	kW	0.04	0.04	0.04	0.04	0.08	0.08
Expected Annual Energy Consumption	kWh/ Annum	72	72	72	72	144	144
Expected Annual Energy Savings	kWh/ Annum	57.6	57.6	72	57.6	115.2	115.2
Percentage of Savings	%	44.44	44.44	50.00	44.44	44.44	44.44
Energy Cost	Rs / kWh	9.31	9.31	9.31	9.31	9.31	9.31
Annual Monetary Savings	Rs / Annum	536	536	670	536	1073	1073
Investment Cost	Rs.	400	400	400	400	800	800
Payback	Month	8.95	8.95	7.16	8.95	8.95	8.95

Replace/ Retrofit Conventional Lights of CFL/ FTL/ MHL to suggested Energy Efficient LED Lights in the Specified Locations

Description	Unit	Conventional Lights to LED				Total
Block		H	H	Connecting Block [H & F]	Connecting Block [H & F]	H
Floor		Fourth Floor	Fourth Floor			
Location		III B.Sc Maths CA	Corridor			
Sub-Location		Class F7		Co-operative Stores	NSS room	
Type of Lamp		FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Capacity of Lamp	W	36	36	36	36	36/ 40
Number of Fixtures		2	4	2	2	
Number of Fittings		1	1	1	1	
Total Number of Lamps		2	4	2	2	149
Actual Power Consumption	kW	0.072	0.144	0.072	0.072	5.508
Average Glowing Hours of Lamps	Hours/ Day	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300
Actual Annual Energy Consumption	kWh/ Annum	129.6	259.2	129.6	129.6	9914.4
Identification		FTL	FTL	FTL	FTL	CFL/ FTL/ LED
Suggestion		LED	LED	LED	LED	LED
Suggested Capacity of Lamps	W	20	20	20	20	12/ 20
Expected Total Power Consumption	kW	0.04	0.08	0.04	0.04	2.78
Expected Annual Energy Consumption	kWh/ Annum	72	144	72	72	5004
Expected Annual Energy Savings	kWh/ Annum	57.6	115.2	57.6	57.6	4910.4
Percentage of Savings	%	44.44	44.44	44.44	44.44	49.53
Energy Cost	Rs./ kWh	9.31	9.31	9 31	9.31	9.31
Annual Monetary Savings	Rs./ Annum	536	1073	536	536	45716
Investment Cost	Rs.	400	800	400	400	27800
Payback	Month	8.95	8.95	8.95	8.95	7.30

Savings Summary

Annual Energy Savings	*4910*	kWh/ Annum
Annual Monetary Savings	*45716*	Rs./ Annum
Investment Cost	*27800*	Rs.
Payback	*7.3*	Months

ECP 2: Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Present Condition:

At Present, the maintained average voltage for Lighting is 240 V.

Proposed System:

It is recommended to ***Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver.***

Backup Calculation:

Reduce Lighting feeder Voltage from 240 V to 220 V using Lighting Energy Saver

Description	Units	Block H
Present Average Power Consumption of Lightings	kW	6
Present Voltage	V	240
Suggested Voltage	V	220
Lamp operating Hours	Operating Hours/Day	6
Actual Energy Consumption by Lighting per day	kWh/Day	33
Actual Annual Energy Consumption of Lighting	kWh/Year	9,914
Expected Annual Energy Savings using LES	kWh/Year	826
Energy Cost	Rs/kWh	9.3
Annual Savings	Rs /Annum	7,692
Capacity of Lighting Energy Saver	kVA	6
Investment Cost	Rs	5,673
Payback period	Months	9

Savings Summary

Annual Energy Savings	*826*	kWh/ Annum
Annual Monetary Savings	*7692*	Rs./ Annum
Investment Cost	*5673*	Rs.
Payback	*9*	Months

