

# **ENERGY AUDIT**

**Report (2022-2023)**



**Prepared by**

**DEPARTMENT OF PHYSICS**

**SIR C R REDDY COLLEGE FOR WOMEN, ELURU**

(Affiliated to ADIKAVI NANNAYA UNIVERSITY ,Rajamahendravaram )

Eluru District, Andhra Pradesh 534007

Certificate

# ENERGY AUDIT

Academic year 2022-23



This is to certify that

**SIR C R REDDY COLLEGE FOR WOMEN, ELURU  
VATLURU, ELURU DISTRICT AP**

has achieved the energy uses standards for the learning spaces  
with least impact on environment during the  
Energy Audit 2022-23

This certificate is issued on the basis of Energy Audit 2022-23



P. Siva Keerani  
Convenor

  
IQAC Coordinator

  
Asst. Executive Engineer  
APPEPDCL  
PEDAPADU

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## **MEMBERS OF ENERGY AUDIT COMMITTEE**

### **Internal Committee**

1. Smt .K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy college for women,  
Eluru
2. Smt. K. Jhansi Rani  
Dept .of Computer science  
IQAC & NAAC  
Coordinator
3. Smt.P.Siva kumari  
Lecturer in Dept. of Physics  
Convenor, Energy Audit
4. Smt.M.Jaya lakshmi Devi  
Lecturer in Dept of Physics  
Sir C R Reddy college for women  
Member

### **External Committee**

1. Sri. Y. Rambabu  
Asst. Engineer  
APEPDCL ,Govt, of AP  
Eluru
2. Sri.T.Kranthi Kiran  
Asst. Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering college, Eluru
3. Sri .K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College,Eluru

## Preface

Data collection for energy audit of **Sir C.R Reddy College for women** was conducting an Energy Audit for the period of June 2022 to May 2023 .The final report was submitted on 2023

This audit was over sight in quire about convenience to progress the energy competence of the campus. Energy audit survey was completed by B. Sc Physics students under the guidance of their faculty members. All data collected from each classroom, laboratory, every room. The work is completed by considering how many tubes ,fan ,A.Cs, electronic instruments ,etc in each room. Consumption of electricity usage in each department component wise analysis

We really appreciate the effort put by Sir. C.R. Reddy College for women, management for creating awareness of Energy Audit, Use renewable energy such as solar energy and their significance use for efficient energy saving. We really appreciate Honorable management of the college for encouraging us by providing this wonderful opportunity to do the energy audit. Through this, we have been cleared the vision of Institution towards the Green campus and save our green nature .This replicates to develop eco friendly atmosphere in our college premises.



## Acknowledgement

Energy Audit is a system is key instrument in knowing the present level of efficiency of the various components and establishing the areas of shortfall for improvement.

We take this opportunity to convey our sincere thanks and gratitude for the kind cooperation extended by the management and staff.

We express our sincere thanks to

1. Smt.P.Sailaja, Principal
2. Smt S.Anuradha ,viceprincipal
3. Smt K. Sirisha Dept of physics

We are sure, this report will be quite useful for energy management to intensify and implement energy conservation measures in the organization and achieve desired savings.

## Summary

Energy audit is a sequence of tasks performed in a planned manner .It requires discussion,survey,collection of data,analysis and reporting.

The salient observations and recommendations are given below.

1. **SIR C. R.Reddy College for women ,Eluru**
2. **SIR C.R.Reddy PG college for Women**
  - a. **From EPDCAPL**
  - b. **Electricity SOLAR Grid connected solar plant(70kw)**
  - c. **High Speed Diesel Generator (HSDG)**

Electrical energy is used for various applications ,like :Computers, Lighting, Air-Conditioning ,Fans Other Laboratory Equipment ,and Printers, Xerox machines ,CCTV,UPS,LCD Projector ,Router system, flood light ,Pumping motor etc.

3. The average cost of energy is around **1,21,168 Rs./Month.**
4. The Specific Energy Consumption (**SEC**) is the ratio of energy required per square meter.

## Abbreviations

<b>AC</b>	Air conditioner
<b>AC</b>	Alternating current
<b>DC</b>	Direct current
<b>HZ</b>	Hertz
<b>Kg</b>	<b>Kilogram</b>
<b>KVA</b>	<b>Kilo-volts-ampere</b>
<b>KW</b>	Kilowatts
<b>KWH</b>	Kilo watt hour
<b>LED</b>	<b>Light Emmitting diode</b>
<b>V</b>	Volts
<b>W</b>	Watts
<b>PF</b>	<b>Power factor</b>
<b>DG</b>	<b>Diesel Generator</b>
<b>SEC</b>	<b>Specific Energy consumption</b>
<b>EPDCAPL</b>	<b>EASTERN Power distribution company of Andhra Pradesh limited</b>



## **Chapter: 1**

### **Introduction to Energy Audit**

#### **Energy Audit:-**

Energy Audit is an inspection, survey and analysis of energy flows for energy conservation in a building or system to reduce the amount of energy input to the system without negatively affecting the output.

As per the Energy conservation Act 2001, Energy Audit is defined as the “the Verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption

#### **Energy Audits are two types**

##### **1.A preliminary energy Audit**

##### **2. Detailed energy Audit**

**Preliminary Energy Audit :-**This type of audit is simply a data – gathering exercise that offers a preliminary analysis.

#### **Detailed energy audit:-**

This type of audit is completed by a professional auditor or who monitors, analyzes, and verifies

Energy use to establish problem areas and ways to implement energy efficiency improvements.

#### **Objectives of Energy Audit:-**

The Energy Audit provides the vital information base for overall energy utilization analysis and evaluation of energy conservation measures. It aims at

- Identifying the quality and cost of various energy inputs
- Assessing present pattern of energy consumption in different cost centers of operations
- Relating energy inputs and production output
- Identifying potential areas of thermal and electrical energy economy
- Highlighting wastage's in major areas
- Fixing of energy saving potential targets for individual cost centers
- Implementation of measures for energy conservation & realization of savings

## Chapter:2

### General Details

Sr. No.	Particulars	Details
1	Name of the Institute	<b>SIR C. R. REDDY COLLEGE FOR WOMEN</b>
2	Address	<b>SIR C. R. REDDY COLLEGE FOR WOMEN ,ELURU, ELURU DISTRICT,A.P</b>
3	Year of Establishment	14 -09-1987
4	Courses Offered	B.Sc (Honours) B. Com (General) & (Voc) B.Sc.(Computer Science) B. Sc and B.Com single Major courses Data science BBA M.Sc (Organic chemistry)
5	Affiliation	Adikavi Nannaya university, Rajamahendravaram

## **Chapter:3**

### **Energy Consumption Profile**

#### **Source of Energy:**

**SIR C R REDDY COLLEGE FOR WOMEN,ELURU, ELURU DISTRICT,AP**

#### **Uses Energy in following forms:**

**a. Electricity from EPDCAPL:**

SIR C.R.Reddy college for women, Eluru, Eluru district ,A.P receives energy

**b. High Speed Diesel Generator(HSDG):**

HSD is used as a fuel for Diesel Generator which is run whenever power supply is not available

EPDCAPL is not available



**SOLAR PANELS**



**LED STREET LIGHT**



**SOLAR GRID INVERTER (70KW)**



## **LED LIGHTS**

**Following are the major consumers of electricity in the facility:**

- Computers
- Lighting
- Air-Conditioning
- Fans
- Other Lab Equipment
- Printers

## CHAPTER-4

### Historical Data Analysis

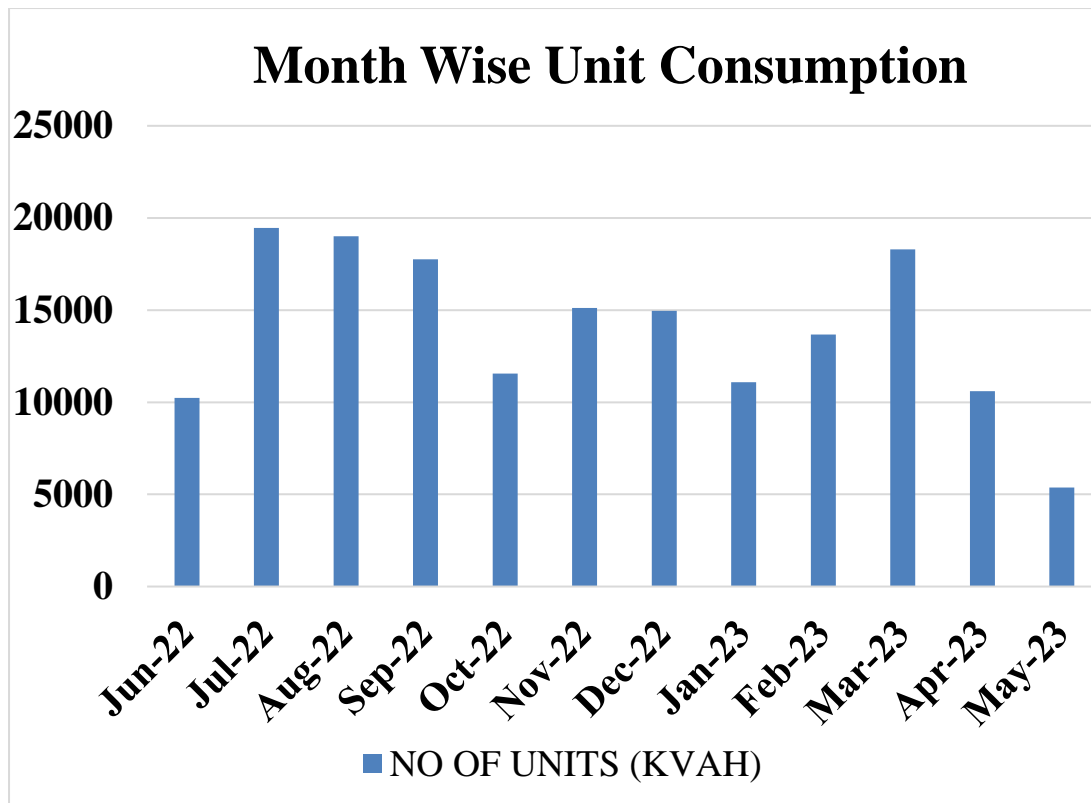
#### 4.1 :Study of variation of Monthly Units consumption & Power Factor:

In this Chapter ,We study the details of 12 month Electricity Bills.

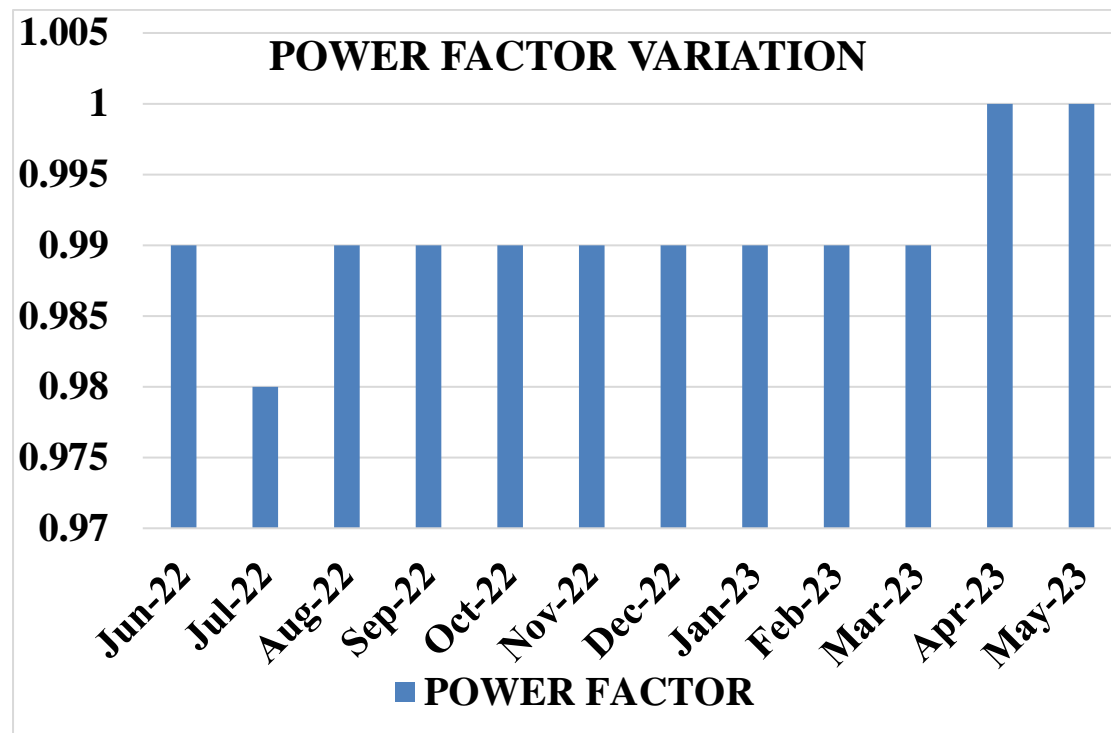
**Table No 4.1 Variation in units consumption & Power Factor (PF)**

<b>Variation in Units consumption and power factor</b>			
<b>S.NO</b>	<b>MONTH</b>	<b>NUMBER OF UNITS (KVAH)</b>	<b>POWER FACTOR</b>
1	Jun-2022	10237	0.99
2	Jul-2022	19453	0.98
3	Aug-2022	19013	0.99
4	Sep-2022	17760	0.99
5	Oct-2022	11552	0.99
6	Nov-2022	15114	0.99
7	Dec-2022	14955	0.99
8	Jan-2023	11095	0.99
9	Feb-2023	13668	0.99
10	Mar-2023	18289	0.99
11	Apr-2023	10597	1.00
12	May-2023	5375	1
	<b>TOTALUNITS =</b>	<b>1,67,108</b>	<b>AVERAGE=0.99</b>





### MONTH WISE POWER FACTOR VARIATION



## **Conclusion :Variation of PF**

The Power Factor to reduce the utility power bill. Most utility bills are influenced by KVAR usage. A good Power Factor provides a better voltage. Reducing the pressure on electrical distribution network .Reducing cable heating, cable over loading and cable losses. Reducing over loadings of control gears and switch-gears etc.....

Whenever the average power factor over a billing cycle or a month, whichever is lower, of a High Tension consumer is below 90%, Penal charges shall be levied to the consumer at the rate of 2 % (two %) of the amount of monthly energy bill (excluding of Demand Charges, FOCA,Electricity Duty and Regulatory Liability Charge etc.)

For power factor of 0.99, the effective incentive will amount to 5% (five percent) reduction in the energy bill and for unity power factor; the effective incentive will amount to 7% (seven percent) reduction in the energy bill.

## 4.2 STUDY OF MONTH WISE ELECTRICITY BILL VARIATION

TABLE NO 4.2

VARIATION IN ELECTRICITY BILL		
SNO	MONTH	ELECTRICITY BILL AMOUNT INRS/-
1	JUN-2022	1,14,935
2	JUL-2022	213713
3	AUG-2022	208747
4	SEP-2022	196190
5	OCT-2022	126753
6	NOV-2022	163307
7	DEC-2022	158622
8	JAN-2023	108776
9	FEB-2023	148097
10	MAR-2023	202507
11	APR-2023	1,01,674
12	MAY-2023	64,143
<b>TOTAL ANNUAL BILL</b>		<b>RS.18,07466</b>
<b>AVERAGE MONTHLY BILL</b>		<b>RS.1,50,622</b>

Conclusion :Monthly Electricity bill variation has been identified  
Roof Top PV Solar System(70kw) installed on terrace of Annex building

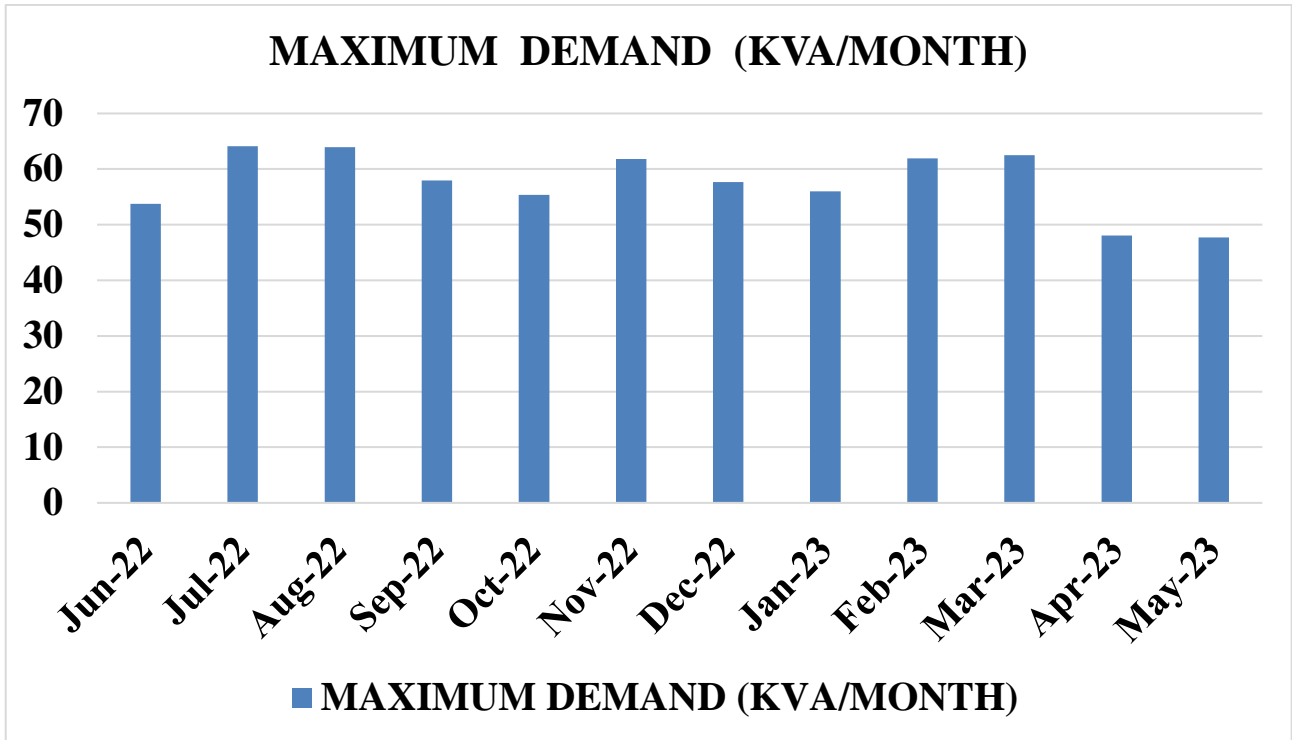
- Average Monthly Bill in the year2021-22 =Rs 1,21,168
- Average Monthly Bill in the year 2022-23 =Rs 1,50,622
- Savings in bill due to installation (per month) =Rs 60,008
- Annual savings in bill (one year) =Rs 7,20,103

### ● 4.3 : STUDY OF MONTH WISE MAXIMUM DEMAND VARIATION

TABLE NO 4.3

SNO	MONTH	MAXIMUM DEMAND (KVA/MONTH)
1	Jun-2022	53.76
2	Jul-2022	64.12
3	Aug-2022	63.94
4	Sep-2022	57.94
5	Oct-2022	55.34
6	Nov-2022	61.8
7	Dec-2022	57.64
8	Jan-2023	55.98
9	Feb-2023	61.94
10	Mar-2023	62.5
11	Apr-2023	48.08
12	May-2023	47.72

**MONTH WISE DEMAND VARIATION**



## 5. Study of Month wise Load Factor Variation

Electrical Load factor is a measure of the utilization rate, or efficiency of electrical energy usage. It is the ratio of total energy (KWh) used in the billing period divided by the possible total energy used within the period, if used at the peak demand (KW) during the entire period. Thus,

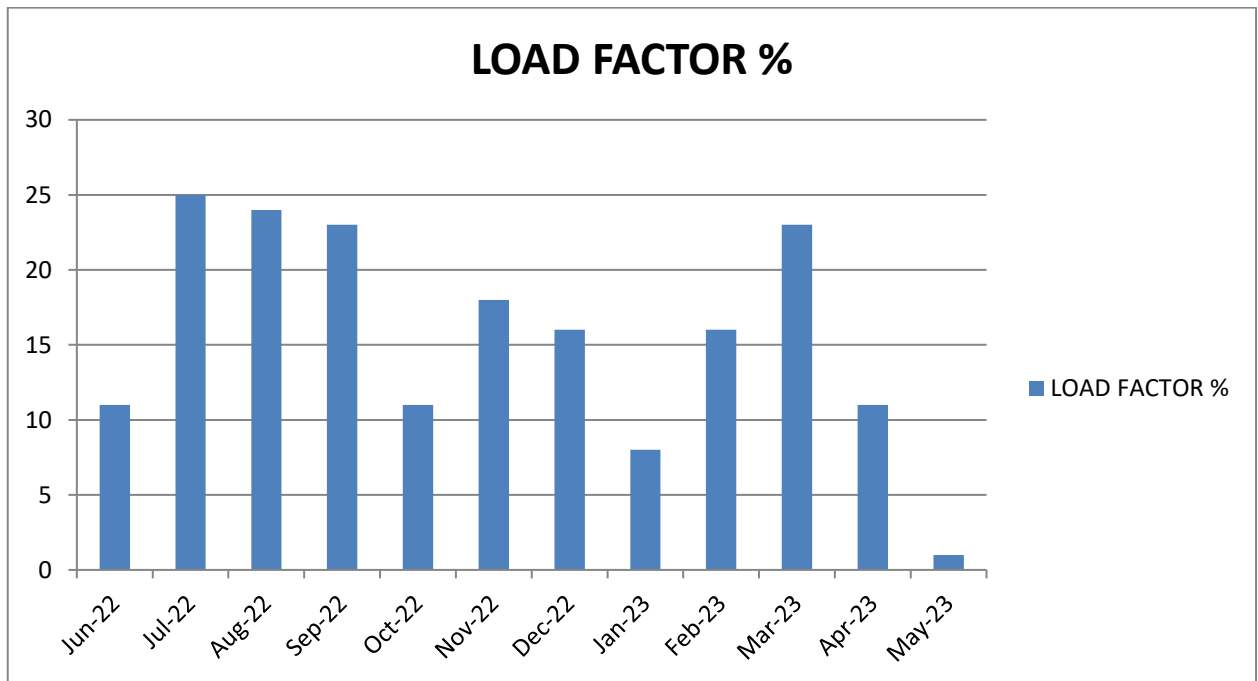
**Load Factor=KWh / (KW/hours in the period /number of days in the billing cycle**

### 4.4 :STUDY OF MONTH WISE LOAD FACTOR VARIATION

**TABLE NO 4.4**

<b>SNO</b>	<b>MONTH</b>	<b>LOADFACTOR %</b>
1	JUN-2022	11
2	JUL-2022	25
3	AUG-2022	24
4	SEP-2022	23
5	OCT-2022	11
6	NOV-2022	18
7	DEC-2022	16
8	JAN-2023	08
9	FEB-2023	16
10	MAR- 2023	23
11	APR-2023	11
12	MAY-2023	01

## LOAD FACTOR VARIATION%



### **Conclusion : Variation in monthly Load Factor**

If your load factor ratio is above 0.75 electrical usage is reasonably efficient. If the load factor is below 0.5, you have periods of very high usage (demand) and a low utilization rate. Low load factor customers would benefit from a peak demand control system or from a Battery Energy Storage System to distribute electrical usage out over longer intervals of time and smooth peaks.

Low load factors, such as below 0.4, contribute significantly to the overall monthly electric bill in the form of demand charges .These demand charges are listed on the bill as coincident demand, facilities demand ,and summer time related demand.

### **General Observations based on Electricity Bill:**

- 1.** For College Campus the Contract Demand (CD) is 100 kVA and minimum billing Demand is 50% of the Contract Demand (i.e. 50 kVA) or the 64% of previous Maximum Demand recorded whichever is higher. Since, the MD recorded is less than 50kVA.
- 2.** The average electricity cost is Rs.7.65 considering the last twelve months.(Excluding TOD charges ,MD and PF charges)
- 3.** Average monthly Power Factor is maintained near **P.F.0.98**

## Chapter:5

### Department wise power Consumption analysis

#### Experimental and Data Collection:-

All required data is Collected by Department of Physics. In building, in every room. how much fans, tubes, Computers, instrument AC, etc will these is measured .According to survey following data is collected

#### Total power requirement of Various Equipment.

	Name Of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage Per Day (Hr)	Power Consumption/ Day (Watt)
1	TUBE Lights	40	102	4080	7	28560
2	Fans	80	317	25360	7	177520
3	LED TUBE LIGHTS	15	385	5775	6	34650
4	Computers	60	240	14400	6	86400
5	Printers & Xerox machines	300	7	2100	1	2100
6	AC's	2000	14	28000	6	16800
7	Scanners	250	4	1000	2	2000
8	Water Cooler	500	7	3500	6	21,000
9	Refrigerator	500	3	1500	6	9,000
10	Physics Lab Equipment Consumption	1000	1	1000	4	4,000
11	Physics Lab Equipment Consumption	500	1	500	4	2,000
12	Chemistry Lab Equipment Consumption	500	2	1000	4	4,000
13	Electronic Lab Equipment	700	1	700	4	2,800
14	lift	3000	2	6000	2	12,000
15	Projecters	700	12	8400	2	16800
16	Sound Systems & speakers	700	4	2800	3	8400
17	Lab Equipment Consumption	700	4	2800	4	11200
18	Bar Code &Machine	50	1	50	2	100
19	Exast Fans	60	9	540	7	3780
20	Biometric machines	12	5	60	4	240



Total power requirement of all instruments is **5,39,450 kW**per day.

Total power consumption per month **16,183,500 kW** per month .

PV solar system 70 kW is installed which is expected to generate 261 unit / day.

This saves Rs 7,20,103/ Year.

## Department wise Load consumption

Correspondent Room						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	TUBE Lights	40	1	40	7	2800
2	Fans	80	3	240	7	1,680
3	LED TUBE LIGHTS	15	10	150	8	1,200
4	Computers	60	1	60	6	360
5	AC's	2000	1	2000	7	14,000

## Principal Room

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	2	160	7	1120
2	LED TUBE LIGHTS	15	11	165	8	1320
3	Computers & CCTV	60	1	60	6	360
4	AC's	2000	1	2000	7	14,000

**UG Office**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	9	720	7	5040
3	Computers	60	10	60	6	360
4	Printer Cum Scanner	300	1	300	1	300
5	LED Tube lights	15	14	210	6	1260
6	Water Cooler	500	1	500	6	3000
7	Xerox machine	650	1	650	2	1300

**Examination Cell**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	5	400	7	2800
2	Computers	60	1	60	6	360
3	Printers	300	1	300	1	300
4	Xerox Machine	650	1	650	2	1300
5	LED Tube lights	15	10	150	6	900

**UG Department of Physics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Physics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	7	560	7	3920
3	LED lights	15	4	60	6	360
3	Physics Lab Equipment Consumption	500	2	1000	4	4000

**UG Department of Electronics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Electronics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	7	420
2	Fans	80	5	400	7	2800
3	Electronics Lab Equipment Consumption	700	1	700	4	2800

<b>UG Department of Chemistry</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360

<b>UG Chemistry Lab</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	1	80	7	560
3	Exast Fans	60	3	180	7	1260
4	Electronics Lab Equipment Consumption	500	2	1000	4	4000

<b>UG Common Area</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	23	920	7	6440
2	Fans	80	8	640	7	4480
3	LED TUBE LIGHTS	15	13	195	6	1170
4	Stage lights LED lights	15	12	180	6	1080

<b>UG Department of Botany</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360
4	Refrigerator	500	1	500	6	3000

<b>UG Botany Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	12	180	7	1260
2	Fans	80	3	240	7	1680

<b>UG Department of Zoology and Fisheries</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

<b>UG Department of Zoology and Fisheries Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	8	120	7	840
2	Fans	80	3	240	7	1680

<b>UG College Ladies Gym:</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	6	360
2	TUBE lights	40	1	40	7	280
3	Fans	80	2	160	7	1120



**UG Waiting Hall:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	1	15	6	90
2	TUBE lights	40	3	120	7	840
3	Fans	80	2	160	7	1120

**Computer Lab**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	2	80	7	560
2	Fans	80	6	480	7	3360
3	LEDLIGHTS	15	10	150	6	900
4	Computers	60	40	2400	6	1440
5	Virtual System	700	2	1400	2	2800

<b>UG Library</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	12	180	7	1260
2	Fans	80	9	720	7	5040
3	Computers	60	3	180	6	1080
4	Printers	300	1	300	1	300
5	BAR code Machine	50	1	50	2	100
6	Xerox Machine	650	1	650	2	1300

<b>UG Department of Computers</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	3	240	7	1680
3	Computers	60	2	120	6	720

<b>UG Computer Lab :</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	32	480	7	3360
2	Fans	80	19	1520	7	10640
3	Computers	60	73	4380	6	26280
4	Virtual systems	700	1	700	2	1400
5	TUBE lights	40	9	360	7	2520
6	AC'S	2000	4	8000	7	56000

**UG Department of Commerce:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360

**IQAC Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	12	180	6	1080
2	Fans	80	5	400	7	2800
3	Computers	60	3	180	6	1080
4	Printer Cum Scanner	300	1	300	2	600
5	Xerox Machine	650	1	650	2	1300

**UG Telugu Department**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	2	30	7	210
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

**UG English Department**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	3	45	7	315
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**UG Department of Mathematics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**Canteen**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	3	240
2	Fans	80	12	960	3	2880
3	LED LIGHTS	15	9	135	6	810

**Security Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560

**Class Room in Degree Block ( 22- 30 )**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	18	270	6	1620
2	Fans	80	27	2,160	6	12960

**Class Rooms in Degree Block (38-58)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	5	200	7	1400
2	Fans	80	50	4000	7	28000
3	LED TUBE LIGHT	15	32	480	6	2880

**Class Rooms in PG Block (101-115)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	LED TUBE LIGHT	15	21	315	6	1890
3	Fans	80	33	2640	7	18480

<b>Class Rooms in PG Block (202-221)</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	9	135	6	810
2	Fans	80	12	960	7	6720

<b>Class rooms in PG Block (301-323)</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	30	450	7	3150
2	TUBE lights	40	19	760	7	5320
3	Fans	80	48	3840	7	26880

<b>UG-Toilets</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Exast Fans	60	1	60	7	420



**PG Seminar Halls**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	34	510	7	3570
2	Fans	80	35	2800	7	19600
3	LCD Projector	280	1	280	6	1680
4	Sound System	300	4	1200	1	1200

**PG Library**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	8	640	7	4480
3	Computers	60	1	60	6	360

### PG Director and Correspondent Rooms

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	5	400	7	2800
3	Computers	60	2	120	6	720
4	AC's	2000	2	4000	6	24000

<b>PG Office</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	2	160	7	11200
3	Computers	60	1	60	6	360
4	Printer cum scanner	300	2	600	1	600
5	Xerox Machine	650	1	650	2	1300
6	LED lights	15	8	120	6	720

<b>PG Department of Chemistry</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

<b>PG Chemistry Lab</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantit y</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	LED Lights	40	14	210	7	1470
2	Fans	80	3	240	7	1680
3	Exast fans	60	6	360	7	2520
4	Refrigerator	500	1	500	4	2000

**PG Common Area and Toilets**

<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quanti ty</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	LED TUBE LIGHTS	15	21	315	6	1890
3	Lift	3000	1	3000	7	21000

**Gents staff room**

<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quanti ty</i>	<i>Power Consumption (Watt)</i>	<i>usage Per Day</i>	<i>PowerConsumption/D ay(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	LED TUBE LIGHTS	15	2	30	6	180
3	Fan	80	2	160	7	1120

**Environmental Consciousness and Sustainability/Alternate Energy initiatives such as:**

**1) Alternative Energy Initiative**

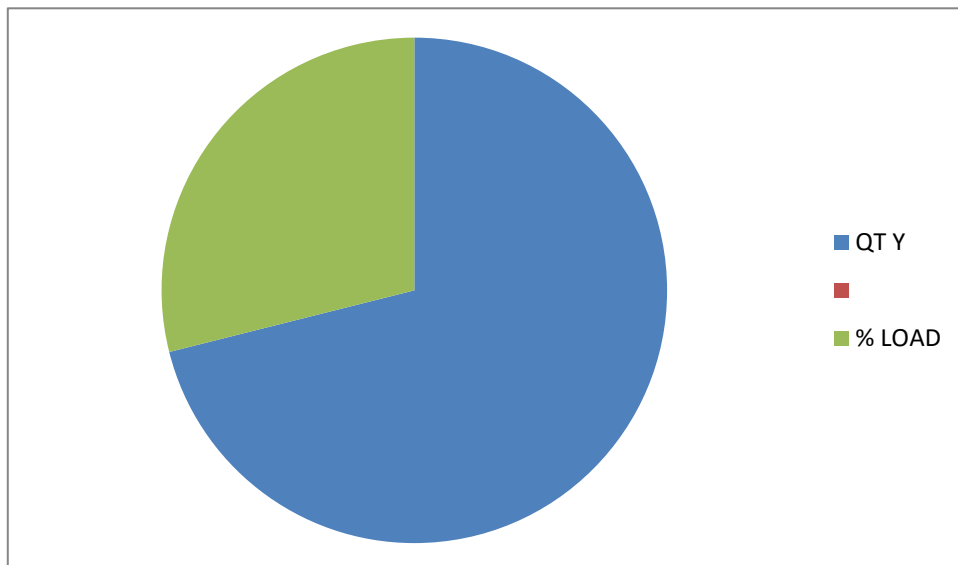
Percentage of power requirement met by renewable energy sources  
=(Power requirement met by renewable energy sources/Total power requirement)×100  
=(94112/167108)× 100  
= 56.31%

**2)Percentage of lighting power requirements met through LED bulbs**

Percentage of lighting power requirement met through LED bulbs  
=(Lighting power requirement met through LED bulbs/Total lighting power Requirement) ×100

**TYPE WISE LIGHTING DISTRIBUTION**

<b>SN O</b>	<b>TYPE</b>	<b>QT Y</b>	<b>Kw LOAD</b>	<b>% LOAD</b>
1	Tube Lights(40W)	102	4.08	41.5
2	LED Lights(15W)	385	5.77	58.5



**Remarks:**

- It has been observed that in old and new building majority of electrical power Consumption is through light load such as fan, FTL and power load such as refrigerator, UPS ,etc .unnecessary use of electrical equipment must be avoided.
- As per individual department level load consumption ,we understand the scope for Improvement of energy saving. Hence our electricity bill will be reduced by proper load Management techniques along with optimum utilization of resources.

## Chapter:6

### **Lighting System**

#### **Observations and suggestions:**

- It is found that FTL ,Bulbs, CFLs is installed in the facility.
- It is recommended that some tube lights in this area be switched off when
- Sufficient day light Is available.
- Presently the reflectors installed for tube light
- Every light or electric gadget left on when not needed is wasting energy and money
- And is causing pollution that is totally unnecessary.
- Stand-by power can use upto8%ofa household's total electricity.

#### **Don't forget to power down these things when not in use:**

- Lights
- Heaters and fans (or air-conditioning)
- Printers and scanners
- Battery and phone chargers
- Computers
- Gaming consoles
- TVs,DVD players
- Stereos
- Kitchen gadgets such as blenders ,kettles ,toasters etc.

Merits /Existing Features for Energy Savings.

1. Staff vigilance.
2. Computers are connected in LAN.
3. Printers are shared in LAN.
4. Screen savers facility implemented for every computer.
5. AC's used are of three STARS.
6. Refrigerator's are three STARS.
7. Incandescent bulbs are nowhere used.
8. They are replaced by CFL tubes with electronic choke.
9. Maximum use of natural light.
10. Cross Ventilation is provided in laboratory & classrooms, which reduced number off ans.
11. Most of the practical's are scheduled in noon time where billing Rate in normal.
12. Walls are painted with off white colour to have sufficient brightness.
13. Solar powered street lamp is used.
14. LED flashlight is used in Seminar hall.
15. PV solar system (70 KV) is installed which is expected to generate 261Unit/day.

This saves Rs 7,20,103/Year.



## Chapter:8

### Energy Conservation Proposals

#### 9.1 Replacing Fluorescent Tube Lights(FTL)with LED Tube Lights

The 500 FTLs can be replaced with the LED tube lights 15 W .These changes can be made at the places where the life is higher .Usually minimum of 3 years warranty is given and approximate burning hours is 40,000.(15 years considering 8 hour)

#### Following calculations are done for 8 hours working:

Power consumption by 36 WFTL with conventional cho	=40W/Tube Light
Equivalent LED tube light	=15W/Tube Light
Savings in power	=24W/Tube Light
Operating hours	=8h/dayx300= 2400h/year
Y Tube Light Yearly savings	=2400x24 W=57.6kWh/year/Tube Light
Average Cost of electricity	= Rs.7.66/kWh
Saving	=57.6kWh x7.66= Rs.441.216/year/Tube light
Approximate investment on single LED Tube lights	=Rs.200
Number of Tube Lights to be replaced	= 250

#### Summary:

Total Yearly Saving= 250 x441.216=Rs.1,10,304/year

Total Investment = 250 x Rs.200=Rs.50,000

## 9.2 General Recommendations

γ All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity. Display the stickers of save electricity, save nature everywhere in the campus. So that all stakeholders are encouraged to save the electricity.

γ Most of the time, all the tube lights in a classroom are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF

γ All projects to be kept OFF or in idle mode if there will be no presentation slides.

γ All computers to have power saving settings to turn off monitors and hard discs ,say 10 minutes/30minutes.

γ The comfort Default airconditioning temperature to be set between 24°C to 26°C.

γ Lights in toilet area may be kept OFF during daytime

γ Use AUTOMATIC POWERFACTOR CORRECTION(APFC) Panel FOR PF improvement.

γ Need to focus on existing solar plant which is generating power below the rated power

γ Need to use power saver circuits for AC.

γ Need to replace FTL by smart LED Tube

γ Need to replace ordinary bulb by LED bulb.

γ Need to replace ordinary CRT monitor by LED.

γ Need to replace ordinary refrigerator by BEE power save refrigerator if possible.

γ Out of total electricity bill paid, 53 percentage are actual energy utilized charges and remaining expense belongs to additional taxes on energy consumption

γ Recently govt. has declared the exemption on electricity duty charges for school and colleges trying to get the benefit of the same as soon as possible

### 9.3 Executive Recommendations:

1. There has to be Institute level student community that keeps track of the energy consumption Parameters of the various departments, classrooms, halls ,areas, meters ,etc
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.
3. Need to Create energy efficiency/ renewable energy awareness among the college campus. College should take initiative to arrange seminars ,lectures, paper presentation competition among students and staff or general awareness.

#### References:

- 1) “Energy Management ,Audit and Conservation” by Barun Kumar De
- 2) “Guide to Energy Management”by Barney L
- 3) “EnergyAudits:AWork book for Energy Management in Buildings”by TarikAl–Shemmeri
- 4) “Fundamentals of Energy Conservation and Audit ”by A Garkar Santosh V yankat rao and Mateti Naresh Kumar
- 5) “Industrial Energy Conservation(UNESCO Energy Engineering)”by Charles MG ottsc

## Energy Audit Report of 2022-2023

Sir C R Reddy College for Women ,Eluru, Andhra Pradesh

### DETAILS OF CONSUMER

---

1. Name of the Consumer : Sir C R Reddy college for Women, Eluru
2. Name of the Contact Persons : Principal, Sir C R Reddy College
3. Address of the Consumer : RS No: ELR11, Vatluru Road,Eluru.
4. Transformer Capacity : 200kVA
5. Permitted /Billable Demand : 100 kVA
6. Demand Charge : Rs.475
7. Annual Energy Consumption : 1,67,108 KWh/Annum
8. Annual Amount Paid : Rs.18,07,466 / Annum
9. Type of Connection/ Sr. No. : HT II A ( i )
10. Name of Supplier' s office : APEPDCL
11. Period of Audit :June 2022-May 2023

**ENERGY AUDIT TEAM REPORT  
WORK COMPLETION REPORT**

**Name of work project** : Energy Audit of Sir C R Reddy College for Women, Eluru

**Work Period** : 01-06-2022 to 31-05-2023

This is to certify that the Energy Audit team appointed by the Principal, SIR CR REDDY COLLEGE FOR WOMEN, Eluru, has Successfully completed Energy audit.  
The Energy Audit is submitted its report on 24-08-2023 for this year 2023.

**Audit report by**

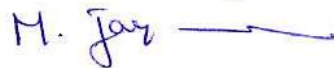
**Internal Committee**

1. Smt. K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy College for women,  
Eluru
2. Smt. K. Jhansi Lakshmi  
Dept.of Computer science  
IQAC & NAAC  
Coordinator
3. Smt. P.Siva kumari  
Lecturer in Dept. of Physics  
Convenor, Energy Audit
4. Smt. M.Jaya lakshmi Devi  
Lecturer in Dept. of Physics  
Sir C R Reddy College for women  
Member





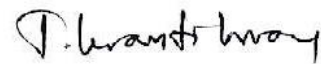


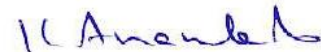


**External Committee**

1. Sri.Y.Rambabu  
Asst. Engineer  
APEPDCL, Govt. of AP  
Eluru
2. Sri.T.Kranthi Kiran  
Assistant Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering College, Eluru
3. Sri. K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College, Eluru

  
Asst. Executive Engineer  
- Operation : : APEPDCL  
PEDAPADU





# **ENERGY AUDIT**

**Report (2021-2022)**



**Prepared by**

**DEPARTMENT OF PHYSICS**

**SIR C R REDDY COLLEGE FOR WOMEN, ELURU**

(Affiliated to ADIKAVI NANNAYA UNIVERSITY ,Rajamahendravaram )

Eluru District,Andhra Pradesh 534007

# Certificate

## ENERGY AUDIT

Academic year 2021 - 22



This is to certify that

SIR C R REDDY COLLEGE FOR WOMEN, ELURU  
VATLURU, ELURU DISTRICT AP

has achieved the energy uses standards for the learning spaces  
with least impact on environment during the

Energy Audit. 2021 - 22

This certificate is issued on the basis of Energy Audit 2021 - 22



P. Siva Kumari  
Convenor

S. Anjaleedhas  
IQAC Coordinator

  
Asst. Executive Engineer  
Operations & Maintenance  
APREDCL  
PEDAPADU

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## **MEBERS OF ENERGY AUDIT COMMITTEE**

### **Internal Committee**

1. Smt .K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy college for women,  
Eluru
2. Smt. K. Jhansi Rani  
Dept.of Computer science  
IQAC & NAAC  
Coordinator
3. Smt.P.Siva kumari  
Lecturer in Dept of Physics  
Convenor, Energy Audit
4. Smt.M.Jaya lakshmi Devi  
Lecturer in Dept of Physics  
Sir C R Reddy college for women  
Member

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1. Y. Rambabu  
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APEPDCL ,Govt, of AP  
Eluru
2. Sri.T.Kranthi Kiran  
Asst. Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering college, Eluru
3. Sri .K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College,Eluru

## Preface

Data collection for energy audit of **Sir C. R Reddy College for women** was conducting an Energy Audit for the period of June 2021 to May 2022 . The final report was submitted on 2022.

This audit was over sight in quire about convenience to progress the energy competence of the campus. Energy audit survey was completed by B. Sc Physics students under the guidance of their faculty members. All data collected from each classroom, laboratory, every room. The work is completed by considering how many tubes, fans, A.Cs, electronic instruments etc in each room. Consumption of electricity usage in each department component wise analysis

We really appreciate the effort put by Sir. C.R. Reddy College for women, management for creating awareness of Energy Audit, Use renewable energy such as solar energy and their significance use for efficient energy saving. We really appreciate Honourable management of the college for encouraging us by providing this wonderful opportunity to do the energy audit. Through this, we have been cleared the vision of Institution towards the Green campus and save our green nature .This replicates to develop Eco friendly atmosphere in our college premises.



## Acknowledgement

Energy Audit is a system is key instrument in knowing the present level of efficiency of the various components and establishing the areas of shortfall for improvement.

We take this opportunity to convey our sincere thanks and gratitude for the kind cooperation extended by the management and staff.

We express our sincere thanks to

- 1.Smt.P.Sailaja, Principal
- 2Smt S.Anuradha, Vice Principal
- 3.Smt K. Sirisha Dept. of physics

We are sure, this report will be quite useful for energy management to intensify and implement energy conservation measures in the organization and achieve desired savings.

## Summary

Energy audit is a sequence of tasks performed in a planned manner .It requires discussion, survey, collection of data analysis and reporting.

The salient observations and recommendations are given below.

1. **SIR C. R. Reddy College for Women , Eluru**
2. **SIR C. R. Reddy PG college for Women**
  - a. **From EPDCAPL**
  - b. **Electricity SOLAR Grid connected solar plant(70kw)**
  - c. **High Speed Diesel Generator (HSDG)**

Electrical energy is used for various applications ,like :Computers, Lighting, Air-Conditioning ,Fans Other Laboratory Equipment ,and Printers, Xerox machines ,CCTV,UPS,LCD Projector ,Router system, flood light ,Pumping motor etc.

3. The average cost of energy is around **Rs.1,21,168 /Month.**
4. The Specific Energy Consumption (**SEC**) is the ratio of energy required per square meter.

## Abbreviations

AC	Air conditioner
AC	Alternating current
DC	Direct current
HZ	Hertz
Kg	<b>Kilogram</b>
KVA	<b>Kilo-volts-ampere</b>
KW	Kilowatts
KWH	Kilo watt hour
LED	<b>Light Emitting diode</b>
V	Volts
W	Watts
P.F	<b>Power factor</b>
D.G	<b>Diesel Generator</b>
SEC	<b>Specific Energy consumption</b>
EPDCAPL	<b>EASTERN Power distribution company of Andhra Pradesh limited</b>

## Chapter: 1

### 4.Introduction to Energy Audit

#### **Energy Audit:-**

Energy Audit is an inspection, survey and analysis of energy flows for energy conservation in a building or system to reduce the amount of energy input to the system without negatively affecting the output.

As per the Energy conservation Act 2001, Energy Audit is defined as the “the Verification ,monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption

#### **Energy Audits are two types**

- 1. A preliminary energy Audit**
- 2. Detailed energy Audit**

**Preliminary Energy Audit:-**This type of audit is simply a data – gathering exercise that offers a preliminary analysis.

#### **Detailed energy audit:-**

This type of audit is completed by a professional audit or who monitors, analyzes ,and verifies

Energy use to establish problem areas and ways to implement energy efficiency improvements.

#### **Objectives of Energy Audit:-**

The Energy Audit provides the vital information base for overall energy utilization analysis and evaluation of energy conservation measures . It aims at

- Identifying the quality and cost of various energy inputs
- Assessing present pattern of energy consumption in different cost centers of operations
- Relating energy inputs and production output
- Identifying potential areas of thermal and electrical energy economy
- Highlighting wastage's in major areas
- Fixing of energy saving potential targets for individual cost centers
- Implementation of measures for energy conservation & realization of savings

## Chapter:2

### General Details

Sr. No.	Particulars	Details
1	Name of the Institute	<b>SIR C. R. REDDY COLLEGE FOR WOMEN</b>
2	Address	<b>SIR C. R. REDDY COLLEGE FOR WOMEN, ELURU, ELURU DISTRICT, A.P</b>
3	Year of Establishment	14 -09-1987
4	Courses Offered	B.Sc (Honours) B. Com (General) & (Voc) B.Sc/B.Sc.(Computer Science) B. Sc (life sciences) M.Sc (Organic chemistry)
5	Affiliation	Adikavi Nannaya university, Rajamahendravaram

## **Chapter:3**

### **Energy Consumption Profile**

#### **Source of Energy:**

**SIR C R REDDY COLLEGE FOR WOMEN, ELURU, ELURU DISTRICT, AP**

#### **Uses Energy in following forms:**

**a. Electricity from EPDCAPL:**

SIR C.R.Reddy college for women, Eluru, Eluru district ,A.P receives energy

**b. High Speed Diesel Generator (HSDG):**

HSD is used as a fuel for Diesel Generator which is run whenever power supply is not available

EPDCAPL is not available





**SOLAR PANELS**



LED STREET LIGHTS



**SOLAR GRID INVERTER (70 kW)**



**LED LIGHTS**

**Following are the major consumers of electricity in the facility:**

- Computers
- Lighting
- Air-Conditioning
- Fans
- Other Lab Equipment
- Printers

## CHAPTER-4

### Historical Data Analysis

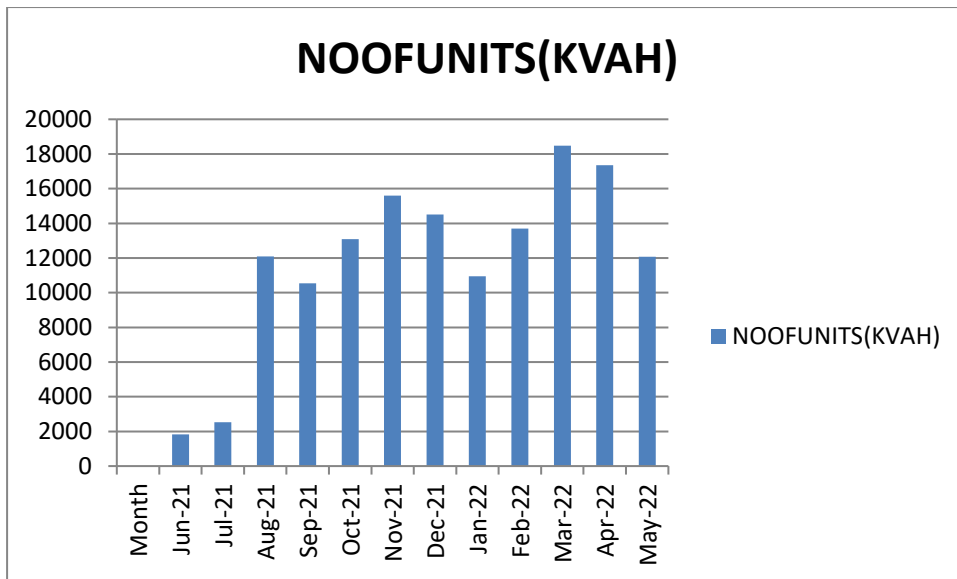
#### 4.1:Study of variation of Monthly Units consumption & Power Factor:

In this Chapter ,We study the details of 12 month Electricity Bills.