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan							
Block		H	H	H	H	H	H	H	H
Floor		TF	TF	TF	TF	TF	TF	TF	Fourth Floor
Location		I B Sc Maths A	II B Sc Maths (SF A)	III B Sc Maths (SF A)	M.Phil History	III BA English Literature SF B	PG Dept of Maths (SF)	PG Dept. of Computer Science	I B.Sc Maths SF B
Sub-Location		Class T37	Class T38	Class T39	Class T40	Class T41			Class F1
Type of Fan		Ceiling Fan							
Capacity of Fan	W	60	60	60	60	60	60	60	60
Total Number of Fan	No 's	2	2	2	1	2	8	7	2
Total Power Consumption	kW	0 12	0 12	0 12	0 06	0 12	0 48	0 42	0 12
Average Operating Hours	Oper Hours/ Day	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0 72	0 72	0 72	0 36	0 72	2 88	2 52	0 72
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	216	216	108	216	864	756	216
Existing System		Ceiling Fan							
Suggestion		EE Super Fan							
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0 056	0 056	0 056	0 028	0 056	0 224	0 196	0 056
Expected Energy Consumption	kWh/ Annum	100 8	100.8	100.8	50.4	100 8	403.2	352 8	100 8
Expected Energy Savings	kWh/ Annum	115	115	115	58	115	461	403	115
Savings Percentage	%	53 33	53 33	53 33	53 33	53 33	53 33	53 33	53 33
Energy Cost	Rs / kWh	9 31	9 31	9 31	9 31	9 31	9 31	9 31	9 31
Annual Monetary Savings	Rs / Annum	1073	1073	1073	536	1073	4290	3754	1073
Investment	Rs	6600	6600	6600	3300	6600	26400	23100	6600
Payback	Months	73 85	73 85	73 85	73.85	73 85	73.85	73 85	73.85

Replace Conventional Ceiling Fan to Energy Efficient type of Super Fan

Description	Unit	Conventional Fan to EE Super Fan								Total
Block		H	H	H	H	H	H	Connecting Block [H & F]		Block I
Floor		Fourth Floor	Fourth Floor	Fourth Floor	Fourth Floor	Fourth Floor	Fourth Floor			
Location		II B Sc Maths SF B	III B Sc Maths SF B	Hindi room	1B Sc Maths (CA)	II B Sc Maths CA	III B Sc Maths CA			
Sub-Location		Class F2	Class F3	Class F4	Class F5	Class F6	Class F7	Co-operative Stores	NSS room	
Type of Fan		Ceiling Fan								Ceiling
Capacity of Fan	W	60	60	60	60	60	60	60	60	60
Total Number of Fan	No 's	2	2	1	2	3	2	2	2	33
Total Power Consumption	kW	0 12	0.12	0.06	0.12	0 18	0.12	0 12	0 12	1.98
Average Operating Hours	Oper. Hours/ Day	6	6	6	6	6	6	6	6	6
Energy Consumption per Day	kWh/ Day	0 72	0.72	0 36	0 72	1 08	0 72	0 72	0 72	11.88
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	216	216	108	216	324	216	216	216	3564
Existing System		Ceiling Fan								Ceiling
Suggestion		EE Super Fan								EE Super Fan
Suggested Capacity to be replaced	W	28	28	28	28	28	28	28	28	28
Expected Power Consumption	kW	0.056	0 056	0 028	0 056	0 084	0 056	0 056	0 056	0.924
Expected Energy Consumption	kWh/ Annum	100 8	100 8	50 4	100 8	151 2	100 8	100 8	100 8	1663.2
Expected Energy Savings	kWh/ Annum	115	115	58	115	173	115	115	115	1900.8
Savings Percentage	%	53 33	53 33	53 33	53 33	53 33	53 33	53 33	53 33	53.3
Energy Cost	Rs / kWh	9 31	9 31	9 31	9.31	9 31	9 31	9.31	9 31	9.31
Annual Monetary Savings	Rs / Annum	1073	1073	536	1073	1609	1073	1073	1073	17696
Investment	Rs	6600	6600	3300	6600	9900	6600	6600	6600	108900
Payback	Months	73 85	73 85	73 85	73 85	73 85	73 85	73 85	73 85	73.8

Savings Summary

Annual Energy Savings	*1900*	kWh/ Annum
Annual Monetary Savings	*17696*	Rs./ Annum
Investment Cost	*108900*	Rs.
Payback	*73.8*	Months

7.1.3 Exhaust Fan

ECP 4: Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Present Condition:

At Present, Conventional type of Exhaust fan is available.