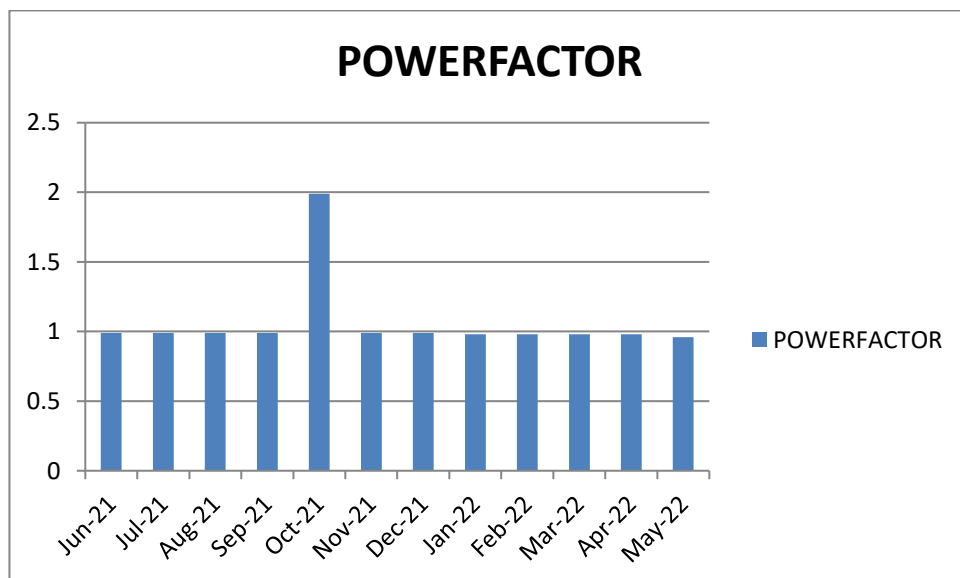
**Table No 4.1 Variation in units consumption & Power Factor (PF)**

<b>Variation in Units consumption and power factor</b>			
<b>S.NO</b>	<b>Month</b>	<b>NO OF UNITS (KVAH)</b>	<b>POWERFACTOR</b>
1	Jun-2021	1821	0.99
2	Jul-2021	2524	0.99
3	Aug-2021	12086	0.99
4	Sep-2021	10536	0.99
5	Oct-2021	13096	1.99
6	Nov-2021	15608	0.99
7	Dec-2021	14509	0.99
8	Jan-2022	10944	0.98
9	Feb-2022	13706	0.98
10	Mar-2022	18488	0.98
11	Apr-2022	17350	0.98
12	May-2022	12080	0.96
	<b>TOTAL UNITS =</b>	<b>142748</b>	<b>AVERAGE=0.99</b>

## MONTH WISE UNIT CONSUMPTION



## MONTH WISE POWER FACTOR VARIATION



### **Conclusion :Variation of PF**

The Power Factor to reduce the utility power bill. Most utility bills are influenced by KVAR usage. A good Power Factor provides a better voltage. Reducing the pressure on electrical distribution network. Reducing cable heating, cable over loading and cable losses. Reducing over loadings of control gears and switch-gears etc.....

Whenever the average power factor over a billing cycle or a month, whichever is lower, of a High Tension consumer is below 90%, Penal charges shall be levied to the consumer at the rate of 2 % (two %) of the amount of monthly energy bill (excluding of Demand Charges, FOCA,

Electricity Duty and Regulatory Liability Charge etc.)

For power factor of 0.99, the effective incentive will amount to 5% (five percent) reduction in the energy bill and for unity power factor; the effective incentive will amount to 7% (seven percent) reduction in the energy bill.

#### 4.1 STUDY OF MONTH WISE ELECTRICITY BILL VARIATION

**TABLE NO 4.2**

<b>VARIATION IN ELECTRICITY BILL</b>		
<b>SNO</b>	<b>MONTH</b>	<b>ELECTRICITYBILL AMOUNT INRS/-</b>
1	Jun-2021	19,369
2	Jul-2021	33,033
3	Aug-2021	1,22,698
4	Sep-2021	1,11,446
5	Oct-2021	1,37,497
6	Nov-2021	1,54,173
7	Dec-2021	1,49,241
8	Jan-2022	1,16,060
9	Feb-2022	1,32,826
10	Mar-2022	1,76,829
11	Apr-2022	1,85,663
12	May-2022	1,15,191
<b>TOTAL ANNUAL BILL</b>		<b>Rs. 1,454,026</b>
<b>AVERAGE MONTHLY BILL</b>		<b>Rs.1,21,168</b>

Conclusion: Monthly Electricity bill variation has been identified  
Roof top PV Solar System (70kw) installed on terrace of Annex building

- Average Monthly Bill in the year 2020-21 =Rs 67,945
- Average Monthly Bill in the year 2021-22 =Rs 1,21,168
- Savings in bill due to installation (per month) =Rs 51,798
- Annual savings in bill (oneyear) =Rs 6,21,579,

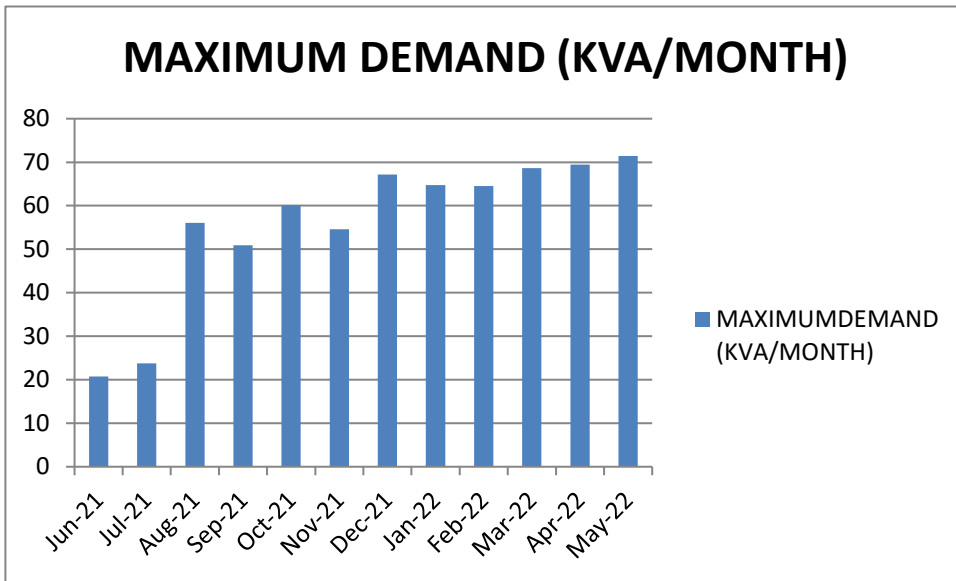


## 4.2 STUDY OF MONTH WISE MAXIMUM DEM AND VARIATION

**TABLE NO4.3**

<b>SNO</b>	<b>MONTH</b>	<b>MAXIMUM DEMAND (KVA/MONTH)</b>
1	Jun-2021	20.76
2	Jul-2021	23.76
3	Aug-2021	56.08
4	Sep-2021	50.92
5	Oct-2021	60.12
6	Nov-2021	54.58
7	Dec-2021	67.18
8	Jan-2022	64.72
9	Feb-2022	64.54
10	Mar-2022	68.64
11	Apr-2022	69.44
12	May-2022	71.46

**MONTH WISE DEMAND VARIATION**



#### 4.4 Study of Month wise Load Factor Variation

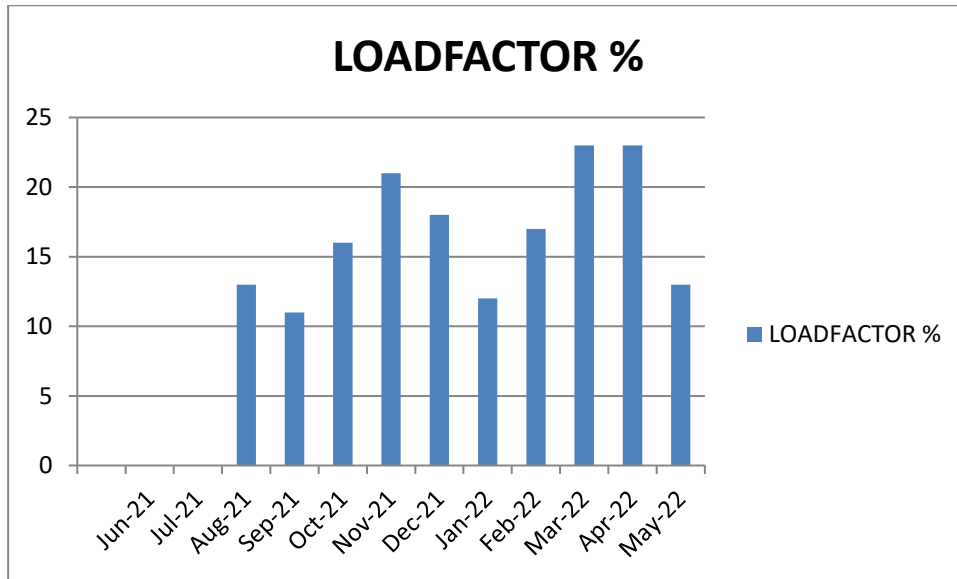
Electrical Load factor is a measure of the utilization rate, or efficiency of electrical energy usage. It is the ratio of total energy (KWh) used in the billing period divided by the possible total energy used within the period, if used at the peak demand (KW) during the entire period. Thus,

**Load Factor=KWh / (KW/hours in the period /number of days in the billing cycle**

**4.4 :STUDY OF MONTH WISE LOAD FACTOR VARIATION  
TABLE NO 4.4**

<b>SNO</b>	<b>MONTH</b>	<b>LOADFACTOR %</b>
1	Jun-2021	0
2	Jul-2021	0
3	Aug-2021	13
4	Sep-2021	11
5	Oct-2021	16
6	Nov-2021	21
7	Dec-2021	18
8	Jan-2022	12
9	Feb-2022	17
10	Mar-2022	23
11	Apr-2022	23
12	May-2022	13

## LOAD FACTOR VARIATION%



### **Conclusion : Variation in monthly Load Factor**

If your load factor ratio is above 0.75 electrical usage is reasonably efficient. If the load factor is below 0.5, you have periods of very high usage (demand) and a low utilization rate. Low load factor customers would benefit from a peak demand control system or from a Battery Energy Storage System to distribute electrical usage out over longer intervals of time and smooth peaks.

Low load factors, such as below 0.4, contribute significantly to the overall monthly electric bill in the form of demand charges .These demand charges are listed on the bill as coincident demand, facilities demand ,and summer time related demand.

### **General Observations based on Electricity Bill:**

- 1.** For College Campus the Contract Demand (CD) is 100 kVA and minimum billing Demand is 50% of the Contract Demand (i.e. 50 kVA) or the 72% of previous Maximum Demand recorded whichever is higher. Since, the MD recorded is less than 50kVA.
- 2.** The average electricity cost is Rs.7.65 considering the last twelve months.(Excluding TOD charges ,MD and PF charges)
- 3.** Average monthly Power Factor is maintained near **P.F.0.99**

## Chapter:5

### Department wise power Consumption analysis

#### Experimental and Data Collection:-

All required data is Collected by Department of Physics. In building, in every room. how much fans, tubes, Computers, instrument ACs, etc will these is measured .According to survey following data is collected

#### Total power requirement of Various Equipment.

	Name Of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage Per Day (Hr)	Power Consumption/ Day (Watt)
1	TUBE Lights	40	195	7,800	7	54,600
2	Fans	80	314	25,120	7	1,75,840
3	LED TUBE LIGHTS	15	292	4,380	6	26,280
4	Computers	60	128	7,680	6	46,080
5	Printers & Xerox machines	300	4	1,200	1	1,200
6	AC's	2,000	5	10,000	6	60,000
7	Scanners	250	2	500	2	1,000
8	Water Cooler	500	7	3,500	6	21,000
9	Refrigerator	500	3	1500	6	9,000
10	Physics Lab Equipment Consumption	1,000	1	1,000	4	4,000
11	Physics Lab Equipment Consumption	500	1	500	4	2,000
12	Chemistry Lab Equipment Consumption	500	2	1,000	4	4,000
13	Electronic Lab Equipment	700	1	700	4	2,800
14	Projecters	700	3	2100	2	4,200
15	Sound Systems & speakers	700	4	2,800	3	8,400
16	Lab Equipment Consumption	700	4	2,800	4	11,200
17	Bar Code & Machine	50	1	50	2	100
18	Exast Fans	60	9	540	7	3,780
19	Biometric machines	12	4	48	2	96

Total power requirement of all instruments is **4,35,576 kW** per day.

Total power consumption per month **1,30,67,280 kW** per month .

PV solar system 70 kW is installed which is expected to generate 261 unit / day.

This saves Rs 6,21,579/ Year.

## Department wise Load consumption

Correspondent Room						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	3	240	7	1,680
3	LED TUBE LIGHTS	15	10	150	8	1,200
4	Computers	60	1	60	6	360
5	AC's	2000	1	2000	7	14,000

## Principal Room

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	2	160	7	1120
2	LED TUBE LIGHTS	15	11	165	8	1320
3	Computers & CCTV	60	1	60	6	360
4	AC's	2000	1	2000	7	14,000



**UG Office**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	5	200	7	1400
2	Fans	80	9	720	7	5040
3	Computers	60	10	600	6	3600
4	Printer Cum Scanner	300	1	300	1	300
5	LED Tube lights	15	12	180	6	1080
6	Water Cooler	500	1	500	6	3000
7	Xerox machine	650	1	650	2	1300

**Examination Cell**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	5	400	7	2800
2	Computers	60	1	60	6	360
3	Printers cum Scanner	300	1	300	1	300
4	Xerox Machine	650	1	650	2	1300
5	LED Tube lights	15	10	150	6	900

**UG Department of Physics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Physics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	7	560	7	3920
3	LED lights	15	4	60	6	360
3	Physics Lab Equipment Consumption	500	2	1000	4	4000

**UG Department of Electronics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Electronics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	2	30	7	210
2	Fans	80	5	400	7	2800
3	Electronics Lab Equipment Consumption	700	1	700	4	2800
4	Tube Lights	40	2	80	7	560

<b>UG Department of Chemistry</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360

<b>UG Chemistry Lab</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	5	75	7	525
2	Fans	80	1	80	7	560
3	Exast Fans	60	3	180	7	1260
4	Electronics Lab Equipment Consumption	500	1	500	4	2000
5	Tube Lights	40	2	80	7	560

<b>UG Common Area</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	23	920	7	6440
2	Fans	80	8	640	7	4480
3	LED TUBE LIGHTS	15	13	195	6	1170
4	Stage lights LED lights	15	12	180	6	1080
5	Water Cooler	500	3	1500	6	9000

<b>UG Department of Botany</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360
4	Refrigerator	500	1	500	6	3000

<b>UG Botany Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	9	135	7	945
2	Fans	80	3	240	7	1680
3	Tube Lights	40	6	240	7	1680

<b>UG Department of Zoology and Fisheries</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

<b>UG Department of Zoology and Fisheries Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	7	420
2	Fans	80	3	240	7	1680
3	Tube Lights	40	4	160	7	1120

<b>UG College Ladies Gym:</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Tube Lights	15	4	60	6	360
2	TUBE lights	40	1	40	7	280
3	Fans	80	2	160	7	1120

**UG Waiting Hall:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	1	15	6	90
2	TUBE Lights	40	3	120	7	840
3	Fans	80	2	160	7	1120

**Computer Lab**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	6	240	7	1680
2	Fans	80	6	480	7	3360
3	LED TUBE LIGHTS	15	6	90	6	540
4	Computers	60	40	2400	6	14400
5	Virtual System	700	1	700	2	1400
6	Ac's	2000	1	2000	1	2000

<b>UG Library</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	16	90	7	630
2	Fans	80	9	720	7	5040
3	Computers	60	3	180	6	1080
4	BAR code Machine	50	1	50	2	100
5	Tube Lights	40	6	240	7	1680

<b>UG Department of Computers</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	3	240	7	1680
3	Computers	60	2	120	6	720

<b>UG Computer Lab :</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	20	300	7	2100
2	Fans	80	19	1520	7	10640
3	Computers	60	54	3240	6	19440
4	Virtual systems	700	1	700	2	1400
5	TUBE lights	40	21	840	7	5880
6	AC'S	2000	1	2000	7	56000



**UG Department of Commerce:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	3	45	7	315
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360
4	Tube Lights	40	3	120	7	840

**IQAC Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	12	180	6	1080
2	Fans	80	5	400	7	2800
3	Computers	60	3	180	6	1080
4	Xerox Machine	650	1	650	2	1300

**UG Telugu Department**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	2	80	7	560
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

**UG English Department**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	3	120	7	840
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**UG Department of Mathematics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**Canteen**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	3	480
2	Fans	80	12	960	3	2880
3	LED LIGHTS	15	7	105	6	630

**Security Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560

**Class Room in Degree Block ( 22- 30 )**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	14	210	7	1470
2	Fans	80	27	2,160	7	15120
3	Tube Lights	40	8	320	7	2240

**Class Rooms in Degree Block (38-58)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	14	560	7	3920
2	Fans	80	50	3360	7	23520
3	LED TUBE LIGHT	15	15	225	6	1350

**Class Rooms in PG Block (101-115)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	LED TUBE LIGHT	15	21	315	6	1890
3	Fans	80	33	2640	7	18480

**Class Rooms in PG Block (202-221)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	8	120	6	720
2	Fans	80	12	960	7	6720
3	Tube Lights	40	4	160	7	1120

**Class rooms in PG Block (301-323)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	22	330	7	2310
2	TUBE lights	40	19	760	7	5320
3	Fans	80	30	2400	7	16800

**UG-Toilets**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Exast Fans	60	1	60	7	420

**PG Seminar Halls**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	29	435	7	3045
2	Fans	80	20	1600	7	11200
3	LCD Projector	280	3	840	6	5040
4	Sound System	300	4	1200	1	1200
5	Tube Lights	40	5	200	7	1400

**PG Library**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	8	640	7	4480
3	Computers	60	1	60	6	360

### PG Director and Correspondent Rooms

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	5	400	7	2800
3	Computers	60	2	120	6	720
4	AC's	2000	2	2000	6	12000
5	Refrigerator	500	1	500	6	3000

<b>PG Office</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360
4	Xerox Machine	650	1	650	2	1300
5	LED lights	15	8	120	6	720



<b>PG Department of Chemistry</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

<b>PG Chemistry Lab</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantit y</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	LED Lights	15	10	150	7	1050
2	Fans	80	3	240	7	1680
3	Exast fans	60	5	300	7	2100
4	Refrigerator	500	1	500	6	3000
5	Tube Lights	40	4	160	7	1120

<b>PG Common Area and Toilets</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption(Watt)</i>	<i>Usage Per Day</i>	<i>PowerConsumption/Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	LED TUBE LIGHTS	15	21	315	6	1890
3	Lift	3000	1	3000	7	21000
4	Water Cooler	500	4	2000	6	12000

<b>Gents staff room</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption(Watt)</i>	<i>usage Per Day</i>	<i>PowerConsumption/Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	LED TUBE LIGHTS	15	2	30	6	180
3	Fan	3000	2	6000	7	42000

**Environmental Consciousness and Sustainability/Alternate Energy initiatives such as:**

**1) Alternative Energy Initiative**

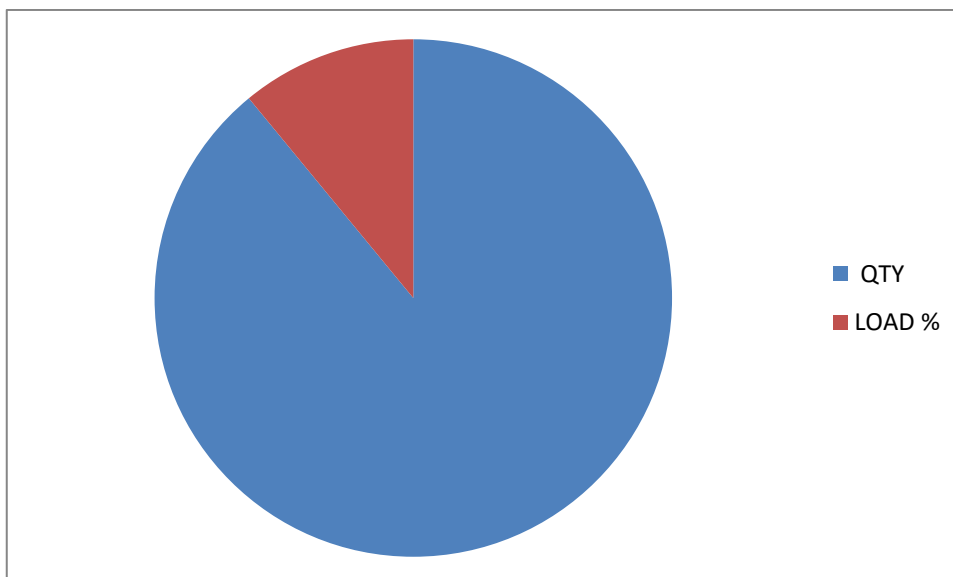
Percentage of power requirement met by renewable energy sources  
=(Power requirement met by renewable energy sources/Total power requirement)×100  
=(81252/142748)× 100  
= 56.91%

**2)Percentage of lighting power requirements met through LED bulbs**

Percentage of lighting power requirement met through LED bulbs  
=(Lighting power requirement met through LED bulbs/Total lighting power Requirement) ×100

**TYPE WISE LIGHTING DISTRIBUTION**

<b>SN O</b>	<b>TYPE</b>	<b>QTY</b>	<b>Kw LOAD</b>	<b>% LOAD</b>
1	LED Lights(15W)	292	4.38	35.96
2	Tube Lights(40W)	195	7.8	64.04



**Remarks:**

- It has been observed that in old and new building majority of electrical power Consumption is through light load such as fan, FTL and power load such as refrigerator, UPS ,etc .unnecessary use of electrical equipment must be avoided.
- As per individual dept .level load consumption ,we understand the scope for Improvement of energy saving. Hence our electricity bill will be reduced by proper load Management techniques along with optimum utilization of resources.

## Chapter:6

### **Lighting System**

#### **Observations and suggestions:**

- It is found that FTL ,Bulbs, CFLs is installed in the facility.
- It is recommended that some tube lights in this area be switched off when
- Sufficient day light Is available.
- Presently the reflectors installed for tube light
- Every light or electric gadget left on when not needed is wasting energy and money
- And is causing pollution that is totally unnecessary.
- Stand-by power can use upto 8% of a household's total electricity.

#### **Don't forget to power down these things when not in use:**

- Lights
- Heaters and fans (or air-conditioning)
- Printers and scanners
- Battery and phone chargers
- Computers
- Gaming consoles
- TVs,DVD players
- Stereos
- Kitchen gadgets such as blenders ,kettles ,toasters etc.

Merits /Existing Features for Energy Savings.

1. Staff vigilance.
2. Computers are connected in LAN.
3. Printers are shared in LAN.
4. Screen savers facility implemented for every computer.
5. AC's used are of three STARS.
6. Refrigerator's are three STARS.
7. Incandescent bulbs are nowhere used.
8. They are replaced by CFL tubes with electronic choke.
9. Maximum use of natural light.
10. Cross Ventilation is provided in laboratory & classrooms, which reduced number off ans.
11. Most of the practical's are scheduled in noon time where billing Rate in normal.
12. Walls are painted with off white colour to have sufficient brightness.
13. Solar powered street lamp is used.
14. LED flashlight is used in Seminar hall.
15. PV solar system (70 kW) is installed which is expected to generate 261 Unit/day.

This saves Rs 6,21,579 /Year.

## Chapter:8

### Energy Conservation Proposals

#### 9.1 Replacing Fluorescent Tube Lights (FTL) with LED Tube Lights

The 500 FTLs can be replaced with the LED tube lights 15 W .These changes can be made at the places where the life is higher .Usually minimum of 3 years warranty is given and approximate burning hours is 40,000.(15 years considering 8 hour)

#### Following calculations are done for 8 hours working:

Power consumption by 36 WFTL with conventional cho	=40W/Tube Light
Equivalent LED tube light	=15W/Tube Light
Savings in power	=24W/Tube Light
Operating hours	=8h/dayx300= 2400h/year
Y Tube Light Yearly savings	=2400x24 W=57.6kWh/year/Tube Light
Average Cost of electricity	= Rs.7.66/kWh
Saving	=57.6kWh x7.66= Rs.441.216/year/Tube light
Approximate investment on single LED Tube lights	=Rs.200
Number of Tube Lights to be replaced	= 250

#### Summary:

Total Yearly Saving= 250 x441.216=Rs.1,10,304/year

Total Investment = 250 x Rs.200=Rs.50,000

## 9.2 General Recommendations

γ All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity. Display the stickers of save electricity, save nature everywhere in the campus. So that all stakeholders are encouraged to save the electricity.

γ Most of the time, all the tube lights in a classroom are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF

γ All projects to be kept OFF or in idle mode if there will be no presentation slides.

γ All computers to have power saving settings to turn off monitors and hard discs , say 10 minutes/30minutes.

γ The comfort Default air conditioning temperature to be set between 24°C to 26°C.

γ Lights in toilet area may be kept OFF during daytime.

γ Use AUTOMATIC POWERFACTOR CORRECTION (APFC) Panel FOR PF improvement.

γ Need to focus on existing solar plant which is generating power below the rated power

γ Need to use power saver circuits for AC.

γ Need to replace FTL by smart LED Tube

γ Need to replace ordinary bulb by LED bulb.

γ Need to replace ordinary CRT monitor by LED.

γ Need to replace ordinary refrigerator by BEE power save refrigerator if possible.

γ Out of total electricity bill paid,53 percentage are actual energy utilized charges and remaining expense belongs to additional taxes on energy consumption

γ Recently govt.has declared the exemption on electricity duty charges for school and colleges trying to get the benefit of the same as soon as possible



### 9.3 Executive Recommendations:

1. There has to be Institute level student community that keeps track of the energy consumption Parameters of the various departments, classrooms, halls ,areas, meters ,etc
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.
3. Need to Create energy efficiency/ renewable energy awareness among the college campus. College should take initiative to arrange seminars ,lectures, paper presentation competition among students and staff or general awareness.

#### References:

- 1) “Energy Management ,Audit and Conservation” by Barun Kumar De
- 2) “Guide to Energy Management” by Barney L
- 3) “Energy Audits : A Work book for Energy Management in Buildings” by TarikAl–Shemmeri
- 4) “Fundamentals of Energy Conservation and Audit ” by A Garkar Santosh V yankat rao and Mateti Naresh Kumar
- 5) “Industrial Energy Conservation(UNESCO Energy Engineering)” by Charles MG ottsc

## **Energy Audit Report of 2021-2022**

**Sir C R Reddy College for Women, Eluru, Andhra Pradesh**

### **DETAILS OF CONSUMER**

---

1. Name of the Consumer : Sir C R Reddy college for Women,Eluru
2. Name of the Contact Persons : Principal, Sir C R Reddy College
3. Address of the Consumer : RS No: ELR11, Vatluru Road,Eluru.
4. Transformer Capacity : 200kVA
5. Permitted /Billable Demand : 100 kVA
6. Demand Charge : Rs.475
7. Annual Energy Consumption : 1,42,748 kWh/Annum
8. Annual Amount Paid : Rs.14,54,026/ Annum
9. Type of Connection/ Sr. No. : HT II A ( i )
10. Name of Supplier' s office : APEPDCL
11. Period of Audit :June 2021-May 2022

**ENERGY AUDIT TEAM REPORT  
WORK COMPLETION REPORT**

**Name of work project** : Energy Audit of Sir C R Reddy College for Women, Eluru

**Work Period** : 01-06-2021 to 31-05-2022

This is to certify that the Energy Audit team appointed by the Principal, SIR CR REDDY COLLEGE FOR WOMEN, Eluru, has Successfully completed Energy audit.  
The Energy Audit is submitted its report on 12-08-2022 for this year 2022.

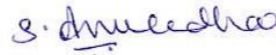
**Audit report by**

**Internal Committee**

1. Smt. K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy College for women,  
Eluru



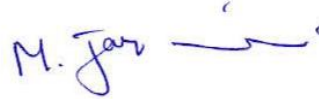
2. Smt. S.Anuradha  
Head of the Dept.of Biotechnology  
IQAC & NAAC  
Coordinator



3. Smt. P.Siva kumari  
Lecturer in Dept. of Physics  
Convenor, Energy Audit



4. Smt. M.Jaya lakshmi Devi  
Lecturer in Dept. of Physics  
Sir C R Reddy College for women  
Member



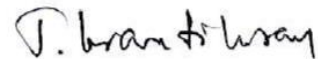
**External Committee**

1. Sri.Y.Rambabu  
Asst. Engineer  
APEPDCL, Govt. of AP  
Eluru



Asst. Executive Engineer  
Operation : : APEPDCL  
PEDAPADU

2. Sri.T.Kranthi Kiran  
Assistant Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering College, Eluru



3. Sri. K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College, Eluru



# **ENERGY AUDIT**

**Report (2020-2021)**



**Prepared by**

**DEPARTMENT OF PHYSICS**

**SIR CR REDDY COLLEGE FOR WOMEN, ELURU**

(Affiliated to ADIKAVI NANNAYA UNIVERSITY ,Rajamahendravaram )

West Godavari District, Andhra Pradesh 534007

Certificate

# ENERGY AUDIT

Academic year 2020 - 21



This is to certify that

SIR C R REDDY COLLEGE FOR WOMEN, ELURU

VATLURU WEST GODAVARI DISTRICT, AP

has achieved the energy uses standards for the learning spaces  
with least impact on environment during the

Energy Audit 2020 - 21

This certificate is issued on the basis of Energy Audit 2020 - 21

P. Siva Kumari  
Convenor

s. chandras  
IQAC Coordinator

  
Asst. Executive Engineer  
APERDCL  
PEDAPADU



## INDEX

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## **MEMBERS OF ENERGY AUDIT COMMITTEE**

### **Internal Committee**

1. Smt. K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy college for women,  
Eluru
2. Smt. K. Jhansi Rani  
Dept.of Computer science  
IQAC & NAAC  
Coordinator
3. Smt. P.Siva kumari  
Lecturer in Dept of Physics  
Convenor, Energy Audit
4. Smt.M.Jayalakshmi Devi  
Lecturer in Dept of Physics  
Sir C R Reddy college for women  
Member

### **External Committee**

1. Y. Rambabu  
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Eluru
2. Sri. T .Kranthi Kiran  
Asst. Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering college, Eluru
3. Sri . K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College, Eluru

## Preface

Data collection for energy audit of **Sir C. R Reddy College for women** was conducting an Energy Audit for the period of June 2020 to May 2021 .The final report was submitted on 2021.

This audit was over sight in quire about convenience progress the energy competence of the campus. Energy audit survey was completed by B.Sc Physics students under the guidance of their faculty members. All data collected from each classroom, laboratory, every room. The work is completed by considering how many tubes, fan, A.Cs , electronic instruments,etc in each room Consumption of electricity usage in each department component wise analysis.

We really appreciate the effort put by Sir. C.R. Reddy College for women, management for creating awareness of Energy Audit, Use renewable energy such as solar energy and their significance use for efficient energy saving. We really appreciate Honorable management of the college for encouraging us by providing this wonderful opportunity to do the energy audit. Through this, we have been cleared the vision of Institution towards the Green campus and save our green nature.This replicates to develop ecofriendly atmosphere in our college premises.





## Acknowledgement

Energy Audit is a system is key instrument in knowing the present level of efficiency of the various components and establishing the areas of short fall for improvement.

We take this opportunity to convey our sincere thanks and gratitude for the kind cooperation extended by the management and staff.

We express our sincere thanks to

1 Smt. P.Sailaja, Principal

2Smt S. Anuradha,vice principal

3Smt K. Sirisha Dept of physics

We are sure, this report will be quite useful for energy management to intensity and implement energy conservation measures in the organization and achieve desired savings.

## Summary

Energy audit is a sequence of tasks performed in a planned manner. It requires discussion, survey, collection of data, analysis and reporting.

The salient observations and recommendations are given below.

1. **SIR C. R. Reddy College for women, Eluru**
2. **SIR C.R. Reddy PG college for Women**
  - a. **From EPD CAPL**
  - b. **Electricity SOLAR Grid connected solar plant(70kw)**
  - c. **High Speed Diesel Generator (HSDG)**

Electrical energy is used for various applications, like energy is used for various applications, like: Computers, Lighting, Air-Conditioning, Fans Other Laboratory Equipment, and Printers, Xerox machines, CCTV, UPS, LCD Projector, Router system, floodlight, Pumping motor etc.

3. The average cost of energy is around **67,945 Rs./Month.**
4. The Specific Energy Consumption (SEC) is the ratio of energy required per square meter.

## Abbreviations

AC	Air conditioner
AC	Alternating current
DC	Direct current
HZ	Hertz
Kg	<b>Kilogram</b>
KVA	<b>Kilo-volts-ampere</b>
KW	Kilowatts
KWH	Kilowatt hour
LED	<b>Light Emmitting diode</b>
V	Volts
W	Watts
P.F	<b>Power factor</b>
D.G	<b>Diesel Generator</b>
SEC	<b>Specific Energy consumption</b>
EPDCAPL	<b>EASTERN Power distribution company of Andhra Pradesh limited</b>

## Chapter: 1

### 4.Introductionto Energy Audit

#### **Energy Audit:-**

Energy Audit is an inspection, survey and analysis of energy flows for energy conservation in a building or system to reduce the amount of energy input to the system without negatively affecting the output.

As per the Energy conservation Act 2001, Energy Audit is defined as the “the Verification ,monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption

#### **Energy Audits are two types**

##### **1PreliminaryenergyAudit2**

##### **Detailed energy Audit**

**Preliminary Energy Audit :-**This type of audit is simply a data – gathering exercise that offers a preliminary analysis.

#### **Detailed energy audit:-**

This type of audit is completed by a professional auditor who monitors ,analyzes ,and verifies

Energy use to establish problem areas and ways to implement energy efficiency improvements.

#### **Objectives of Energy Audit:-**

The Energy Audit provides the vital information base for overall energy utilization analysis and evaluation of energy conservation measures. It aims at

- Identifying the quality and cost of various energy inputs
- Assessing present pattern of energy consumption in different cost centers of operations
- Relating energy inputs and production output
- Identifying potential areas of thermal and electrical energy economy
- Highlighting wastage's in major areas
- Fixing of energy saving potential targets for individual cost centers
- Implementation of measures for energy conservation & realization of savings

## Chapter:2

### General Details

Sr. No.	Particulars	Details
1	Name of the Institute	<b>SIR C.R. REDDY COLLEGE FOR WOMEN</b>
2	Address	<b>SIR C. R. REDDY COLLEGE FOR WOMEN ,ELURU, WEST GODAVARI DISTRICT,A.P</b>
	Year of Establishment	14 -09-1987
4	Courses Offered	B.Sc (Honours) B. Com (General)&(Voc) B.Sc / B.Sc.(Computer Science) B.Sc (life sciences) M.Sc Organic chemistry
5	Affiliation	Adikavi Nannaya university, Rajamahendravaram

## **Chapter:3**

### **Energy Consumption Profile**

#### **Source of Energy:**

**SIR CR REDDY COLLEGE FOR WOMEN, ELURU, WEST GODAVARI DISTRICT, AP**

#### **Uses Energy in following forms:**

**a. Electricity from EPDCAPL:**

SIR C.R.Reddy college for women ,Eluru ,Eluru district ,A.P receives energy

**b. High Speed Diesel Generator (HSDG):**

HSD is used as a fuel for Diesel Generator which is run when ever power supply is not available

EPDCAPL is not available



**SOLAR PANELS**



**LED STREET LIGHT**





**SOLAR GRID INVERTER (70KW)**



## **LED LIGHTS**

**Following are the major consumers of electricity in the facility:**

- Computers
- Lighting
- Air-Conditioning
- Fans
- Other Lab Equipment
- Printers

## CHAPTER-4

### Historical Data Analysis

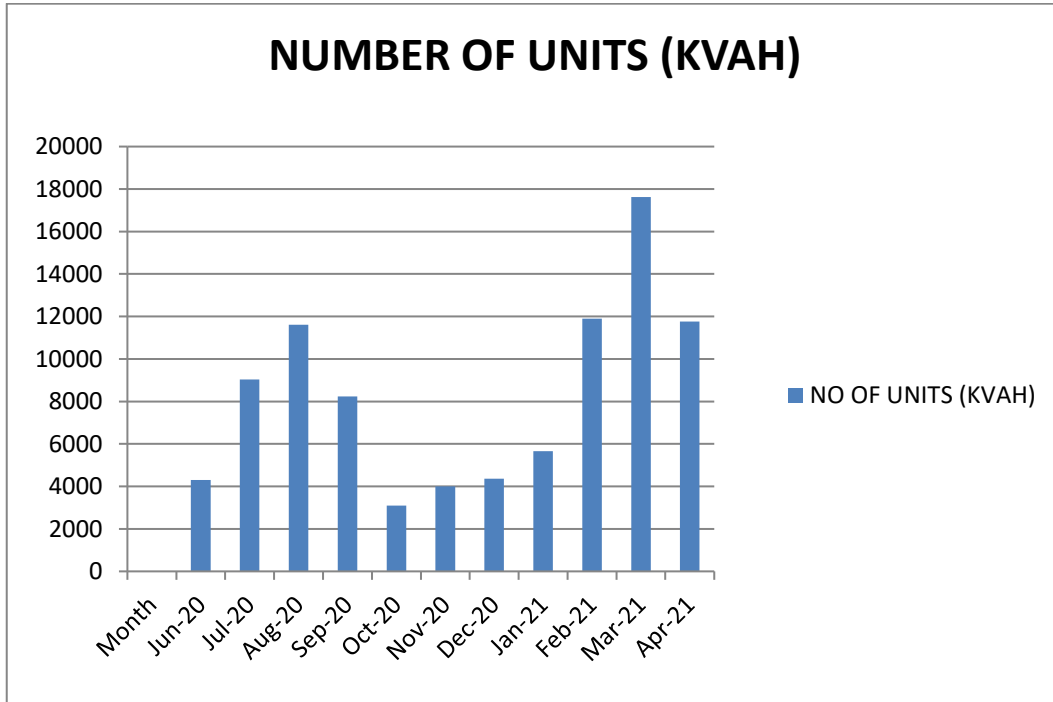
#### 4.1 : Study of variation of Monthly Units consumption & Power Factor:

In this Chapter, We study the details of 12 month Electricity Bills.

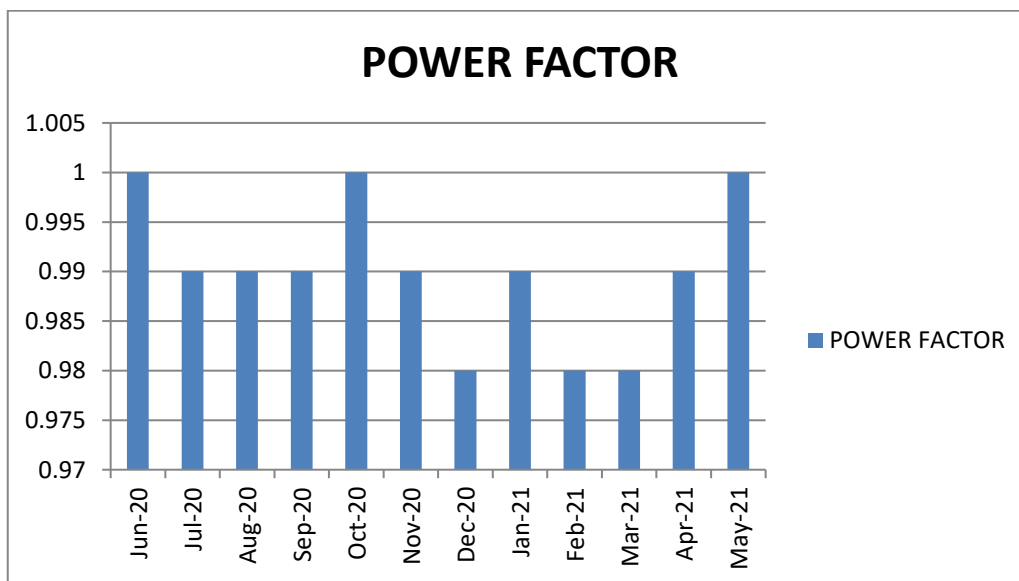
**Table No 4.1 Variation in units consumption & Power Factor (PF)**

<b>Variation in Units consumption and power factor</b>			
<b>S.NO</b>	<b>MONTH</b>	<b>NUMBER OF UNITS (KVAH)</b>	<b>POWERFACTOR</b>
1	Jun-2020	4295	1.00
2	Jul-2020	9029	0.99
3	Aug-2020	11609	0.99
4	Sep-2020	8242	0.99
5	Oct-2020	3104	1.00
6	Nov-2020	4005	0.99
7	Dec-2020	4360	0.98
8	Jan-2021	5658	0.99
9	Feb-2021	11893	0.98
10	Mar-2021	17627	0.98
11	Apr-2021	11764	0.99
12	May-2021	1681	1.00
	<b>TOTALUNITS =</b>	<b>93267</b>	<b>AVERAGE=0.99</b>

## MONTH WISE UNIT CONSUMPTION



## MONTH WISE POWER FACTOR VARIATION



## **Conclusion: Variation of PF**

The Power Factor to reduce the utility power bill. Most utility bills are influenced by KVAR usage. A good Power Factor provides a better voltage. Reducing the pressure on electrical distribution network. Reducing cable heating, cable overloading and cable losses. Reducing over loadings of control gears and switch-gears etc.....

Whenever the average power factor over a billing cycle or a month, whichever is lower, of a High Tension consumer is below 90%, Penal charges shall be levied to the consumer at the rate of 2 % (two %) of the amount of monthly energy bill (excluding of Demand Charges, FOCA, Electricity Duty and Regulatory Liability Charge etc.)

For power factor of 0.99, the effective incentive will amount to 5% (five percent) reduction in the energy bill and for unity power factor; the effective incentive will amount to 7% (seven percent) reduction in the energy bill.

## 4.2 STUDY OF MONTH WISE ELECTRICITY BILL VARIATION

**TABLENO4.2**

<b>VARIATION IN ELECTRICITY BILL</b>		
<b>SNO</b>	<b>MONTH</b>	<b>ELECTRICITY BILL AMOUNT IN RS/-</b>
1	Jun-2020	27,720
2	Jul-2020	88,934
3	Aug-2020	1,15,692
4	Sep-2020	47,353
5	Oct-2020	37,272
6	Nov-2020	38575
7	Dec-2020	33763
8	Jan-2021	48741
9	Feb-2021	1,07,990
10	Mar-2021	1,66,134
11	Apr-2021	97050
12	May-2021	6118
<b>TOTAL ANNUAL BILL</b>		<b>Rs. 815342</b>
<b>AVERAGE MONTHLY BILL</b>		<b>Rs.67945</b>

Conclusion: Monthly Electricity bill variation has been identified  
Roof top PV Solar System(70kW) installed on terrace of Annex building

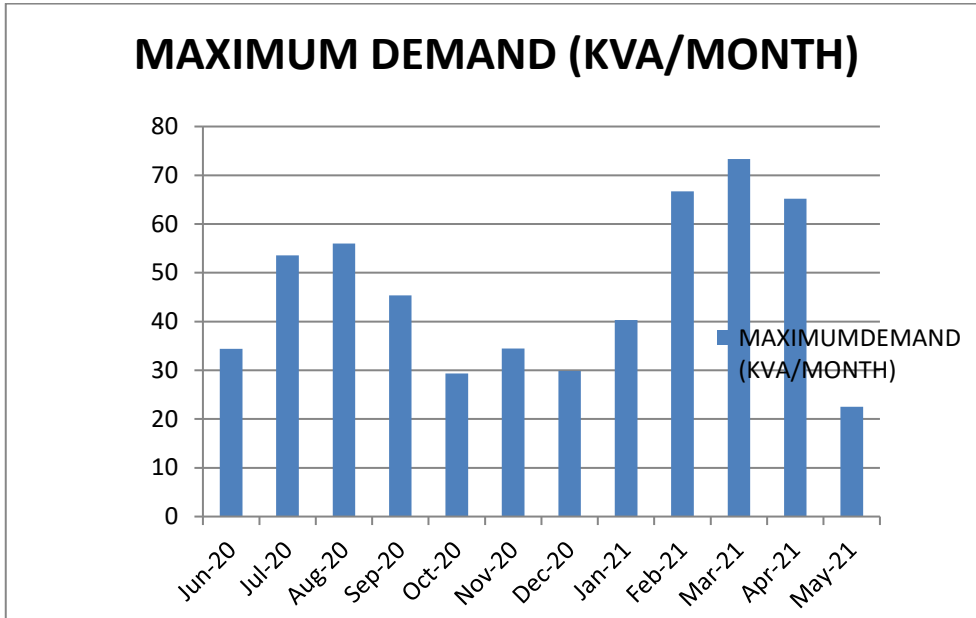
- Average Monthly Bill in the year 2019-20 =Rs 1,42,836
- Average Monthly Bill in the year 2020-21 =Rs 67,945
- Savings in bill due to installation(per month) =Rs 63,545
- Annual savings in bill(one year) =Rs 7,62,545

### 4.3 :STUDY OF MONTH WISE MAXIMUM DEMAND VARIATION

TABLE NO 4.3

<b>SN O</b>	<b>MONTH</b>	<b>MAXIMUM DEMAND (KVA/MONTH)</b>
1	Jun-2020	34.40
2	Jul-2020	53.58
3	Aug-2020	55.98
4	Sep-2020	45.36
5	Oct-2020	29.36
6	Nov-2020	34.48
7	Dec-2020	29.88
8	Jan-2021	40.32
9	Feb-2021	66.7
10	Mar-2021	73.36
11	Apr-2021	65.18
12	May-2021	22.54

## MONTH WISE DEMAND VARIATION





## 5. Study of Month wise Load Factor Variation

Electrical Load factor is a measure of the utilization rate, or efficiency of electrical energy usage. It is the ratio of total energy (KWh) used in the billing period divided by the possible total energy used within the period, if used at the peak demand (KW) during the entire period. Thus,

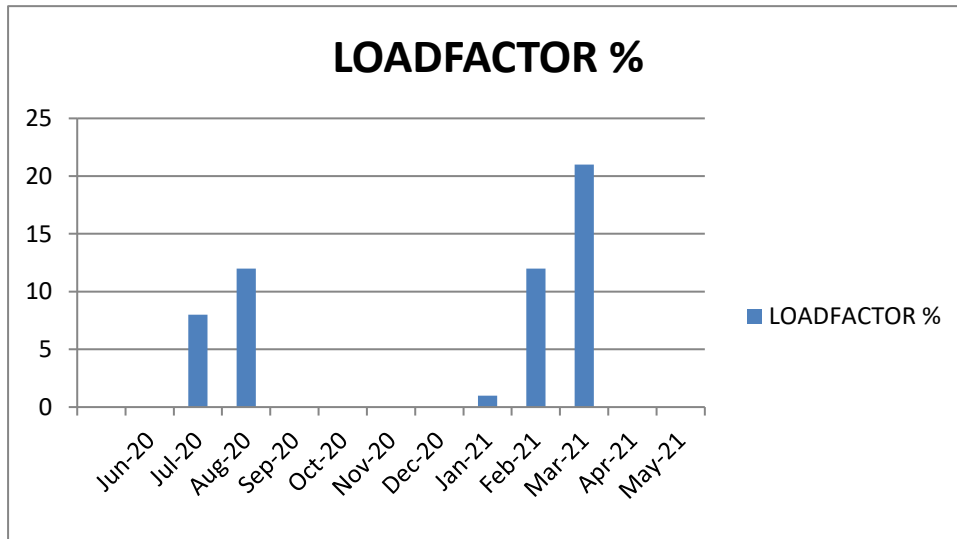
**Load Factor=KWh/(KW/hours in the period/number of days in the billing cycle**

### 4.4 :STUDY OF MONTH WISE LOAD FACTOR VARIATION

**TABLE NO 4.4**

<b>SN O</b>	<b>MONTH</b>	<b>LOAD FACTOR %</b>
1	Jun-2020	0
2	Jul-2020	8
3	Aug-2020	12
4	Sep-2020	0
5	Oct-2020	0
6	Nov-2020	0
7	Dec-2020	0
8	Jan-2021	1
9	Feb-2021	12
10	Mar-2021	21
11	Apr-2021	0
12	May-2021	0

## LOAD FACTOR VARIATION %



### **Conclusion:Variation in monthly Load Factor**

If your load factor ratio is above 0.75 electrical usage is reasonably efficient. If the load factor is below 0.5, you have periods of very high usage (demand) and a low utilization rate. Low load factor customers would benefit from a peak demand control system or from a Battery Energy Storage System to distribute electrical usage out over longer intervals of time and smooth peaks.