Proposed System:

It is recommended to ***Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan***

Backup Calculation:

Replace Conventional Exhaust Fan to Energy Efficient type of Exhaust Fan

Description	Unit	Conventional Exhaust Fan to EE Exhaust Fan		Total
Block		H	H	**Block H**
Floor		Fourth Floor	TF	
Location		Rest room	Rest room	
Sub-Location		Student	Students	
Type of Fan		Exhaust Fan	Exhaust Fan	**Exhaust Fan**
Capacity of Fan	W	50	50	**50**
Total Number of Fan	No.'s	3	3	**6**
Total Power Consumption	kW	0.15	0.15	**0.30**
Average Operating Hours	Oper. Hours/ Day	6	6	**6**
Energy Consumption per Day	kWh/ Day	0.9	0.9	**1.8**
Annual Operating Days	Days/ Annum	300	300	**300**
Annual Energy Consumption	kWh/ Annum	270	270	**540**
Existing System		Exhaust Fan	Exhaust Fan	**Exhaust Fan**
Suggestion		EE Exhaust Fan	EE Exhaust Fan	**EE Exhaust Fan**
Suggested Capacity to be replaced	W	20	20	**20**
Expected Power Consumption	kW	0.06	0.06	**0.12**
Expected Energy Consumption	kWh/ Annum	108	108	**216**
Expected Energy Savings	kWh/ Annum	162	162	**324**
Savings Percentage	%	60.00	60.00	**60.0**
Energy Cost	Rs./ kWh	9.31	9.31	**9.31**
Annual Monetary Savings	Rs./ Annum	1508	1508	**3016**
Investment	Rs.	9900	9900	**19800**
Payback	Months	78.77	78.77	**78.8**

Savings Summary

Annual Energy Savings	*324*	kWh/ Annum
Annual Monetary Savings	*3016*	Rs./ Annum
Investment Cost	*19800*	Rs.
Payback	*78.8*	Months

7.1.4 Air Conditioning

ECP 5: Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Location of AC's

Present Condition:

At Present, Dust is in rust in the outdoor units of 1.5/ 2 Ton Split AC's in the stated locations.

Proposed System:

It is recommended to ***Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's.***

Backup Calculation:

Periodical Maintenance required for Dust Cleaning in Outdoor Units in the Specified Locations of AC's

Description	Unit	AC Maintenance			Total
Block		H	H	H	H
Floor		GF	GF	FF	
Location		Non Residence Hall	Central Research Lab	Computer Science Lab IX	
Sub-Location					
Type	Split/ Window	Split	Split	Window	
Make		Llyod	Ogeneral		
Capacity - TR	TR	2	2	2	6
Star rate					
Quantity	No.'s	6	1	3	10
EER					
Power Consumption - kW	kW	2.2	2.2	2.2	6.60
Total Power Consumption, kW	kW	13.2	2.2	6.6	22.0
Working hours	Hours/ Day	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300
Annual Energy Consumption	kWh/ Annum	23760	3960	11880	39600
Expected Power Consumption	kW	12.80	2.13	6.40	21.34
Expected Power Savings	kW	0.40	0 07	0.20	0.66
Savings Percentage	%	3.00	3.00	3.00	3
Expected Annual Energy Consumption	kWh/ Annum	23047	3841	11524	38412
Expected Annual Energy Savings	kWh/ Annum	713	119	356	1188
Energy Cost	Rs./ kWh	9	9	9	9.31
Cost Saving Per annum	Rs./ Annum	6,636	1,106	3,318	11060
Investment	Rs.	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Immediate

Savings Summary

Annual Energy Savings	*1188*	kWh/ Annum
Annual Monetary Savings	*11060*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 6: Optimize Set Temperature of AC in Stated Locations

Present Condition:

At Present, set temperature for split AC units is varies as 18 to 22 Deg. C in the stated locations.

Proposed System:

It is recommended to ***Optimize Set Temperature of AC in Stated Locations.***

Backup Calculation:

Optimize Set Temperature of Split AC in Stated Locations

Description	Unit	Set Temp. Reduction			Total
Block		H	H	H	H
Floor		GF	GF	FF	
Location		Non Residence Hall	Central Research Lab	Computer Science Lab IX	
Sub-Location					
Type	Split/ Window	Split	Split	Window	
Make		Llyod	Ogeneral		
Capacity	TR	2	2	2	6.0
Star rate					
Quantity	No.'s	6	1	3	10
EER					
Power Consumption	kW	2.2	2.2	2.2	6.6
Total Power Consumption	kW	13.2	2.2	6.6	22
Working hours	Hour	6	6	6	6
Annual Working Days	Days/ Annum	300	300	300	300
Actual Energy Consumption	kWh/ Annum	23760	3960	11880	39600
Present Set Temperature	Deg. C	20	20	20	
Required Temperature	Deg. C	24	24	24	
Set Point @ Thermostat	Deg. C	22	22	22	
Expected Power Consumption	kW	12.41	2.07	6.20	20.68
Expected Power Savings	kW	0.79	0.13	0.40	1.32
Savings Percentage	%	6.00	6.00	6.00	6
Expected Annual Energy Consumption	kWh/ Annum	22334	3722	11167	37224
Expected Annual Energy Savings	kWh/ Annum	1426	238	713	2376
Energy Cost	Rs./ kWh	9	9	9	9.31
Cost Saving per Annum	Rs./ Annum	13,272	2,212	6,636	22120
Investment	Rs.	Nil	Nil	Nil	Nil
Payback	Months	Immediate	Immediate	Immediate	Immediate

Savings Summary

Annual Energy Savings	*2376*	kWh/ Annum
Annual Monetary Savings	*22120*	Rs./ Annum
Investment Cost	*Nil*	Rs.
Payback	*Immediate*	Months

ECP 7: Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Present Condition:

At Present, Conventional (low star rated) Split AC's are available in the stated locations.

Proposed System:

It is recommended to ***Replace Inefficient/ Conventional Split AC to 5 star Energy Efficient AC's in the Specified Location.***

Backup Calculation:

Replace Inefficient/ Conventional Split AC/ Window AC to 5 star Energy Efficient AC's in the Specified Location

Description	Unit	Star rated AC			Total
Block		H	H	H	H
Floor		GF	GF	FF	
Location		Non Residence Hall	Central Research Lab	Computer Science Lab IX	
Sub-Location					
Type of AC	Type	Split	Split	Window	Split/ Window
Make		Llyod	Ogeneral		
Rated Capacity of AC's	TR	2	2	2	6
Actual Star Rated					
No of AC		6	1	3	10
Energy Efficiency Ratio (EER)	EER				
Cooling Capacity	kCal/hr	6052	6052	6052	
Total Capacity of AC's	TR	12.0	2.0	6.0	20.08
Power Consumption of Actual AC	Watt	12987	2165	6494	21646
EER of 5 Star AC	EER	3.21	3.21	3.21	
Power Consumption of 5 Star AC	Watt	11312	1885	5656	18853
Estimated Power Savings	Watt	2580.3	430.1	1290.2	4301
Expected Power Consumption	kW	8.7	1.5	4.4	14.6
Operating Hours	Hours/ Day	6	6	6	6.0
Annual Working Days	Days/Annum	300	300	300	300
Annual Actual Energy Consumption	kWh/Annum	23377	3896	11689	38962
Expected Annual Energy Consumption	kWh/Annum	18733	3122	9366	31221
Estimated Annual Energy Savings	kWh/Annum	4645	774	2322	7741
Energy Cost	Rs./kWh	9.31	9.31	9.31	9.3
Annual Monetary Savings	Rs./Annum	43241	7207	21620	72068
Investment Cost	Rs.	180715	30119	90358	301192
Payback	Months	50	50	50	50.2