Low load factors, such as below 0.4, contribute significantly to the overall monthly electric bill in the form of demand charges .These demand charges are listed on the bill as coincident demand ,facilities demand ,and summer time related demand.

### **General Observations based on Electricity Bill:**

- 1.** For College Campus the Contract Demand (CD) is 100 kVA and minimum billing Demand is 50% of the Contract Demand (i.e. 50 kVA) or the 73% of previous Maximum Demand recorded whichever is higher. Since, the MD recorded is less than 50k VA.
- 2.** The average electricity cost is Rs.7.65 considering the last twelve months.(Excluding TO D charges, MD and PF charges)
- 3.** Average monthly Power Factor is maintained near**P.F.0.99**

## Chapter:5

### Department wise power Consumption analysis

#### Experimental and Data Collection:-

All required data is Collected by Department of Physics. In building, in every room .how much fans, tubes, Computers, instrument AC, etc will these is measured. According to survey following data is collected

#### Total power requirement of Various Equipment.

	Name Of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage Per Day (Hr)	Power Consumption / Day (Watt)
1	Tube Lights	40	245	9800	7	68600
2	Fans	80	309	24720	7	173040
3	LED TUBE LIGHTS	15	242	3630	6	21780
4	Computers	60	128	7680	6	46080
5	Printers & Xerox machines	300	4	1200	1	1200
6	AC's	2000	5	10000	6	60000
7	Scanners	250	2	500	2	1000
8	Water Cooler	500	7	3500	6	21,000
9	Refrigerator	500	3	1500	6	9,000
10	Physics Lab Equipment Consumption	1000	1	1000	4	4,000
11	Physics Lab Equipment Consumption	500	1	500	4	2,000
12	Chemistry Lab Equipment Consumption	500	2	1000	4	4,000
13	Electronic Lab Equipment	700	1	700	4	2,800
14	Projecters	700	3	2100	2	4200
15	Sound Systems & speakers	700	4	2800	3	8400
16	Lab Equipment Consumption	700	4	2800	4	11200
17	Bar Code & Machine	50	1	50	2	100
18	Exast Fans	60	9	540	7	3780
19	Biometric machines	12	4	48	2	96

Total power requirement of all instruments is **44,2,276 KW** perday.

Total power consumption per month **13,268,280 KW** per month .

PV solar system 70 kW is installed which is expected to generate 261 unit / day.

This saves Rs 7,62,545/ Year.

## Department wise Load consumption

Correspondent Room						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	3	240	7	1,680
3	LED TUBE LIGHTS	15	10	150	8	1,200
4	Computers	60	1	60	6	360
5	AC's	2000	1	2000	7	14,000

## Principal Room

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	2	160	7	1120
2	LED TUBE LIGHTS	15	9	135	8	1080
3	Computers & CCTV	60	1	60	6	360
4	AC's	2000	1	2000	7	14,000
5	Tube Lights	40	2	80	7	560

**UG Office**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	5	200	7	1400
2	Fans	80	9	720	7	5040
3	Computers	60	10	600	6	3600
4	Printer Cum Scanner	300	1	300	1	300
5	LED Tube lights	15	12	180	6	1080
6	Water Cooler	500	1	500	6	3000
7	Xerox machine	650	1	650	2	1300

**Examination Cell**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	5	400	7	2800
2	Computers	60	1	60	6	360
3	Printer Cum Scanner	300	1	300	1	300
4	Xerox Machine	650	1	650	2	1300
5	LED Tube lights	15	10	150	6	900

<b>UG Department of Physics</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

<b>UG Physics Lab</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	2	80	7	560
2	Fans	80	7	560	7	3920
3	LED lights	15	4	60	6	360
3	Physics Lab Equipment Consumption	500	2	1000	4	4000



**UG Department of Electronics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Electronics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	2	30	7	210
2	Fans	80	5	400	7	2800
3	Electronics Lab Equipment Consumption	700	1	700	4	2800
4	Tube Lights	40	2	80	7	560

<b>UG Department of Chemistry</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360

<b>UG Chemistry Lab</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	1	80	7	560
3	Exast Fans	60	3	180	7	1260
4	Chemistry Lab Equipment Consumption	500	1	500	4	2000
5	Tube Lights	40	2	80	7	560

<b>UG Common Area</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	26	1040	7	7280
2	Fans	80	8	640	7	4480
3	LED TUBE LIGHTS	15	10	150	6	900
4	Stage lights LED lights	15	12	180	6	1080

<b>UG Department of Botany</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360
4	Refrigerator	500	1	500	6	3000

<b>UG Botany Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	3	45	7	315
2	Fans	80	3	240	7	1680
3	Tube Lights	40	9	360	7	2520

<b>UG Department of Zoology and Fisheries</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	3	120	7	840
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

<b>UG Department of Zoology and Fisheries Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	7	420
2	Fans	80	3	240	7	1680
3	Tube Lights	40	4	160	7	1120

<b>UG College Ladies Gym:</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Tube Lights	15	4	60	6	360
2	TUBE lights	40	1	40	7	280
3	Fans	80	2	160	7	1120

**UG Waiting Hall:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED TUBE Lights	15	1	15	6	90
2	lights	40	3	120	7	840
3	Fans	80	2	160	7	1120

**Computer Lab**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	2	80	7	560
2	Fans	80	6	480	7	3360
3	LED LIGHTS	15	4	60	6	360
4	Computers	60	40	2400	6	14400
5	Ac's	2000	1	2000	6	12000
6	Virtual System	700	2	1400	2	2800

<b>UG Library</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED /0Lights	15	4	60	7	420
2	Fans	80	9	720	7	5040
3	Computers	60	3	180	6	1080
4	BAR code Machine	50	1	50	2	100
5	Tube Lights	40	8	320	7	2240

<b>UG Department of Computers</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>PowerConsumption(Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	3	240	7	1680
3	Computers	60	2	120	6	720

<b>UG Computer Lab :</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	15	225	7	1575
2	Fans	80	19	1520	7	10640
3	Computers	60	54	3240	6	19440
4	Virtual systems	700	1	700	2	1400
5	TUBE lights	40	26	1040	7	7280
6	AC'S	2000	1	2000	7	14000

**UG Department of Commerce:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	3	45	7	315
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360
4	Tube Lights	40	3	120	7	840

**IQAC Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	12	180	6	1080
2	Fans	80	5	400	7	2800
3	Computers	60	3	180	6	1080
4	Xerox Machine	650	1	650	2	1300

**UG Telugu Department**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	2	80	7	560
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

**UG English Department**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	3	45	7	315
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360



**UG Department of Mathematics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**Canteen**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	3	240
2	Fans	80	12	960	3	2880
3	LEDTUBE LIGHTS	15	9	135	6	810

**Security Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560

**Class Room in Degree Block ( 22- 30 )**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	18	270	6	1620
2	Fans	80	27	2,160	6	12960
3	Tube Lights	40	10	400	7	2800

**Class Rooms in Degree Block (38-58)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	16	640	7	4480
2	Fans	80	37	2960	7	20720
3	LED TUBE LIGHT	15	13	195	6	1170

**ClassRooms in PGBlock (101-115)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	19	760	7	5320
2	LED TUBE LIGHT	15	15	225	6	1350
3	Fans	80	33	2640	7	18480

**Class Rooms in PG Block(202-221)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	9	135	6	810
2	Fans	80	12	960	7	6720
3	Tube Lights	40	4	160	7	1120

**Classrooms in PG Block(301-323)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	18	270	7	1890
2	TUBE lights	40	33	1320	7	9240
3	Fans	80	30	2400	7	16800

**UG-Toilets**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Exast Fans	60	1	60	7	420

**PG Seminar Halls**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	24	360	7	2520
2	Fans	80	20	1600	7	11200
3	LCD Projector	280	3	840	6	5040
4	Sound System	300	4	1200	1	1200
5	Tube Lights	40	10	400	7	2800

**PG Library**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	8	640	7	4480
3	Computers	60	1	60	6	360

### PG Director and Correspondent Rooms

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	5	400	7	2800
3	Computers	60	2	120	6	720
4	AC's	2000	2	4000	6	24000

<b>PG Office</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	6	240	7	1680
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360
4	Xerox Machine	650	1	650	2	1300
5	LED lights	15	7	105	6	630

<b>PG Department of Chemistry</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

<b>PG Chemistry Lab</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantit y</i>	<i>Power Consumption(Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	3	240	7	1680
3	Exast fans	60	5	300	7	2100
4	Refrigerator	500	1	500	4	2000
5	Tube Lights	40	8	320	7	2240

<b>PG Common Area and Toilets</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quanti ty</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/Day (Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	LED TUBE LIGHTS	15	21	315	6	1890
3	Lift	3000	1	3000	7	21000

<b>Gents staff room</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quanti ty</i>	<i>Power Consumptio n (Watt)</i>	<i>usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	LED TUBE LIGHTS	15	2	30	6	180
3	Fan	3000	2	6000	7	42000



**Environmental Consciousness and Sustain ability / Alternate Energy initiatives such as:**

**1) Alternative Energy Initiative**

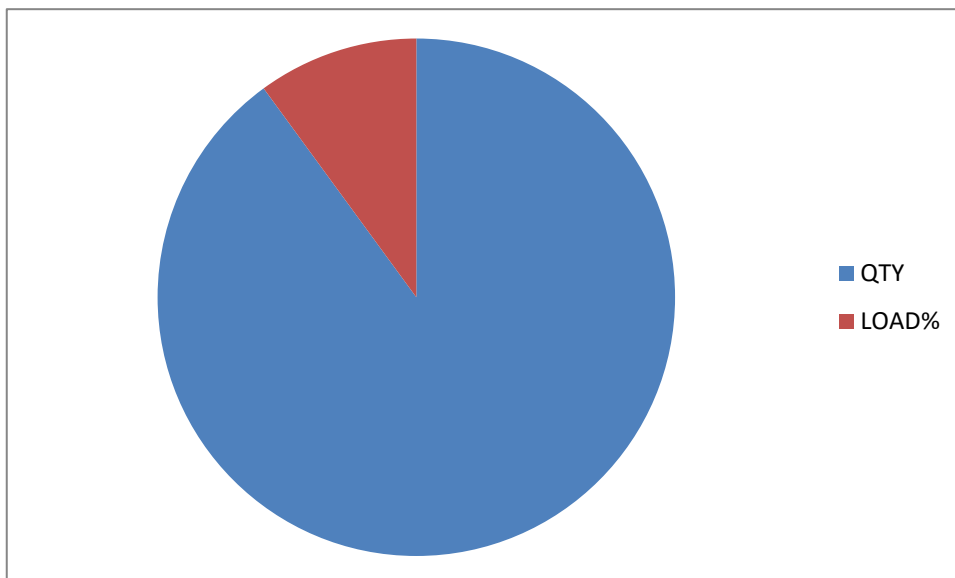
Percentage of power requirement met by renewable energy sources  
=(Power requirement met by renewable energy sources /Total power requirement)×100  
=(99680/89881)× 100  
=110.9%

**2)Percentage of lighting power requirements met through LED bulbs**

Percentage of light in power requirement met through LED bulbs  
=(Lighting power requirement met through LED bulbs/Total lighting power Requirement)×100

**TYPE WISE LIGHTING DISTRIBUTION**

<b>SN O</b>	<b>TYPE</b>	<b>QT Y</b>	<b>KW LOAD</b>	<b>% LOAD</b>
1	Tube Lights(40W)	242	3.63	27.03%
2	LED Lights(15W)	245	9.8	72.97%



**Remarks:**

- It has been observed that in old and new building majority of electrical power Consumption is through light load such as fan, FTL and power load such as refrigerator, UPS ,etc. unnecessary use of electrical equipment must be avoided.
- As per individual dept. level load consumption, we understand the scope for Improvement of energy saving .Hence our electricity bill will be reduced by proper load Management techniques along with optimum utilization of resources.

## Chapter:6

### **Lighting System**

#### **Observations and suggestions:**

- It is found that FTL, Bulbs, CFLs is installed in the facility.
- It is recommended that some tube lights in this area be switched off when
- Sufficient day light is available.
- Presently there flectors installed for tube light
- Every light are electric gad get left on when not needed is wasting energy and money
- And is causing pollution that is totally unnecessary.
- Stand-by power can use upto8% of a household's total electricity.

#### **Don't forget to power down these things when not in use:**

- Lights
- Heaters and fans(or air-conditioning)
- Printers and scanners
- Battery and phone chargers
- Computers
- Gaming consoles
- TVs, DVD players
- Stereos
- Kitchen gadgets such as blenders , kettles ,toasters etc.

Merits/Existing Features for Energy Savings.

1. Staff vigilance.
2. Computers are connected in LAN.
3. Printers are shared in LAN.
4. Screen savers facility implemented for every computer.
5. AC's used are of three STARS.
6. Refrigerator's are three STARS.
7. In can descent bulbs are now here used.
8. They are replaced by CFL tubes with electronic choke.
9. Maximum use of natural light.
10. Cross Ventilation is provided in laboratory & class rooms, which reduced number of fans.
11. Most of the practical's are scheduled in noon time where billingRate in normal.
12. Walls are painted with off white colour to have sufficient brightness.
13. Solar powered street lamp is used.
14. LED flashlight is used in Seminar hall.
15. PV solar system (70KV)is installed which is expected to generate 261 Unit/day.

This saves Rs 7,62,545/Year.

## Chapter:8

### Energy Conservation Proposals

#### 9.1 Replacing Fluorescent Tube Lights(FTL)with LED Tube Lights

The 500 FTLs can be replaced with the LED tube lights 15W. These changes can be made at the places where the life is higher. Usually minimum of 3 years warranty is given and approximate burning hours is 40,000. (15 years considering 8 hour)

#### Following calculations are done for 8 hours working:

Power consumption by 36 WFTL with conventional cho	=40W/Tube Light
Equivalent LED tube light	=15W/Tube Light
Savings in power	=24W/Tube Light
Operating hours	=8h/dayx300= 2400h/year
Y Tube Light Yearly savings	=2400x24 W=57.6kWh/year/Tube Light
Average Cost of electricity	= Rs.7.66/kWh
Saving	=57.6kWh x7.66= Rs.441.216/year/Tube light
Approximate investment on single LED Tube lights	=Rs.200
Number of Tube Lights to be replaced	= 250

#### Summary:

Total Yearly Saving= 250 x441.216=Rs.1,10,304/year

Total Investment = 250 xRs.200=Rs.50,000

## 9.2 General Recommendations

- γ All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity. Display the stickers of save electricity, save nature everywhere in the campus. So that all stake holders are encouraged to save the electricity.
- γ Most other time , all the tube lights in a classroom are kept ON, even though, there is sufficient light level in earth window opening. In such cases ,the light own earth e window may be kept OFF
- γ All projects to be kept OFF or in idle mode if there will be no presentation slides.
- γ All computers to have power saving settings to turn off monitors and hard discs, say 10 minutes/30minutes.
- γ The comfort Default air condition in temperature to be set between 24°C to 26°C.
- γ Lights in toilet area may be kept OFF during day time
- γ Use AUTOMATIC POWER OF FACTOR CORRECTION(APFC)Panel FOR PF improvement.
- γ Need to focus on existing solar plant which is generating power below the rated power
- γ Need to use power saver circuits for AC.
- γ Need to replace FTL by smart LED Tube
- γ Need to replace ordinary bulb by LED bulb.
- γ Need to replace ordinary CRT monitor by LED.
- γ Need to replace ordinary refrigerator by BEE power save refrigerator if possible.
- γ Out of total electricity bill paid, 53 percentage are actual energy utilized charges and remaining expense belongs to additional taxes on energy consumption
- γ Recently govt has declared the exemption one electricity duty charges for school and colleges trying to get the benefit of the same as soon as possible

### 9.3 Executive Recommendations:

1. There has to be Institute level student community that keep track of the energy consumption Parameters of the various departments, classrooms, halls, areas, meters,etc
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.
3. Need to Create energy efficiency/ renewable energy awareness among the college campus. College should take initiative to arrange seminars, lectures, paper presentation competition among students and staff or general awareness.

#### References:

- 1) "Energy Management, Audit and Conservation" by Barun Kumar De
- 2) "Guide to Energy Management" by Barney L
- 3) "Energy Audits: A Work book for "Energy Management in Buildings" by Tarik Al-Shemmeri
- 4) "Fundamentals of Energy Conservation and Audit" by A Garkar Santosh Vyankat rao and Mateti Naresh Kumar
- 5) "Industrial Energy Conservation (UNESCO Energy Engineering)" by Charles M Gottsc

## Energy Audit Report of 2020-2021

Sir C.R. Reddy College for Women , Eluru, Andhra Pradesh

### DETAILS OF CONSUMER

---

1. Name of the Consumer : Sir C. R. Reddy College for Women, Eluru
2. Name of the Contact Persons : Principal, Sir C.R.Reddy College
3. Address of the Consumer : R S No: ELR 11, Vatluru Road ,Eluru.
4. Transformer Capacity : 200KVA
5. Permitted /Billable Demand : 100 KVA
6. Demand Charge : Rs.475
7. Annual Energy Consumption : 93,267 KWh/Annum
8. Annual Amount Paid : Rs.8,15,342/ Annum
9. Type of Connection/ Sr. No. : HT II A ( i )
10. Name of Supplier' s office : APEPDCL
11. Period of Audit : June 2020-May 2021



**ENERGY AUDIT TEAM REPORT  
WORK COMPLETION REPORT**

**Name of work project** : Energy Audit of Sir C R Reddy College for Women, Eluru

**Work Period** : 01-06-2020 to 31-05-2021

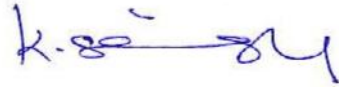
This is to certify that the Energy Audit team appointed by the Principal, SIR CR REDDY COLLEGE FOR WOMEN, Eluru, has Successfully completed Energy audit.

The Energy Audit is submitted its report on 24-08-2021 for this year 2021.

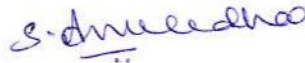
**Audit report by**

**Internal Committee**

1. Smt. K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy College for women,  
Eluru



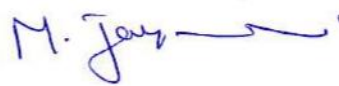
2. Smt. S.Anuradha  
Head of the Dept.of Biotechnology  
IQAC & NAAC  
Coordinator



3. Smt. P.Siva kumari  
Lecturer in Dept. of Physics  
Convenor, Energy Audit



4. Smt. M.Jaya lakshmi Devi  
Lecturer in Dept. of Physics  
Sir C R Reddy College for women  
Member




**External Committee**

1. Sri.Y.Rambabu  
Asst. Engineer  
APEPDCL, Govt. of AP  
Eluru



Asst. Executive Engineer  
Operation : : APEPDCL  
PEDAPADU

2. Sri.T.Kranthi Kiran  
Assistant Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering College, Eluru



3. Sri. K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College, Eluru



# **ENERGY AUDIT**

**Report (2019-2020)**



**Prepared by**

**DEPARTMENT OF PHYSICS**

**SIR C R REDDY COLLEGE FOR WOMEN, ELURU**

(Affiliated to ADIKAVI NANNAYA UNIVERSITY, Rajamahendravaram )

West Godavari District, Andhra Pradesh 534007

Certificate

# ENERGY AUDIT

Academic year 2019-20



This is to certify that

SIR C R REDDY COLLEGE FOR WOMEN, ELURU

VATLURU, WEST GODAVARI DISTRICT, AP

has achieved the energy uses standards for the learning spaces

with least impact on environment during the

Energy Audit 2019-20

This certificate is issued on the basis of Energy Audit 2019 - 20

*Ch. Anita*  
Convenor

*S. Anuradha*  
IQAC Coordinator

*[Signature]*  
Asst. Executive Engineer  
APPEPDC  
PEDAPADU



## INDEX

Sr. No.	Particulars	Page No.
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## **MEMBERS OF ENERGY AUDIT COMMITTEE**

### **Internal Committee**

1. Smt. K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy college for women,  
Eluru
2. Smt. K. Jhansi Rani  
Dept. of Computer science  
IQAC & NAAC  
Coordinator
3. Smt. P.Siva kumari  
Lecturer in Dept of Physics  
Convenor, Energy Audit
4. Smt. M.Jaya lakshmi Devi  
Lecturer in Dept of Physics  
Sir C R Reddy college for women  
Member

### **External Committee**

1. Y. Rambabu  
Asst. Engineer  
APEPDCL ,Govt, of AP  
Eluru
2. Sri T. Kranthi Kiran  
Asst. Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering college, Eluru
3. Sri K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College,Eluru

## Preface

Data collection for energy audit of **Sir C.R Reddy College for women** was conducting an Energy Audit for the period of June 2019 to May 2020 .The final report was submitted on 2020

This audit was over sight in quire about convenience to progress the energy competence of the campus. Energy audit survey was completed by B. Sc Physics students under the guidance of their faculty members. All data collected from each classroom, laboratory, every room. The work is completed by considering how many tubes, fan ,A.Cs, electronic instruments, etc in each room. Consumption of electricity usage in each department component wise analysis.

We really appreciate the effort put by Sir. C.R. Reddy College for women, management for creating awareness of Energy Audit, Use renewable energy such as solar energy and their significance use for efficient energy saving. We really appreciate Honorable management of the college for encouraging us by providing this wonderful opportunity to do the energy audit. Through this, we have been cleared the vision of Institution towards the Green campus and save our green nature . This replicates to develop eco friendly atmosphere in our college premises.



## Acknowledgement

Energy Audit is a system is key instrument in knowing the present level of efficiency of the various components and establishing the areas of shortfall for improvement.

We take this opportunity to convey our sincere thanks and gratitude for the kind cooperation extended by the management and staff.

We express our sincere thanks to

1. Smt.P.Sailaja, Principal
2. Smt S.Anuradha VicePrincipal
3. Smt K. Sirisha Dept of physics

We are sure, this report will be quite useful for energy management to intensify and implement energy conservation measures in the organization and achieve desired savings.

## Summary

Energy audit is a sequence of tasks performed in a planned manner. It requires discussion, survey, collection of data, analysis and reporting.

The salient observations and recommendations are given below.

1. **SIR C. R. Reddy College for Women, Eluru**
2. **SIR C. R. Reddy PG College for Women**
  - a. **From EPDCAPL**
  - b. **Electricity SOLAR Grid connected solar plant(70kW)**
  - c. **High Speed Diesel Generator (HSDG)**

Electrical energy is used for various applications, like Computers, Lighting, Air Conditioning Fans Other Laboratory Equipment, and Printers, Xerox machines, CCTV, UPS,LCD Projector ,Router system, flood light ,Pumping motor etc.

3. The average cost of energy is around **1,42,836 Rs/Month.**
4. The Specific Energy Consumption (**SEC**) is the ratio of energy required per square meter.



## Abbreviations

AC	Air conditioner
AC	Alternating current
DC	Direct current
HZ	Hertz
Kg	<b>Kilogram</b>
KVA	<b>Kilo-volts-ampere</b>
KW	KiloWatts
KWH	Kilo watt hour
LED	<b>Light Emmitting diode</b>
V	Volts
W	Watts
PF	<b>Power factor</b>
D.G	<b>Diesel Generator</b>
SEC	<b>Specific Energy consumption</b>
EPDCAPL	<b>EASTERN Power distribution company of Andhra Pradesh limited</b>

## **Chapter: 1**

### **4.Introduction to Energy Audit**

#### **Energy Audit :-**

Energy Audit is an inspection, survey and analysis of energy flows for energy conservation in a building or system to reduce the amount of energy input to the system without negatively affecting the output.

As per the Energy conservation Act 2001, Energy Audit is defined as the Verification ,monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption

#### **Energy Audits are two types**

##### **1A preliminary energy Audit**

##### **2 Detailed energy Audit**

#### **Preliminary Energy Audit :-**

This type of audit is simply a data – gathering exercise that offers a preliminary analysis.

#### **Detailed energy Audit:-**

This type of audit is completed by a professional auditor who monitors, analyzes ,and verifies

- Energy use to establish problem areas and ways to implement energy efficiency improvements.

#### **Objectives of Energy Audit:-**

The Energy Audit provides the vital information base for overall energy utilization analysis and evaluation of energy conservation measures. It aims at

- Identifying the quality and cost of various energy inputs
- Assessing present pattern of energy consumption in different cost centers of operations
- Relating energy inputs and production output
- Identifying potential areas of thermal and electrical energy economy
- Highlighting wastage's in major areas
- Fixing of energy saving potential targets for individual cost centers
- Implementation of measures for energy conservation & realization of savings

## Chapter:2

### General Details

Sr. No.	Particulars	Details
1	Name of the Institute	<b>SIR C.R. REDDY COLLEGE FOR WOMEN</b>
2	Address	<b>SIR C. R. REDDY COLLEGE FOR WOMEN ,ELURU, WEST GODAVARI DISTRICT, A.P</b>
3	Year of Establishment	14 -09-1987
4	Courses Offered	B.Sc B. Com (General) & (Voc) B.Sc.(Computer Science) B. Sc ( life sciences) M.Sc (Organic chemistry)
5	Affiliation	Adikavi Nannaya university, Rajamahendravaram

## **Chapter:3**

### **Energy Consumption Profile**

#### **Source of Energy:**

**SIR C R REDDY COLLEGE FOR WOMEN, ELURU, WEST GODAVARI DISTRICT, AP**

#### **Uses Energy in following forms:**

**a. Electricity from EPDCAPL:**

SIR C.R.Reddy college for women, Eluru, West Godavari district ,A.P receives energy

**b. High Speed Diesel Generator (HSDG):**

HSD is used as a fuel for Diesel Generator which is run whenever power supply is not available

EPDCAPL is not available



**SOLAR PANELS**



**LED STREET LIGHT**



**SOLAR GRID INVERTER (70KW)**



## **LED LIGHTS**

**Following are the major consumers of electricity in the facility:**

- Computers
- Lighting
- Air-Conditioning
- Fans
- Other Lab Equipment
- Printers



## CHAPTER-4

### Historical Data Analysis

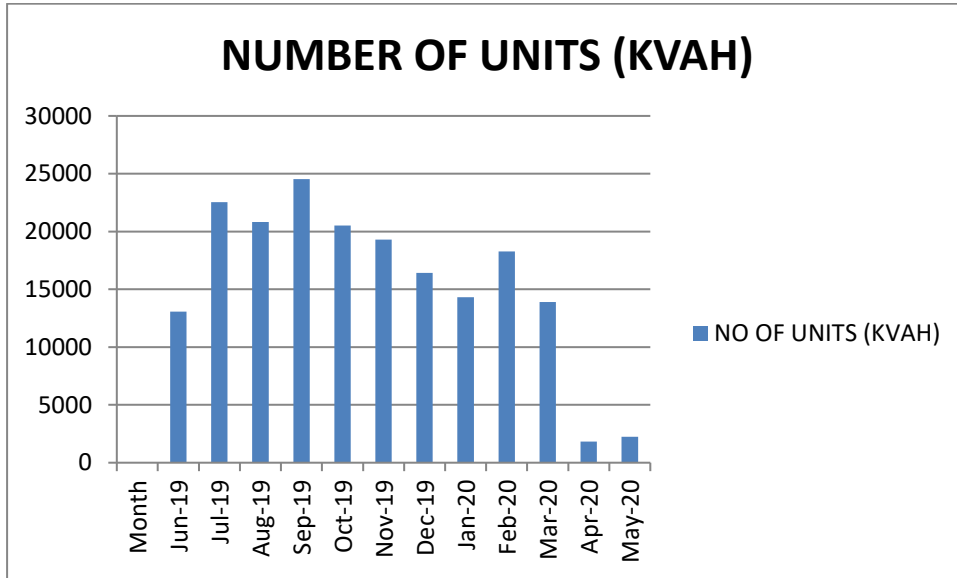
#### 4.1 :Study of variation of Monthly Units consumption & Power Factor:

In this Chapter ,We study the details of 12 month Electricity Bills.

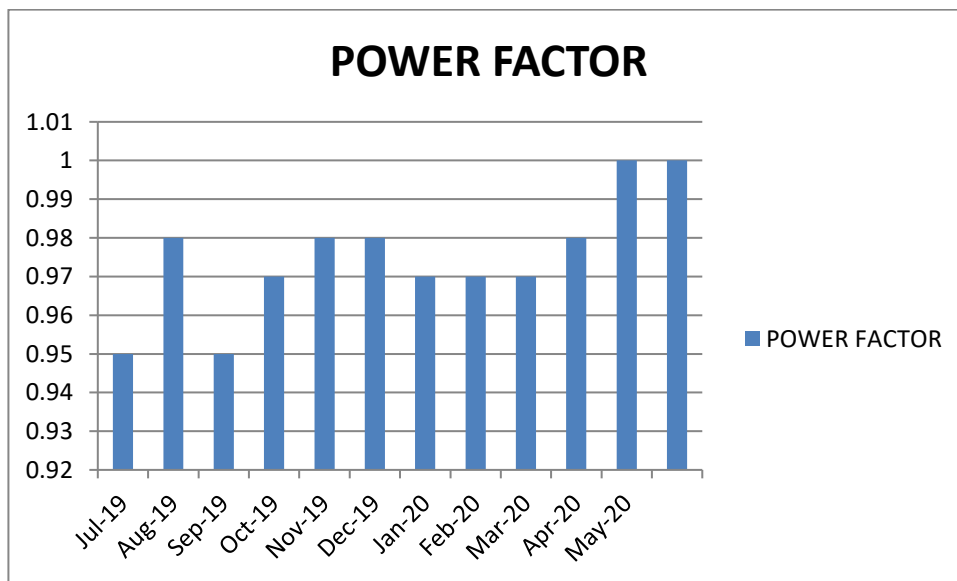
**Table No 4.1 Variation in units consumption & Power Factor (PF)**

<b>Variation in Units consumption and power factor</b>			
<b>S.NO</b>	<b>Month</b>	<b>NUMBER OF UNITS (KVAH)</b>	<b>POWER FACTOR</b>
1	Jun-2019	13057	0.95
2	Jul-2019	22528	0.98
3	Aug-2019	20827	0.95
4	Sep-2019	24538	0.97
5	Oct-2019	20516	0.98
6	Nov-2019	19299	0.98
7	Dec-2019	16425	0.97
8	Jan-2020	14312	0.97
9	Feb-2020	18280	0.97
10	Mar-2020	13891	0.98
11	Apr-2020	1831	1.00
12	May-2020	2254	1.00
	<b>TOTAL UNITS =</b>	<b>1,69,505</b>	<b>AVERAGE=0.975</b>

## MONTH WISE UNIT CONSUMPTION



## MONTH WISE POWER FACTOR VARIATION



## **Conclusion :Variation of PF**

The Power Factor to reduce the utility power bill. Most utility bills are influenced by KVAR usage. A good Power Factor provides a better voltage. Reducing the pressure on electrical distribution network, Reducing cable heating, cable over loading and cable losses. Reducing over loadings of control gears and switch-gears etc.

Whenever the average power factor over a billing cycle or a month, whichever is lower, of a HighTension consumer is below 90%, Penal charges shall be levied to the consumer at the rate of 2 % (two %) of the amount of monthly energy bill (excluding of Demand Charges, FOCA, Electricity Duty and Regulatory Liability Charge etc.)

For power factor of 0.99, the effective incentive will amount to 5% (five percent) reduction in the energy bill and for unity power factor; the effective incentive will amount to 7% (seven percent) reduction in the energy bill.

## 4.2 STUDY OF MONTH WISE ELECTRICITY BILL VARIATION

TABLE NO 4.2

VARIATION IN ELECTRICITY BILL		
SNO	MONTH	ELECTRICITY BILL AMOUNT IN RS/-
1	Jun-2019	1,22,772
2	Jul-2019	2,09,128
3	Aug-2019	1,94,467
4	Sep-2019	2,28,681
5	Oct-2019	2,00,205
6	Nov-2019	1,80,885
7	Dec-2019	1,46,461
8	Jan-2020	1,23,343
9	Feb-2020	1,64,360
10	Mar-2020	1,12,953
11	Apr-2020	18,407
12	May-2020	12,418
<b>TOTAL ANNUAL BILL</b>		<b>Rs.17,14,035</b>
<b>AVERAGE MONTHLY BILL</b>		<b>Rs.1,42,836</b>

Conclusion : Monthly Electricity bill variation has been identified  
Roof top PV Solar System (70kW) installed on terrace of Annex building

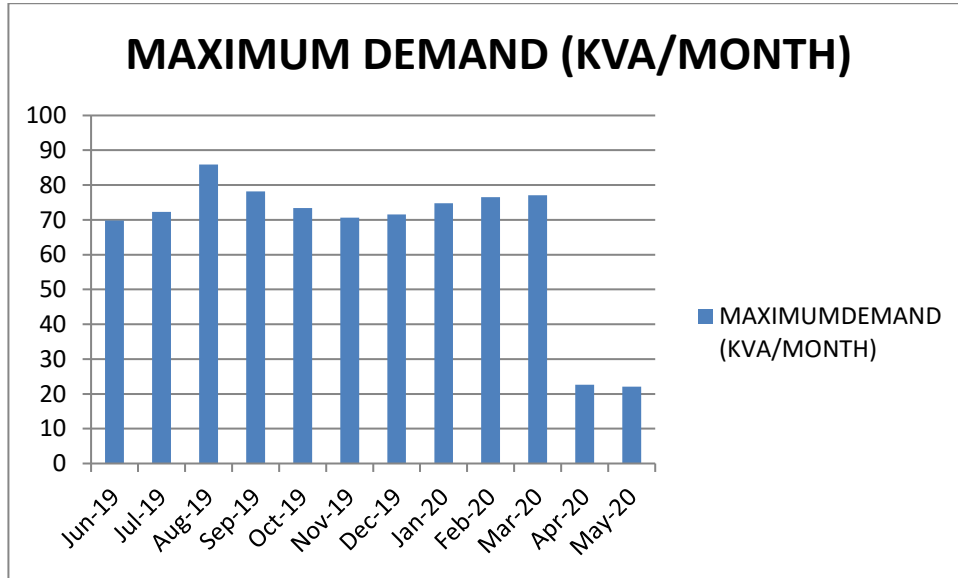
- Average Monthly Bill in the year 2018-19 =Rs 1,58,728
- Average Monthly Bill in the year 2019-20 =Rs 1,42,836
- Savings in bill due to installation (per month) =Rs 62,221
- Annual savings in bill (one year) =Rs 7,46,658

### ● 4.3 : STUDY OF MONTH WISE MAXIMUM DEMAND VARIATION

TABLE NO 4.3

SNO	MONTH	MAXIMUM DEMAND (KVA/MONTH)
1	Jun-2019	69.80
2	Jul-2019	72.32
3	Aug-2019	85.90
4	Sep-2019	78.22
5	Oct-2019	73.36
6	Nov-2019	70.62
7	Dec-2019	71.56
8	Jan-2020	74.82
9	Feb-2020	76.56
10	Mar-2020	77.12
11	Apr-2020	22.60
12	May-2020	22.08

## MONTH WISE DEMAND VARIATION



## 5. Study of Month wise Load Factor Variation

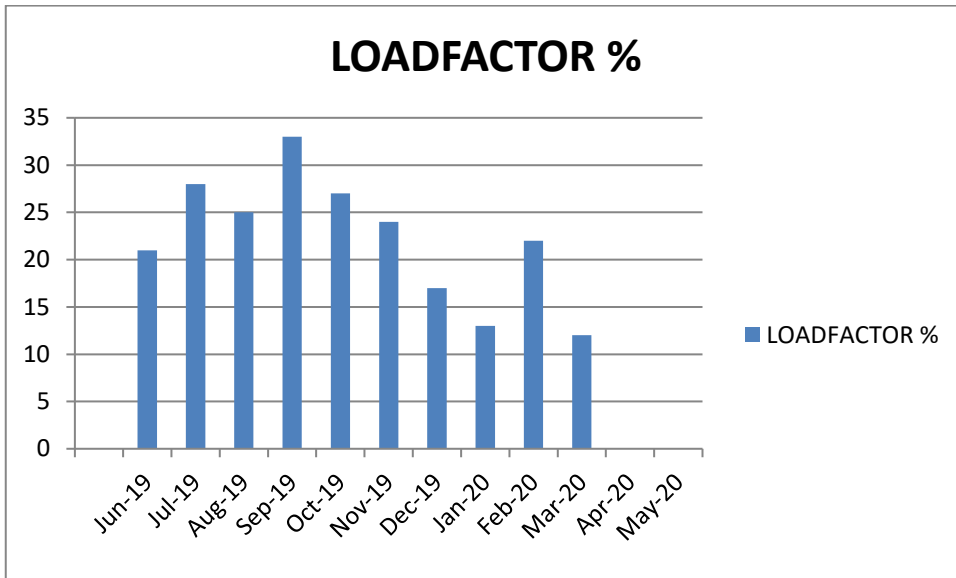
Electrical Load factor is a measure of the utilization rate, or efficiency of electrical energy usage. It is the ratio of total energy (kWh) used in the billing period divided by the possible total energy used within the period, if used at the peak demand (KW) during the entire period. Thus,

**Load Factor=KWh / (KW/hours in the period /number of days in the billing cycle)**

### 4.4 :STUDY OF MONTH WISE LOAD FACTOR VARIATION TABLE NO 4.4

SNO	MONTH	LOADFACTOR %
1	Jun-2019	21
2	Jul-2019	28
3	Aug-2019	25
4	Sep-2019	33
5	Oct-2019	27
6	Nov-2019	24
7	Dec-2019	17
8	Jan-2020	13
9	Feb-2020	22
10	Mar-2020	12
11	Apr-2020	0
12	May-2020	0

## LOAD FACTOR VARIATION%



### **Conclusion : Variation in monthly Load Factor**

If your load factor ratio is above 0.75 electrical usage is reasonably efficient. If the load factor is below 0.5, you have periods of very high usage (demand) and a low utilization rate. Low load factor customers would benefit from a peak demand control system or from a Battery Energy Storage System to distribute electrical usage out over longer intervals of time and smooth peaks.

Low load factors, such as below 0.4, contribute significantly to the overall monthly electric bill in the form of demand charges. These demand charges are listed on the bill as coincident demand, facilities demand ,and summer time related demand.

### **General Observations based on Electricity Bill:**

- 1.** For College Campus the Contract Demand (CD) is 100 kVA and minimum billing Demand is 50% of the Contract Demand (i.e 50 kVA) or the 85% of previous Maximum Demand recorded whichever is higher. Since, the MD recorded is less than 50kVA.
- 2.** The average electricity cost is Rs.7.65 considering the last twelve months (Excluding TOD charges ,MD and PF charges).
- 3.** Average monthly Power Factor is maintained near **P.F.0.975**



## Chapter:5

### Department wise power Consumption analysis

#### Experimental and Data Collection:-

All required data is Collected by Department of Physics. In building, in every room. how much fans, tubes, Computers, instrument AC, etc will these is measured .According to survey following data is collected

#### Total power requirement of Various Equipment.

	Name Of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage Per Day (Hr)	Power Consumption/ Day (Watt)
1	TUBE Lights	40	289	11560	7	80920
2	Fans	80	307	24560	7	171920
3	LED TUBE LIGHTS	15	198	2970	6	17820
4	Computers	60	120	7200	6	43200
5	Printers & Xerox machines	300	3	900	1	900
6	AC's	2000	4	8000	6	48000
7	Scanners	250	2	500	2	1000
8	Water Cooler	500	6	3000	6	18000
9	Refrigerator	500	3	1500	6	9000
10	Physics Lab Equipment Consumption	1000	1	1000	4	4,000
11	Physics Lab Equipment Consumption	500	1	500	4	2,000
12	Chemistry Lab Equipment Consumption	500	2	1000	4	4,000
13	Electronic Lab Equipment	700	1	700	4	2,800
14	Projecters	700	3	2100	2	4200
15	Sound Systems & speakers	700	4	2800	3	8400
16	Lab Equipment Consumption	700	4	2800	4	11200
17	Bar Code & Machine	50	1	50	2	100
18	Exast Fans	60	9	540	7	3780
19	Biometric machines	12	3	36	2	240

Total power requirement of all instruments is **4,31,312 kw** per day.

Total power consumption per month **12,939,360 kW** per month .

PV solar system 70 Kw is installed which is expected to generate 261 unit / day.

This saves Rs 7,46,658/ Year.

## Department wise Load consumption

Correspondent Room						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	3	240	7	1,680
3	LED TUBE LIGHTS	15	10	150	8	1,200
4	Computers	60	1	60	6	360
5	AC's	2000	1	2000	7	14,000

## Principal Room

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	2	160	7	1120
2	LED TUBE LIGHTS	15	9	135	8	1080
3	Computers & CCTV	60	1	60	6	360
4	AC's	2000	1	2000	7	14,000
5	Tube Lights	40	2	80	7	560

**UG Office**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	5	200	7	1400
2	Fans	80	9	720	7	5040
3	Computers	60	10	600	6	3600
4	Printer Cum Scanner	300	1	300	1	300
5	LED Tube lights	15	12	180	6	1080
6	Xerox machine	650	1	650	2	1300

**Examination Cell**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	5	400	7	2800
2	Computers	60	1	60	6	360
3	Printers Cum Scanner	300	1	300	1	300
4	Xerox Machine	650	1	650	2	1300
5	LED Tube lights	15	10	150	6	900

**UG Department of Physics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Physics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	7	560	7	3920
3	LED lights	15	4	60	6	360
4	Physics Lab Equipment Consumption	500	2	1000	4	4000

**UG Department of Electronics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Electronics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	2	30	7	210
2	Fans	80	5	400	7	2800
3	Electronics Lab Equipment Consumption	700	1	700	4	2800
4	Tube Lights	40	2	80	7	560

<b>UG Department of Chemistry</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360

<b>UG Chemistry Lab</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage PerDay</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	7	420
2	Fans	80	1	80	7	560
3	Exast Fans	60	4	240	7	1680
4	Electronics Lab Equipment Consumption	500	1	500	4	2000
5	Tube Lights	40	2	80	7	560

<b>UG Common Area</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	31	1240	7	8680
2	Fans	80	8	640	7	4480
3	LED TUBE LIGHTS	15	5	75	6	950
4	Stage lights LED lights	15	12	180	6	1080
5	Water Cooler	500	3	1500	6	9000

<b>UG Department of Botany</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360
4	Refrigerator	500	1	500	6	3000



<b>UG Botany Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	3	45	7	315
2	Fans	80	3	240	7	1680
3	Tube Lights	40	9	360	7	2520

<b>UG Department of Zoology and Fisheries</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

<b>UG Department of Zoology and Fisheries Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	7	420
2	Fans	80	3	240	7	1680
3	Tube Lights	40	4	160	7	1120

<b>UG College Ladies Gym:</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Tube Lights	15	2	30	6	180
2	TUBE lights	40	3	120	7	840
3	Fans	80	2	160	7	1120

**UG Waiting Hall:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED TUBE Lights	15	1	15	6	90
2	Tube lights	40	3	120	7	840
3	Fans	80	2	160	7	1120

**Computer Lab**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	8	320	7	2240
2	Fans	80	6	480	7	3360
3	LED LIGHTS	15	4	60	6	360
4	Computers	60	40	2400	6	14400
5	Virtual System	700	1	700	2	1400

<b>UG Library</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	7	420
2	Fans	80	9	720	7	5040
3	Computers	60	3	180	6	1080
4	BAR code Machine	50	1	50	2	100
5	Tube Light	40	8	320	7	2240

<b>UG Department of Computers</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	3	240	7	1680
3	Computers	60	2	120	6	720

<b>UG Computer Lab :</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	15	225	7	1575
2	Fans	80	19	1520	7	10640
3	Computers	60	46	2760	6	16560
4	Virtual systems	700	1	700	2	1400
5	TUBE lights	40	26	1040	7	7280
6	AC'S	2000	1	2000	7	14000

**UG Department of Commerce:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	3	45	7	315
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360
4	Tube Lights	40	3	120	7	840

**IQAC Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	12	180	6	1080
2	Fans	80	5	400	7	2800
3	Computers	60	3	180	6	1080

**UG Telugu Department**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	40	2	80	7	560
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

**UG English Department**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	40	3	120	7	840
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**UG Department of Mathematics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**Canteen**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	9	360	3	1080
2	Fans	80	12	960	3	2880
3	LED TUBE LIGHTS	15	2	30	6	180

**Security Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560

**Class Room in Degree Block ( 22- 30 )**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	5	75	7	525
2	Fans	80	27	2,160	7	15120
3	Tube Lights	40	14	560	7	3920

**Class Rooms in Degree Block (38-58)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	25	1000	7	7000
2	Fans	80	35	2800	7	19600
3	LED TUBE LIGHT	15	4	60	6	360

**Class Rooms in PG Block (101-115)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	30	1200	7	8400
2	LED TUBE LIGHT	15	6	90	6	540
3	Fans	80	33	2640	7	18480



<b>Class Rooms in PG Block (202-221)</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Powe Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	6	540
2	Fans	80	12	960	7	6720
3	Tube Lights	40	13	520	7	3640

<b>Class rooms in PG Block (301-323)</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	15	225	7	1575
2	TUBE lights	40	38	1520	7	10640
3	Fans	80	30	2400	7	16800

<b>UG-Toilets</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Exast Fans	60	8	480	7	3360

**PG Seminar Halls**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	18	270	7	1890
2	Fans	80	20	1600	7	11200
3	LCD Projector	280	1	280	6	1680
4	Sound System	300	4	1200	1	1200
5	Tube Lights	40	21	840	7	5880

**PG Library**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	8	640	7	4480

## PG Director and Correspondent Rooms

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	5	400	7	2800
3	Computers	60	2	120	6	720
4	AC's	2000	1	2000	6	12000
5	Water Cooler	500	3	1500	6	9000

<b>PG Office</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	8	320	7	2240
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360
4	Xerox Machine	650	1	650	2	1300
5	LED lights	15	5	75	6	450

<b>PG Department of Chemistry</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

<b>PG Chemistry Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	3	240	7	1680
3	Exast fans	60	5	300	7	2100
4	Refrigerator	500	1	500	6	3000

<b>PG Common Area and Toilets</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quanti ty</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>PowerConsumption/ Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	LED TUBE LIGHTS	15	19	285	6	1710
3	Lift	3000	1	3000	7	21000
4	Water cooler	500	3	1500	6	9000

<b>Gents staff room</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quanti ty</i>	<i>Power Consumptio n(Watt)</i>	<i>usage Per Day</i>	<i>PowerConsumption/D ay(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	LED TUBE LIGHTS	15	2	30	6	180
3	Fan	3000	2	6000	7	42000

**Environmental Consciousness and Sustainability/Alternate Energy initiatives such as:**

**1) Alternative Energy Initiative**

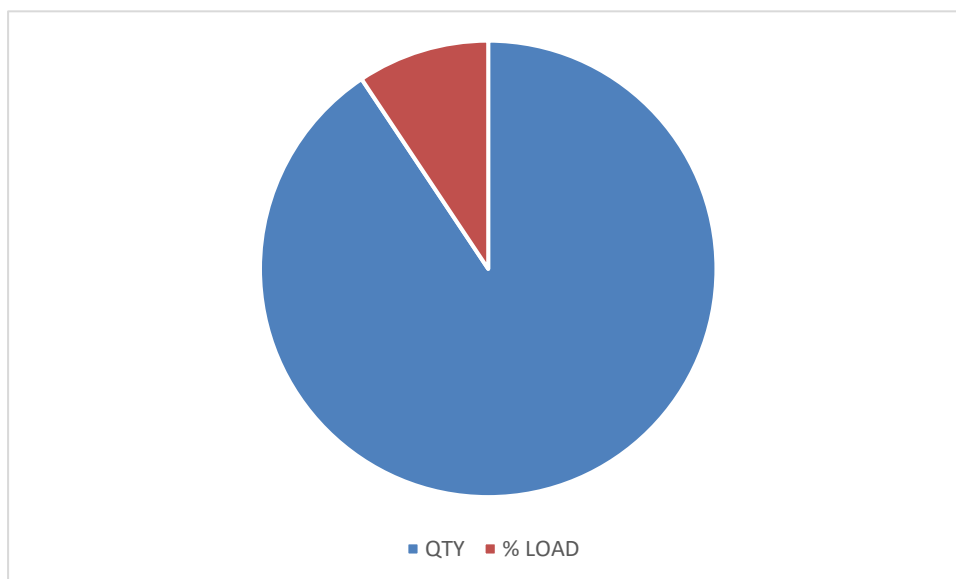
Percentage of power requirement met by renewable energy sources  
=(Power requirement met by renewable energy sources/Total power requirement)×100  
=(97603/187785)× 100  
= 51.98%

**2)Percentage of lighting power requirements met through LED bulbs**

Percentage of lighting power requirement met through LED bulbs  
=(Lighting power requirement met through LED bulbs/Total lighting power Requirement) ×100

**TYPE WISE LIGHTING DISTRIBUTION**

<b>SN O</b>	<b>TYPE</b>	<b>QTY</b>	<b>Kw LOAD</b>	<b>% LOAD</b>
1	LED Lights (15W)	198	2.97	20.45
2	Tube Lights (40W)	289	11.56	79.55



**Remarks:**

- It has been observed that in old and new building majority of electrical power Consumption is through light load such as fan, FTL and power load such as refrigerator, UPS etc. Unnecessary use of electrical equipment must be avoided.
- As per individual dept. level load consumption, we understand the scope for Improvement of energy saving. Hence our electricity bill will be reduced by proper load Management techniques along with optimum utilization of resources.