Savings Summary

Annual Energy Savings	*7741*	kWh/ Annum
Annual Monetary Savings	*72068*	Rs./ Annum
Investment Cost	*301192*	Rs.
Payback	*50.2*	Months

7.1.5 Green Energy Utilization/ Solar Panel

ECP 8: Install Solar Panel for the Specified Loads

Present Condition:

At Present, solar panel is not utilized for Lighting and other loads.

Proposed System:

It is recommended to ***Install Solar Panel for the Specified Loads.***

Backup Calculation:

Install Solar Panel for the Specified Loads

Description	Units	Lighting		AC		Ceiling Fan		Miscellaneous Loads	Total	
Suggested Implementation		Before	After	Before	After	Before	After		Before	After
Actual Power Consumption	kW	6	3	22	19	2	0.924	11.1	41	34
Operating Hours per Day	Operating Hours	6	6	6	6	6	6	6	6	6
Annual Operating Days	Days/ Annum	300	300	300	300	300	300	300	300	300
Annual Energy Consumption	kWh/ Annum	9,914	5,004	39,600	33,972	3,564	1,663	20,052	73,130	60,691
Capacity of Solar Panel Required	kW	6	3	23	20	2	1	12	43	35
Expected Operating Hours of Solar	Hours/ Day	8	8	8	8	8	8	8	8	8
Actual Energy Generated per Annum by Solar	kWh/ Annum	13,219	6,672	52,800	45,296	4,752	2,218	26,736	97,507	80,922
Energy Cost (inside)	Rs./ kWh	9	9	9	9	9	9	9	9	9
Expected Annual Monetary Savings (inside)	Rs / Annum	92,303	46,587	368,676	316,279	33,181	15,484	186,684	680,844	565,035
Expected Annual Energy Export	kWh/ Annum	3,305	1,668	13,200	11,324	1,188	554	6,684	24,376.8	20,230
Energy Cost for Export	Rs /kWh	4	4	4	4	4	4	4	4	4
Annual Monetary Savings	Rs / Annum	52,877	26,688	211,200	181,184	19,008	8,870	106,944	390,029	323,686
Total Annual Monetary Savings	Rs / Annum	145,180	73,275	579,876	497,463	52,189	24,355	293,628	1,070,873	888,721
Investment Cost	Rs.	462,672	233,520	1,848,000	1,585,360	166,320	77,616	935,760	3,412,752	2,832,256
Payback period	Year	3	3	3	3	3	3	3	3	3

Savings Summary

Annual Energy Savings	*73130*	kWh/ Annum
Annual Monetary Savings	*1070873*	Rs./ Annum
Investment Cost	*3412752*	Rs.
Payback	*3*	Year

CHAPTER – 8
ANNEXURE

8. ANNEXURE

8.1 Annexure i- Standard Lighting Code

Lighting Codes has been inferred from "**Indian Standard – Code of Practice for Interior Illumination, IS – 3646 Part –II**"

SI.No	Location	Standard Illumination Lux	Limiting Glare Index
1	Canteens	150	-
2	Cloak Rooms	100	-
3	Entrances, Corridors, Stairs	100	-
4	Main Entrances, Exit Roads	20	-
5	Internal Factory Roads	20	-
6	Oven Rooms	150	25
7	Ganges - Washing, Cutting, General Servicing	150	28
8	Cutting to Size, Grinding, Polishing, Toughening	200	25
9	Distribution & Storage	200 - 300	-
10	Transformer & Outdoor Switch Gear	100	-
11	DG Room	100	-