## Chapter:6

### **Lighting System**

#### **Observations and suggestions:**

- It is found that FTL, Bulbs, CFLs is installed in the facility.
- It is recommended that some tube lights in this area be switched off when
- Sufficient day light is available.
- Presently the reflectors installed for tube light
- Every light or electric gadget left on when not needed is wasting energy and money
- And is causing pollution that is totally unnecessary.
- Stand-by power can use upto 8% of a house hold's total electricity.

#### **Don't forget to power down these things when not in use:**

- Lights
- Heaters and fans (or air-conditioning)
- Printers and scanners
- Battery and phone chargers
- Computers
- Gaming consoles
- TVs, DVD players
- Stereos
- Kitchen gadgets such as blenders, kettles, toasters etc.



Merits /Existing Features for Energy Savings.

1. Staff vigilance.
2. Computers are connected in LAN.
3. Printers are shared in LAN.
4. Screen savers facility implemented for every computer.
5. AC's used are of three STARS.
6. Refrigerator's are three STARS.
7. Incandescent bulbs are nowhere used.
8. They are replaced by CFL tubes with electronic choke.
9. Maximum use of natural light.
10. Cross Ventilation is provided in laboratory & classrooms, which reduced number off ans.
11. Most of the practical's are scheduled in noon time where billing Rate in normal.
12. Walls are painted with off white colour to have sufficient brightness.
13. Solar powered street lamp is used.
14. LED flashlight is used in Seminarhall.
15. PV solar system (70 KV) is installed which is expected to generate 261Unit/day.

This saves Rs 7,20,103/Year.

## Chapter:8

### Energy Conservation Proposals

#### 9.1 Replacing Fluorescent Tube Lights (FTL)with LED Tube Lights

The 500 FTLs can be replaced with the LED tube lights 15W. These changes can be made at the places where the life is higher Usually minimum of 3 years warranty is given and approximate burning hours is 40,000. (15 years considering 8 hour)

#### Following calculations are done for 8 hours working:

Power consumption by 36 WFTL with conventional choke	=40W/Tube Light
Equivalent LED tube light	=15W/Tube Light
Savings in power	=24W/Tube Light
Operating hours	=8h/dayx300= 2400h/year
Y Tube Light Yearly savings	=2400x24 W=57.6kWh/year/Tube Light
Average Cost of electricity	= Rs.7.66/kWh
Saving	=57.6kWh x7.66= Rs.441.216/year/Tube light
Approximate investment on single LED Tube lights	=Rs.200
Number of Tube Lights to be replaced	= 250

#### Summary:

Total Yearly Saving= 250 x441.216=Rs.1,10,304/year

Total Investment = 250 x Rs.200=Rs.50,000

## 9.2 General Recommendations

- γ All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity. Display the stickers of save electricity, save nature everywhere in the campus. So that all stakeholders are encouraged to save the electricity.
- γ Most of the time, all the tube lights in a classroom are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF
- γ All projects to be kept OFF or in idle mode if there will be no presentation slides.
- γ All computers to have power saving settings to turn off monitors and hard discs, say 10 minutes/30minutes.
- γ The comfort Default air conditioning temperature to be set between 24°C to 26°C.
- γ Lights in toilet area may be kept OFF during daytime
- γ Use AUTOMATIC POWER FACTOR CORRECTION (APFC) Panel FOR PF improvement.
- γ Need to focus on existing solar plant which is generating power below the rated power.
- γ Need to use power saver circuits for AC.
- γ Need to replace FTL by smart LED Tube.
- γ Need to replace ordinary bulb by LED bulb.
- γ Need to replace ordinary CRT monitor by LED.
- γ Need to replace ordinary refrigerator by BEE power save refrigerator if possible.
- γ Out of total electricity bill paid, 53 percentage are actual energy utilized charges and remaining expense belongs to additional taxes on energy consumption
- γ Recently govt. has declared the exemption on electricity duty charges for school and colleges trying to get the benefit of the same as soon as possible.

### 9.3 Executive Recommendations:

1. There has to be Institute level student community that keeps track of the energy consumption Parameters of the various departments, classrooms, halls, areas, meters, etc
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.
3. Need to Create energy efficiency/ renewable energy awareness among the college campus. College should take initiative to arrange seminars, lectures, paper presentation competition among students and staff or general awareness.

#### References:

- 1) "Energy Management, Audit and Conservation" by Barun Kumar De
- 2) "Guide to Energy Management" by Barney L
- 3) "Energy Audits: A Work book for Energy Management in Buildings"by TarikAl-Shemmeri
- 4) "Fundamentals of Energy Conservation and Audit by A Garkar Santosh V yankat rao and Mateti Naresh Kumar
- 5) "Industrial Energy Conservation (UNESCO Energy Engineering)"by Charles MG ottsc

## **Energy Audit Report of 2019-2020**

**Sir C R Reddy College for Women, Eluru, Andhra Pradesh**

### **DETAILS OF CONSUMER**

---

1. Name of the Consumer : Sir C R Reddy college for women, Eluru
2. Name of the Contact Persons : Principal, Sir C R Reddy College
3. Address of the Consumer : RS No: ELR11, Vatluru Road, Eluru
4. Transformer Capacity : 200kVA
5. Permitted /Billable Demand : 100 kVA
6. Demand Charge : Rs.475
7. Annual Energy Consumption : 1,69,505 kWh/Annum
8. Annual Amount Paid : Rs.17,14035/ Annum
9. Type of Connection/ Sr. No. : HT II A ( i )
10. Name of Supplier' s office : APEPDCL
11. Period of Audit :June 2019-May 2020

**ENERGY AUDIT TEAM REPORT  
WORK COMPLETION REPORT**

**Name of work project** : Energy Audit of Sir C R Reddy College for Women, Eluru

**Work Period** : 01-06-2019 to 31-05-2020

This is to certify that the Energy Audit team appointed by the Principal, SIR CR REDDY COLLEGE FOR WOMEN, Eluru, has Successfully completed Energy audit.  
The Energy Audit is submitted its report on 19-08-2020 for this year 2020.

**Audit report by**

**Internal Committee**

1. Smt. K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy College for women,  
Eluru
2. Smt. S.Anuradha  
Head of the Dept.of Biotechnology  
IQAC & NAAC  
Coordinator
3. Smt. Ch. Anitha  
Lecturer in Dept. of Physics  
Convenor, Energy Audit
4. Smt. M.Jaya lakshmi Devi  
Lecturer in Dept. of Physics  
Sir C R Reddy College for women  
Member

*K. Sirisha*

*S. Anuradha*

*Ch. Anitha*

*M. Jaya*

**External Committee**

1. Sri.Y.Rambabu  
Asst. Engineer  
APEPDCL, Govt. of AP  
Eluru
2. Sri.T.Kranthi Kiran  
Assistant Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering College, Eluru
3. Sri. K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College, Eluru

*Y. Rambabu*  
Asst. Executive Engineer  
Operation : : APEPDCL  
PEDAPADU

*T. Kranthi Kiran*

*K. Anand Kumar*

# **ENERGY AUDIT**

**Report (2018-2019)**



**Prepared by**

**DEPARTMENT OF PHYSICS**

**SIR C R REDDY COLLEGE FOR WOMEN, ELURU**

(Affiliated to ADIKAVI NANNAYA UNIVERSITY, Rajamahendravaram )

West Godavari District, Andhra Pradesh 534007

Certificate

# ENERGY AUDIT

Academic year 2018-19



This is to certify that

SIR C R REDDY COLLEGE FOR WOMEN, ELURU  
VATLURU, WEST GODAVARI DISTRICT, AP  
has achieved the energy uses standards for the learning spaces  
with least impact on environment during the  
Energy Audit 2018-19

This certificate is issued on the basis of Energy Audit 2018-19

P. Sivakumari  
Convenor

S. Anuradha  
IQAC Coordinator

  
Asst. Executive Engineer  
APEPDCL  
PEDAPADU





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## **ENERGY AUDIT TEAM REPORT**

### **Internal Committee**

1. Smt.K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy College for Women,  
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Sir C R Reddy college for women  
Member

### **External Committee**

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APEPDCL, Govt, of AP  
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2. Sri.T.Kranthi Kiran  
Asst. Professor  
Department of Electrical and Electronics Engineering  
Sir C R Reddy Engineering college, Eluru
3. Sri.K Anand Kumar  
Department of Physics  
Sir C R Reddy Autonomous College, Eluru

## Preface

Data collection for energy audit of **Sir C.R. Reddy College for Women** was conducting an Energy Audit for the period of June 2018 to May 2019 .The final report was submitted on 2019.

This audit was over sight inquire about convenience to progress the energy competence of the campus. Energy audit survey was completed by B.Sc. Physics students under the guidance of their faculty members. All data collected from each classroom, laboratory, every room. The work is completed by considering how many tubes, fan, A.Cs, electronic instruments, etc. in each room. Consumption of electricity usage in each department component wise analysis

We really appreciate the effort put by Sir. C.R. Reddy College for women, management for creating awareness of Energy Audit, Use renewable energy such as solar energy and their significance use for efficient energy saving. We really appreciate Honorable management of the college for encouraging us by providing this wonderful opportunity to do the energy audit. Through this, we have been cleared the vision of Institution towards the Green campus and save our green nature. This replicates to develop ecofriendly atmosphere in our college premises.



## **Acknowledgement**

Energy Audit is a system is key instrument in knowing the present level of efficiency of the various components and establishing the areas of shortfall for improvement.

We take this opportunity to convey our sincere thanks and gratitude for the kind cooperation extended by the management and staff.

We express our sincere thanks to

- 1.Smt.P.Sailaja,Principal
- 2.Smt.S.Anuradha,Vice Principal
- 3.Smt.K. Sirisha Dept. of physics

We are sure, this report will be quite useful for energy management to intensify and implement energy conservation measures in the organization and achieve desired savings.

## Summary

Energy audit is a sequence of tasks performed in a planned manner. It requires discussion, survey, collection of data, analysis and reporting.

The salient observations and recommendations are given below.

1. **SIR C. R. Reddy College for Women, Eluru**
2. **SIR C.R. Reddy PG College for Women**
  - a. **From EPDCAPL**
  - b. **Electricity SOLAR Grid connected solar plant(70kw)**
  - c. **High Speed Diesel Generator (HSDG)**

Electrical energy is used for various applications ,like: Computers, Lighting, Air-Conditioning ,Fans Other Laboratory Equipment ,and Printers, Xerox machines, CCTV, UPS, LCD Projector, Router system, floodlight, Pumping motor etc.

3. The average cost of energy is around **1,58,432 Rs./Month.**
4. The Specific Energy Consumption (SEC) I is the ratio of energy required per square meter.

## Abbreviations

<b>AC</b>	Air conditioner
<b>AC</b>	Alternating current
<b>DC</b>	Direct current
<b>HZ</b>	Hertz
<b>Kg</b>	<b>Kilogram</b>
<b>KVA</b>	<b>Kilo-volts-ampere</b>
<b>KW</b>	Kilowatts
<b>KWH</b>	Kilowatthour
<b>LED</b>	<b>Light Emmitting diode</b>
<b>V</b>	Volts
<b>W</b>	Watts
<b>PF</b>	<b>Powerfactor</b>
<b>DG</b>	<b>Diesel Generator</b>
<b>SEC</b>	<b>SpecificEnergyconsumption</b>
<b>EPDCAPL</b>	<b>EASTERNPowerdistributioncompanyofAndhra Pradesh limited</b>

## Chapter: 1

### 4. Introduction to Energy Audit

#### **Energy Audit:-**

Energy Audit is an inspection, survey and analysis of energy flows for energy conservation in a building or system to reduce the amount of energy input to the system without negatively affecting the output.

As per the Energy conservation Act 2001, Energy Audit is defined as the “the Verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption

#### **Energy Audits are two types**

##### **1. A preliminary Energy Audit**

##### **2. Detailed Energy Audit**

**Preliminary Energy Audit:-**This type of audit is simply a data – gathering exercise that offers a preliminary analysis.

#### **Detailed energy audit:-**

This type of audit is completed by a professional auditor who monitors, analyzes, and verifies

Energy use to establish problem areas and ways to implement energy efficiency improvements.

#### **Objectives of Energy Audit:-**

The Energy Audit provides the vital information base for overall energy utilization analysis and evaluation of energy conservation measures. It aims at

- Identifying the quality and cost of various energy inputs
- Assessing present pattern of energy consumption in different cost centers of operations
- Relating energy inputs and production output
- Identifying potential areas of thermal and electrical energy economy
- Highlighting wastages in major areas
- Fixing of energy saving potential targets for individual cost centers
- Implementation of measures for energy conservation & realization of savings

## Chapter:2

### General Details

Sr. No.	Particulars	Details
1	Name of the Institute	<b>SIR C.R. REDDY COLLEGE FOR WOMEN</b>
2	Address	<b>SIR C.R. REDDY COLLEGE FOR WOMEN ,ELURU, WEST GODAVARI DISTRICT, A.P</b>
3	Year of Establishment	14 -09-1987
4	Courses Offered	B.Sc B. Com (General)&(Voc) B.Sc.(Computer Science) B.Sc( Life sciences) M.Sc (Organic chemistry)
5	Affiliation	Adikavi Nannaya University, Rajamahendravaram



## **Chapter:3**

### **Energy Consumption Profile**

#### **Source of Energy:**

**SIR C R REDDY COLLEGE FOR WOMEN, ELURU, WEST GODAVARI DISTRICT, AP**

#### **Uses Energy in following forms:**

**a. Electricity from EPDCAPL:**

SIR C.R. Reddy college for women, Eluru, West Godavari district, A .P receives energy

**b. High Speed Diesel Generator (HSDG):**

HSD is used as a fuel for Diesel Generator which is run whenever power supply is not available

EPDCAPL is not available



**SOLAR PANELS**



**LED STREET LIGHTS**



**SOLAR GRID INVERTER (70KW)**



## **LED LIGHTS**

**Following are the major consumers of electricity in the facility:**

- Computers
- Lighting
- Air-Conditioning
- Fans
- Other Lab Equipment
- Printers

## CHAPTER-4

### Historical Data Analysis

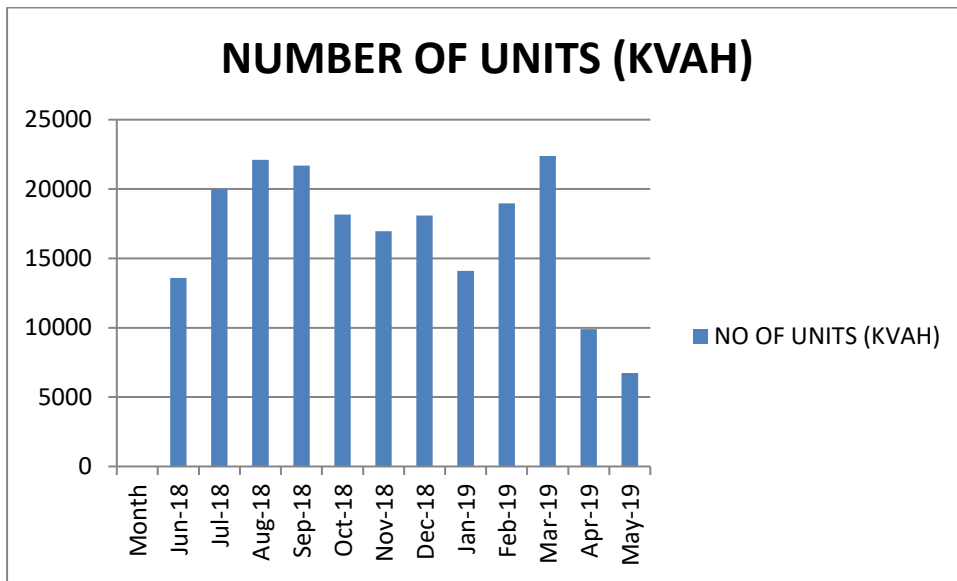
#### 4.1: Study of variation of Monthly Units consumption & Power Factor:

In this Chapter, We study the details of 12 month Electricity Bills.

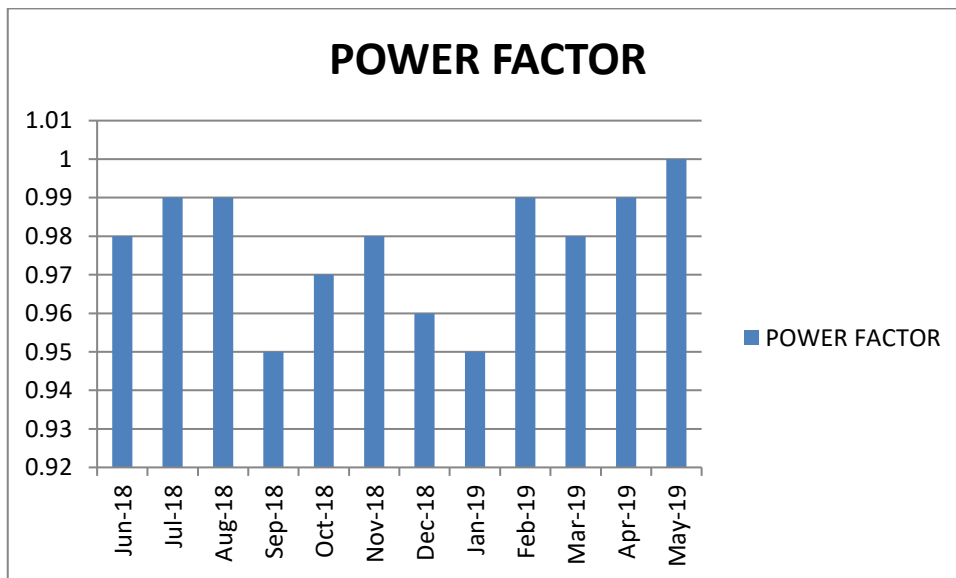
**Table No 4.1 Variation in units consumption & Power Factor(PF)**

<b>Variation in Units consumption and power factor</b>			
<b>S.NO</b>	<b>Month</b>	<b>NUMBER OF UNITS(KV AH)</b>	<b>POWERFACTOR</b>
1	Jun-2018	13588	0.98
2	Jul-2018	20011	0.99
3	Aug-2018	22108	0.99
4	Sep-2018	21693	0.95
5	Oct-2018	18172	0.97
6	Nov-2018	16960	0.98
7	Dec-2018	18093	0.96
8	Jan-2019	14096	0.95
9	Feb-2019	18964	0.99
10	Mar-2019	22382	0.98
11	Apr-2019	9909	0.99
12	May-2019	6745	1.00
	<b>TOTALUNITS =</b>	<b>2,02,892</b>	<b>AVERAGE = 0.97</b>

## MONTH WISE UNIT CONSUMPTION



## MONTH WISE POWER FACTOR VARIATION



### **Conclusion: Variation of PF**

The Power Factor to reduce the utility power bill. Most utility bills are influenced by KVAR usage. A good Power Factor provides a better voltage. Reducing the pressure on electrical distribution network. Reducing cable heating, cable over loading and cable losses .Reducing over loadings of control gears and switch-gears etc.....

Whenever the average power factor over a billing cycle or a month, whichever is lower, of a High Tension consumer is below 90%, Penal charges shall be levied to the consumer at the rate of 2 % (two %) of the amount of monthly energy bill (excluding of Demand Charges, FOCA, Electricity Duty and Regulatory Liability Charge etc.)

For power factor of 0.99, the effective incentive will amount to 5% (five percent) reduction in the energy bill and for unity power factor; the effective incentive will amount to 7% (seven percent) reduction in the energy bill.