8.2 Annexure ii - Comparisons of induction, metal halide & high pressure sodium lamps

Comparison	iGROW Induction Lighting	Metal Halide	High Pressure Sodium
Warranty	Lamp: 5 Years; Ballast: 5 Years	Lamp: 0 – 1 Years; Ballast: 3 – 5 Years	Lamp: 0 – 1 Years; Ballast: 3 – 5 Years
Life Hours	100,000	12,000	24,000
Energy Savings	Excellent	Poor	Poor
Lumen Failure Rate	10% @ 70,000 Hours	30% @ 6,000 Hours	30% @ 12,000 Hours
Lamp Operating Temperature	140 - 200 Degrees F	600 - 1000 Degrees F	600 - 1000 Degrees F
Amperage	120v / 277v	120v / 277v	120v / 277v
Using 1000w lamp	3.5amp / 1.6 amp	9.5amp / 4.75amp	9.5amp / 4.75amp
Re-strike	Instant	10 - 15 minutes	10 - 15 minutes
Impact on Lamp	None	High	High
Flicker	No	Yes	Yes
Glare	Low	High	High
Environmental Safety	< 10 mg Mercury; No lamp waste over 10 Years	> 30 mg Mercury; 600 - 1200 mg Mercury waste over 10 Years	> 30 mg Mercury; 600 - 1200 mg Mercury waste over 10 Years

Important Note: Lighting Calculation sheet is attached as Excel Sheet as soft as Annexure IA, Annexure IB; Similarly, Fan Calculation Sheet is attached as Annexure IIA, Annexure IIB.

CHAPTER – 9
VENDOR DETAILS FOR IMPLEMENTATION

9. VENDOR DETAILS FOR IMPLEMENTATION

VENDOR DETAILS FOR IMPLEMENTATION

S. No	Description	Contact details
1	LIGHTINGS (T5-24 W FTL)	**Energys Service P Ltd [For Retrofits]**
		No 679, Rajagopalapuram, Pudukkottai-622003
		Mr N Gunasekaran
		04322 260819/94434 94990
		Elpro Energy Dimensions (P) Ltd.
		#6,7 & 8, IV th 'N' Block, Dr Raj kumar Road,
		Rajaji Nagar Entrance
		Bangalore - 560 010
		Tel : +(91)-80-24123238
2	LIGHTINGS (LED)/ SOLAR	ENTRUST EXIM
		2nd Floor
		Pettukola Towers
		90A, Poonamalee High Road
		Kilpauk, Chennai
		Tel: 044 25322044
		Cell:8939906050
		Email:sales2tn@entrustexim com
		Excess (Excellence In Energy Saving Solutions)
		2nd street,kothari Layout,
		No.11,1st Floor,Opp .Stock Exchange,
		Singanallur
		Coimbatore - 641005
		Tamil Nadu, India
		Mob:9894623157
		Ambay Energy Solutions Pvt. Ltd.
		303, ANAND BUILDING, I FLOOR, SUITE
		NO.10, P.H. ROAD, KILPAUK,
		Chennai -600010
		Tamil Nadu, India
		Mobile : +919841312743
3	LIGHTING ENERGY SAVER	**UNITECH ASSOCIATES PVT. LTD.,**
		Mr. Ramesh
		No-13 Mooparappan Street , T Nagar
		Chennai
		91-44-42178888, Mob- 9840399816
4	Power Factor **(capacitor bank)**	STTAR Engineering
		203,SIDCO AIEMA Tower,
		#6,7 & IV th 'N' Block, Dr Raj Kumar Road,
		Rajaji Nagar Entrance
		Bangalore – 560 010
		Tel : +(91) – 80241232238

1 % OF ENERGY SAVINGS=2 % OF ENERGY GENERATION