## 4.2 STUDY OF MONTH WISE ELECTRICITY BILL VARIATION

TABLE NO 4.2

VARIATION IN ELECTRICITY BILL		
SNO	MONTH	ELECTRICITY BILL AMOUNT IN RS/-
1	Jun-2018	1,24,500
2	Jul-2018	1,93,356
3	Aug-2018	2,12,061
4	Sep-2018	2,44,082
5	Oct-2018	173,654
6	Nov-2018	1,56,959
7	Dec-2018	174314
8	Jan-2019	1,19,442
9	Feb-2019	1,75,034
10	Mar-2019	2,12,064
11	Apr-2019	65,949
12	May-2019	49,774
<b>TOTAL ANNUAL BILL</b>		<b>19,01,189</b>
<b>AVERAGE MONTHLY BILL</b>		<b>1,58,432</b>

Conclusion: Monthly Electricity bill variation has been identified  
Roof top PV Solar System (70kW) installed on terrace of Annex building

- Average Monthly Bill in the year 2017-18 =Rs 1,85,728
- Average Monthly Bill in the year 2018-19 =Rs 1,58,432
- Savings in bill due to installation(per month) =Rs 65735
- Annual savings in bill(one year) =Rs 7,23085

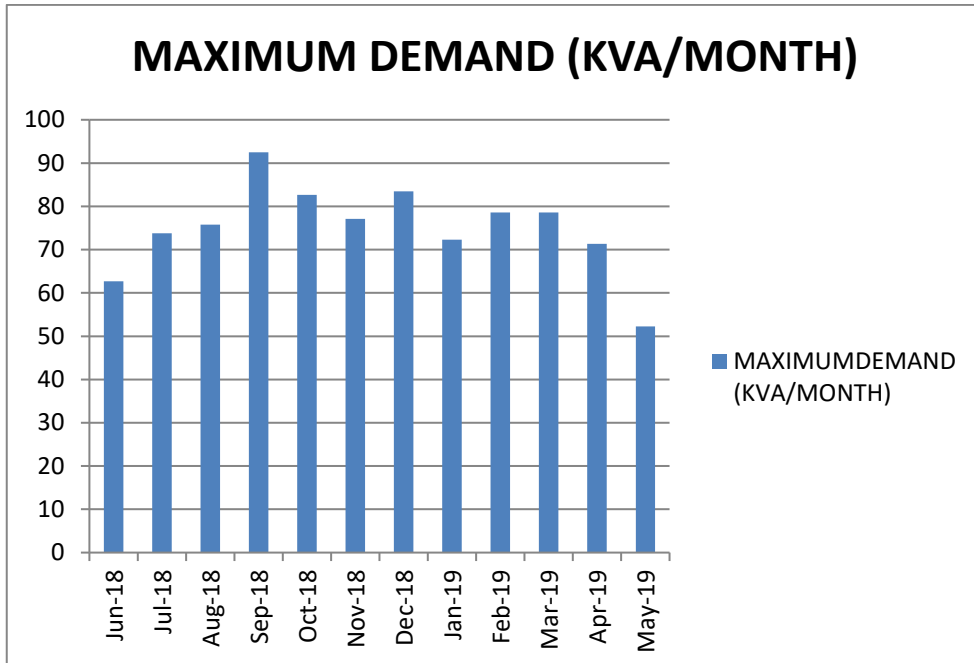
### ● 4.3: STUDY OF MONTH WISE MAXIMUM DEMAND VARIATION

TABLE NO 4.3

SNO	MONTH	MAXIMUM DEMAND (KVA/MONTH)
1	Jun-2018	62.70
2	Jul-2018	73.80
3	Aug-2018	75.80
4	Sep-2018	92.52
5	Oct-2018	82.68
6	Nov-2018	77.08
7	Dec-2018	83.50
8	Jan-2019	72.32
9	Feb-2019	78.60
10	Mar-2019	78.60
11	Apr-2019	71.30
12	May-2019	52.22



## MONTH WISE DEMAND VARIATION



## 5. Study of Month wise Load Factor Variation

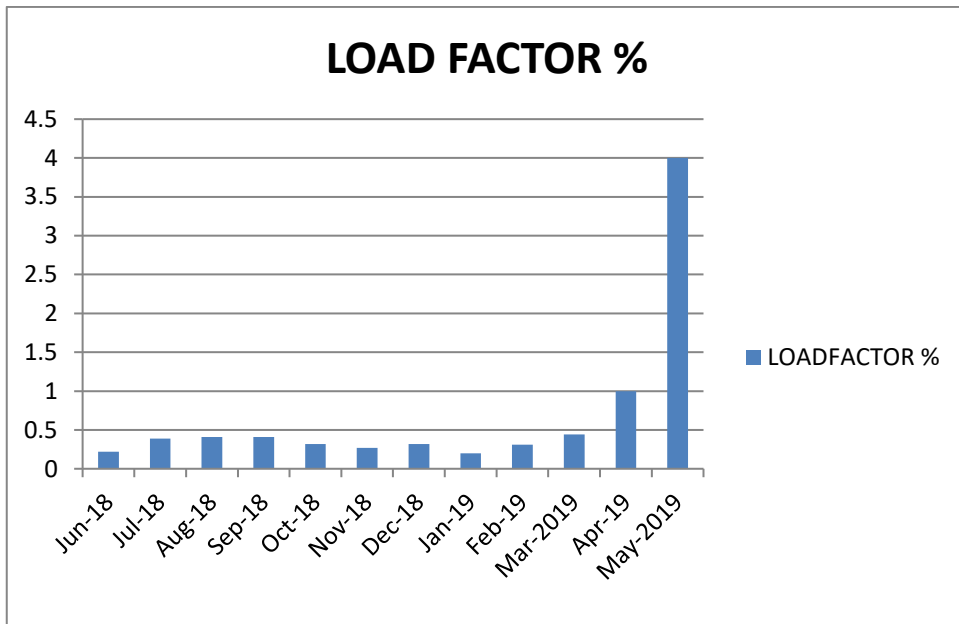
Electrical Load factor is a measure of the utilization rate, or efficiency of electrical energy usage. It is the ratio of total energy (KWh) used in the billing period divided by the possible total energy used within the period, if used at the peak demand (KW) during the entire period. Thus,

**Load Factor=KWh/(KW/hours in the period/number of days in the billing cycle**

**4.4 :STUDY OF MONTH WISE LOAD FACTOR VARIATION  
TABLE NO 4.4**

<b>SNO</b>	<b>MONTH</b>	<b>LOADFACTOR %</b>
1	Jun-2018	0.22
2	Jul-2018	0.39
3	Aug-2018	0.41
4	Sep-2018	0.41
5	Oct-2018	0.32
6	Nov-2018	0.27
7	Dec-2018	0.32
8	Jan-2019	0.20
9	Feb-2019	0.31
10	Mar-2019	0.44
11	Apr-2019	1
12	May-2019	4

## LOAD FACTOR VARIATION%



### **Conclusion: Variation in monthly Load Factor**

If your load factor ratio is above 0.75 electrical usage is reasonably efficient. If the load factor is below 0.5, you have periods of very high usage (demand) and a low utilization rate. Low load factor customers would benefit from a peak demand control system or from a Battery Energy Storage System to distribute electrical usage out over longer intervals of time and smooth peaks.

Low load factors, such as below 0.4, contribute significantly to the overall monthly electric bill in the form of demand charges. These demand charges are listed on the bill as coincident demand, facilities demand, and summer time related demand.

### **General Observations based on Electricity Bill:**

- 1.** For College Campus the Contract Demand (CD) is 100 kVA and minimum billing Demand is 50% of the Contract Demand (i.e. 50 kVA) or the 92% of previous Maximum Demand recorded whichever is higher. Since, the MD recorded is less than 50kVA.
- 2.** The average electricity cost is Rs.7.66 considering the last twelve months. (Excluding TOD charges, MD and PF charges)
- 3.** Average monthly Power Factor is maintained near **P.F.0.97**

## Chapter:5

### Department wise power Consumption analysis

#### Experimental and Data Collection:-

All required data is Collected by Department of Physics. In building, in every room. how much fans, tubes, Computers, instrument AC, etc will these is measured. According to survey following data is collected

#### Total power requirement of Various Equipment.

	Name Of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage Per Day (Hr)	Power Consumption/ Day (Watt)
1	TUBE Lights	40	300	12000	7	84000
2	Fans	80	304	24320	7	170240
3	LED TUBELIGHTS	15	187	2805	6	16830
4	Computers	60	45	2700	6	16200
5	Printers & Xerox machines	300	3	900	1	900
6	AC's	2000	4	8000	6	48000
7	Scanners	250	2	500	2	1000
8	Water Cooler	500	5	2500	6	15000
9	Refrigerator	500	3	1500	6	9,000
10	Physics Lab Equipment Consumption	1000	1	1000	4	4,000
11	Physics Lab Equipment Consumption	500	1	500	4	2,000
12	Chemistry Lab Equipment Consumption	500	2	1000	4	4,000
13	Electronic Lab Equipment	700	1	700	4	2,800
14	Projecters	700	2	1400	2	2800
15	Sound Systems & speakers	700	4	2800	3	8400
16	Lab Equipment Consumption	700	4	2800	4	11200
17	Bar Code & Machine	50	1	50	2	100
18	Exast Fans	60	9	540	7	3780
19	Biometric machines	12	3	36	4	144

Total power requirement of all instruments is **400,322 kW** per day.

Total power consumption per month **12,009,660 kW** per month .

PV solar system 70 kv is installed which is expected to generate 261 unit / day.  
This saves Rs 7,23,085/ Year.

## Department wise Load consumption

<b>Correspondent Room</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	3	240	7	1,680
3	LED TUBE LIGHTS	15	10	150	8	1,200
4	Computers	60	1	60	6	360
5	AC's	2000	1	2000	7	14,000

## Principal Room

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	2	160	7	1120
2	LED TUBE LIGHTS	15	9	135	8	1080
3	Computers & CCTV	60	1	60	6	360
4	AC's	2000	1	2000	7	14,000
5	TUBE Lights	40	2	80	7	560

**UG Office**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	5	200	7	1400
2	Fans	80	9	720	7	5040
3	Computers	60	10	600	6	3600
4	Printer Cum Scanner	300	1	300	1	300
5	LED Tube lights	15	12	180	6	1080
6	Xerox machine	650	1	650	2	1300

**Examination Cell**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Fans	80	5	400	7	2800
2	Computers	60	1	60	6	360
3	Printers Cum Scanner	300	1	300	1	300
4	Xerox Machine	650	1	650	2	1300
5	LED Tube lights	15	10	150	6	900



**UG Department of Physics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Physics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	7	560	7	3920
3	LED lights	15	4	60	6	360
3	Physics Lab Equipment Consumption	500	1	500	4	2000

**UG Department of Electronics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

**UG Electronics Lab**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	2	30	7	210
2	Fans	80	5	400	7	2800
3	Electronics Lab Equipment Consumption	700	1	700	4	2800
4	TUBE Lights	40	2	80	7	560

<b>UG Department of Chemistry</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360

<b>UG Chemistry Lab</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	7	420
2	Fans	80	1	80	7	560
3	Exast Fans	60	4	240	7	1680
4	Chemistry Lab Equipment Consumption	500	1	500	4	2000
5	Tube Lights	40	2	80	7	560

<b>UG Common Area</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption( Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	35	1400	7	9800
2	Fans	80	8	640	7	4480
3	LED TUBE LIGHTS	15	2	30	6	180
4	Stage lights LED lights	15	12	180	6	1080
5	Water Coolers	500	2	1000	6	6000

<b>UG Department of Botany</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360
4	Refrigerator	500	1	500	6	3000

<b>UG Botany Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	3	45	7	315
2	Fans	80	3	240	7	1680
3	Tube Lights	40	9	360	7	2520

<b>UG Department of Zoology and Fisheries</b>						
<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360

<b>UG Department of Zoology and Fisheries Lab</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	4	60	7	420
2	Fans	80	3	240	7	1680
3	Tube Lights	40	4	160	7	1120

<b>UG College Ladies Gym:</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Tube Lights	15	1	15	6	90
2	TUBE lights	40	4	160	7	1120
3	Fans	80	2	160	7	1120

**UG Waiting Hall:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED TUBE Lights	15	1	15	6	90
2	lights	40	3	120	7	840
3	Fans	80	2	160	7	1120

**Computer Lab**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	Tube Lights	40	8	320	7	2240
2	Fans	80	6	480	7	3360
3	LED LIGHTS	15	4	60	6	360
4	Computers	60	11	660	6	3960

<b>UG Library</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	2	30	7	210
2	Fans	80	9	720	7	5040
3	Computers	60	1	60	6	360
5	BAR code Machine	50	1	50	2	100
6	Tube Lights	40	10	400	7	2800

<b>UG Department of Computers</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

<b>UG Computer Lab :</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	5	75	7	525
2	Fans	80	19	1520	7	10640
3	Computers	60	6	360	6	2160
4	Virtual systems	700	1	700	2	1400
5	TUBE lights	40	30	1200	7	8400
6	AC'S	2000	1	2000	7	14000

**UG Department of Commerce:**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	2	30	7	210
2	Fans	80	4	320	7	2240
3	Computers	60	1	60	6	360
4	TUBE Lights	40	3	120	7	840



**UG Telugu Department**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	40	2	80	7	560
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

**UG English Department**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**UG Department of Mathematics**

<i>Sl no</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	Fans	80	3	240	7	1680
3	Computers	60	1	60	6	360

**Canteen**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	9	360	3	1080
2	Fans	80	12	960	3	2880
3	LEDTUBE LIGHTS	15	1	15	6	90

**Security Room**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560

**Class Room in Degree Block ( 22- 30 )**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	6	540
2	Fans	80	27	2,160	6	12960
3	TUBE Lights	40	12	480	7	3360

**Class Rooms in Degree Block (38-58)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	23	920	7	6440
2	Fans	80	35	2800	7	19600
3	LED TUBE LIGHT	15	12	180	6	1080

**Class Rooms in PG Block (101-115)**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	25	1000	7	7000
2	LEDTUBE LIGHT	15	14	210	6	1260
3	Fans	80	33	2640	7	18480

<b>Class Rooms in PG Block(202-221)</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Powe Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	6	540
2	Fans	80	14	1120	7	7840
3	TUBE Lights	40	10	400	7	2800

<b>Classrooms in PG Block(301-323)</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	17	255	7	1785
2	TUBE lights	40	36	1440	7	10080
3	Fans	80	30	2400	7	16800

<b>UG-Toilets</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	4	160	7	1120

**PG Seminar Halls**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	21	315	7	2205
2	Fans	80	20	1600	7	11200
3	Sound System	700	4	2800	3	8400
4	Tube Lights	40	21	840	7	5880
5	Projector	700	1	700	2	1400

**PG Library**

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	8	640	7	4480

## PG Director and Correspondent Rooms

<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	Fans	80	5	400	7	2800
3	Computers	60	2	120	6	720
4	AC's	2000	2	4000	6	24000
5	Refrigerators	500	1	500	6	3000

<b>PG Office</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	8	320	7	2240
2	Fans	80	2	160	7	1120
3	Computers	60	1	60	6	360
4	Xerox Machine	650	1	650	2	1300
5	LED lights	15	2	30	6	180

<b>PG Department of Chemistry</b>						
<i>Sno</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantity</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	1	40	7	280
2	Fans	80	1	80	7	560
3	Computers	60	1	60	6	360

<b>PG Chemistry Lab</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quantit y</i>	<i>Power Consumption (Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	LED Lights	15	6	90	7	630
2	Fans	80	3	240	7	1680
3	Exast fans	60	5	300	7	2800
4	Refrigerator	500	1	500	6	3000
5	Chemistry Lab Equipment Consumption	500	1	500	4	2000



<b>PG Common Area and Toilets</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quanti ty</i>	<i>Power Consumptio n(Watt)</i>	<i>Usage Per Day</i>	<i>Power Consumption/ Day(Watt)</i>
1	TUBE Lights	40	3	120	7	840
2	LED TUBE LIGHTS	15	18	270	6	1620
3	Water Coolers	500	3	1500	6	9000

<b>Gents staff room</b>						
<i>Sn o</i>	<i>Name of the appliance</i>	<i>Power rating (Watt)</i>	<i>Quanti ty</i>	<i>Power Consumptio n(Watt)</i>	<i>usage Per Day</i>	<i>Power Consumption /Day(Watt)</i>
1	TUBE Lights	40	2	80	7	560
2	LED TUBE LIGHTS	15	1	15	6	90
3	Fan	3000	2	6000	7	42000

**Environmental Consciousness and Sustainability / Alternate Energy initiatives such as:**

**1) Alternative Energy Initiative**

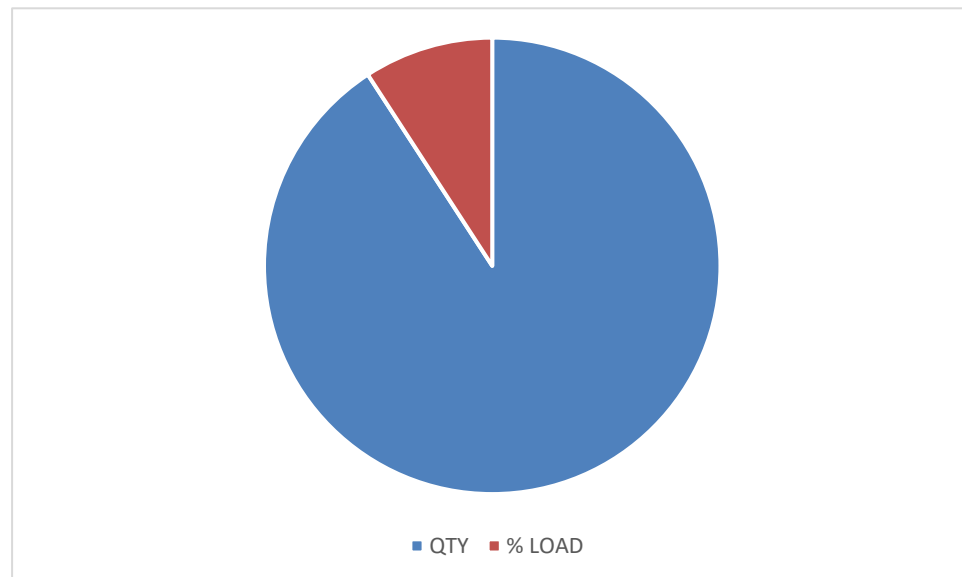
Percentage of power requirement met by renewable energy sources  
=(Power requirement met by renewable energy sources/Total power requirement)×100  
=(96323/202622)× 100  
= 47.5%

**2)Percentage of lighting power requirements met through LED bulbs**

Percentage of lighting power requirement met through LED bulbs  
=(Lighting power requirement met through LED bulbs/Total lighting power Requirement)×100

**TYPEWISELIGHTINGDISTRIBUTION**

<b>SN O</b>	<b>TYPE</b>	<b>QT Y</b>	<b>Kw LOAD</b>	<b>% LOAD</b>
1	Tube Lights(15W)	187	2.8	18.9
2	LED Lights(40W)	300	12.0	81.0



**Remarks:**

- It has been observed that in old and new building majority of electrical power Consumption is through light load such as fan, FTL and power load such as refrigerator, UPS ,etc. Unnecessary use of electrical equipment must be avoided.
- As per individual dept. level load consumption, we understand the scope for Improvement of energy saving. Hence our electricity bill will be reduced by proper load Management techniques along with optimum utilization of resources.

## Chapter: 6

### **Lighting System**

#### **Observations and suggestions:**

- It is found that FTL, Bulbs ,CFLs is installed in the facility.
- It is recommended that some tube lights in this area be switched off when
- Sufficient day light Is available.
- Presently there flectors installed for tube light
- Every light or electric gadget left on when not needed is wasting energy and money
- And is causing pollution that is totally unnecessary.
- Stand-by power can use upto 8% of a household's total electricity.

#### **Don't forget to power down these things when not in use:**

- Lights
- Heaters and fans(or air-conditioning)
- Printers and scanners
- Battery and phone chargers
- Computers
- Gaming consoles
- TVs, DVD players
- Stereos
- Kitchen gadgets such as blenders, kettles , to asters etc.

Merits/Existing Features for Energy Savings.

1. Staff vigilance.
2. Computers are connected in LAN.
3. Printers are shared in LAN.
4. Screen savers facility implemented for every computer.
5. AC's used are of three STARS.
6. Refrigerators are three STARS.
7. In can descent bulbs are no where used.
8. They are replaced by CFL tubes with electronic choke.
9. Maximum use of natural light.
10. Cross Ventilation is provided in laboratory & classrooms, which reduced number of fans.
11. Most of the practical's are scheduled in noon time where billingRate in normal.
12. Walls are painted with off white color to have sufficient brightness.
13. Solar powered street lamp is used.
14. LED flashlight is used in Seminar hall.
15. PV solar system (70KV) is installed which is expected to generate 261 Unit/day.

This saves Rs7,23,085/Year.

## Chapter:8

### Energy Conservation Proposals

#### 9.1 Replacing Fluorescent Tube Lights (FTL) with LED Tube Lights

The 500FTL can be replaced with the LED tube lights 15 W. These changes can be made at the places where the life is higher. Usually minimum of 3years warranty is given and approximate burning hours is 40,000.(15years considering 8hour)

#### **Following calculations are done for 8hours working:**

Power consumption by 36WFTLwith conventional cho	=40W/Tube Light
Equivalent LED tube light	=15W/Tube Light
Savings in power	=24W/Tube Light
Operating hours	=8h/dayx300= 2400h/year
Y Tube Light Yearly savings	=2400x24 W=57.6kWh/year/Tube Light
Average Cost of electricity	= Rs.7.66/kWh
Saving	=57.6kWh x7.66= Rs.441.216/year/Tube light
Approximate investment on single LED Tube lights	=Rs.200
Number of Tube Lights to be replaced	= 250

#### Summary:

Total Yearly Saving= 250 x441.216=Rs.1,10,304/year

Total Investment = 250 xRs.200=Rs.50,000

## 9.2 General Recommendations

γ All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity. Display the stickers of save electricity, save nature everywhere in the campus. So that all stakeholders are encouraged to save the electricity.

γ Most of the time,all the tube lights in a classroom are kept ON,even though,there is sufficient light level n earth window opening .In such cases ,the light own earth window may be kept OFF

γ All projects to be kept OFF or in idle mode if there will be no presentation slides.

γ All computers to have power saving settings to turn off monitors and hard discs, say 10 minutes/30minutes.

γ The comfort Default air conditioning temperature to be set between 24°C to 26°C.

γ Lights in toilet area may be kept OFF during day time

γ Use AUTOMATIC POWER FACTOR CORRECTION (APFC) Panel FOR P F improvement.

γ Need to focus on existing solar plant which is generating power below the rated power

γ Need to use power saver circuits for AC.

γ Need to replace FTL by smart LED Tube

γ Need to replace ordinary bulb by LED bulb.

γ Need to replace ordinary CRT monitor by LED.

γ Need to replace ordinary refrigerator by BEE power save refrigorate or if possible.

γ Out of total electricity bill paid ,53 percentage are actual energy utilized charges and remaining expense belongs to addition all taxes on energy consumption

γ Recently govt .has declared the exemption on electricity duty charges for school and colleges trying to get the benefit of the same as soon as possible

### 9.3 Executive Recommendations:

1. There has to be Institute level student community that keep track of the energy consumption Parameters of the various departments, class rooms, halls, areas, meters,etc
2. Energy auditing in side the campus has to bed one on a regular basis and report should be made public to generate awareness.
3. Need to Create energy efficiency/ renewable energy awareness among the college campus. College should take initiative to arrange seminars ,lectures ,paper presentation competition among students and staff or general awareness.

#### References:

- 1) “Energy Management, Audit and Conservation” by Barun Kumar De
- 2) “Guide to Energy Management” by Barney L
- 3) “Energy Audits: A Work book for Energy Management in Buildings” by Tarik Al-Shemmeri
- 4) “Fundamentals of Energy Conservation and Audit” by A Garkar Santosh Vyankat rao and Mateti Naresh Kumar
- 5) “Industrial Energy Conservation (UNESCO Energy Engineering)”by Charles M G ottsc



## Energy Audit Report of 2018-2019

Sir C R Reddy College for Women , Eluru, Andhra Pradesh

### DETAILS OF CONSUMER

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1. Name of the Consumer : Sir C R Reddy College for Women, Eluru
2. Name of the Contact Persons : Principal, Sir C R Reddy College
3. Address of the Consumer : RS No: ELR11, Vatluru Road, Eluru.
4. Transformer Capacity : 200kVA
5. Permitted /Billable Demand : 100 kVA
6. Demand Charge : Rs.475
7. Annual Energy Consumption : 2,02,892 kWh/Annum
8. Annual Amount Paid : Rs.19,01,189/ Annum
9. Type of Connection/ Sr. No. : HT II A ( i )
10. Name of Supplier' s office : APEPDCL
11. Period of Audit : June 2018-May 2019

**ENERGY AUDIT TEAM REPORT  
WORK COMPLETION REPORT**

**Name of work project** : Energy Audit of Sir C R Reddy College for Women, Eluru

**Work Period** : 01-06-2018 to 31-05-2019

This is to certify that the Energy Audit team appointed by the Principal , SIR CR REDDY COLLEGE FOR WOMEN, Eluru, has Successfully completed Energy audit.

The Energy Audit is submitted its report on 22-08-2019 for this year 2019.

**Audit report by**

**Internal Committee**

1. Smt. K.Sirisha  
Head of the Department of Physics  
Sir C R Reddy College for women,  
Eluru



2. Smt. S.Anuradha  
Head of the Dept.of Biotechnology  
IQAC & NAAC  
Coordinator



3. Smt. P.Siva kumari  
Lecturer in Dept. of Physics  
Convenor, Energy Audit



4. Smt. M.Jaya lakshmi Devi  
Lecturer in Dept. of Physics  
Sir C R Reddy College for women  
Member



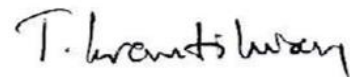
**External Committee**

1. Sri.Y.Rambabu  
Asst. Engineer  
APEPDCL , Govt. of AP  
Eluru



**Asst. Executive Engineer  
Operation : : APEPDCL  
PEDAPADU**

2. Sri.T.Kranthi Kiran  
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3. Sri. K Anand Kumar  
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Sir C R Reddy Autonomous College, Eluru

