

**ENERGY AUDIT REPORT**  
of  
**Deccan Education Society's,**  
**THE BRIHAN MAHARASHTRA COLLEGE OF COMMERCE,**  
**Shivajinagar, Pune 411 004**



**Year: 2021-22**

Prepared by

**ENGRESS SERVICES**

Yashashree, 26, Nirmal Bag Society  
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MAHARASHTRA ENERGY DEVELOPMENT AGENCY



**Maharashtra Energy Development Agency**

(Government of Maharashtra Institution)  
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,  
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Ph No: 020-35000450  
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ECN/2022-23/CR-43/1709

10<sup>th</sup> May, 2022

**CERTIFICATE OF REGISTRATION  
FOR CLASS 'A'**

We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

**Name and Address of the firm** : M/s Engress Services  
Yashshree, 26, Nirmal Bag Society,  
Near Muktangan English School,  
Parvati, Pune – 411 009.

**Registration Category** : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

**Registration Number** : *MEDA/ECN/2022-23/Class A/EA-32.*

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09<sup>th</sup> May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

# Engress Services

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Near Muktangan English School, Parvati, Pune 411 009  
Tel: 09890444795 Email: [engress123@gmail.com](mailto:engress123@gmail.com)

Ref: ES/DESBMCC/21-22/01

Date: 10/5/2022

## CERTIFICATE

This is to certify that we have conducted Energy Audit at Deccan Education Society's The Brihan Maharashtra College of Commerce, Shivajinagar, Pune 411 004, in the year 21-22.

The College has adopted **Energy Efficient** practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of **5500 LPD** Solar Thermal Water Heating System

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

**For Engress Services,**

**A Y Mehendale,**  
Certified Energy Auditor  
EA-8192

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## **ACKNOWLEDGEMENT**

We at Engress Services, Pune, express our sincere gratitude to the management of Deccan Education Society's The Brihan Maharashtra College of Commerce, Pune, for awarding us the assignment of Energy Audit of their campus for the Year: 2021-22.

We are thankful to various Head of Departments & other Staff members for helping us during the field measurements.

## EXECUTIVE SUMMARY

1. Deccan Education Society's, The Brihan Maharashtra College of Commerce, Shivajinagar, Pune 411 004, consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

### 2. Present Energy Consumption:

No	Parameter /Value	Electrical Energy Consumed, kWh	CO <sub>2</sub> Emissions, MT
1	Total	155535	139.98
2	Maximum	21451	19.31
3	Minimum	8117	7.31
4	Average	12961.25	11.67

### 3. Various Majors Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of **5500 LPD** Solar Thermal Water Heating System

### 4. Usage of Alternate / Renewable Energy:

- The College has installed Solar Water Heating System of Capacity **5500 LPD**.
- Equivalent Electrical Energy saved by Solar Water System in 21-22 is **45205 kWh**.
- The Energy purchased from MSEDCL in 21-22 is **155535 kWh**
- Total Energy requirement is **200740 kWh**
- The percentage of Alternate Energy to Annual Energy Demand in 21-22 is **22.52 %**.

### 5. Usage of LED Lighting:

- The total Lighting Load is **25.14 kW**,
- The Total LED Lighting Load is **8.03 kW**.
- The % of Total Lighting Requirement met by LED Lighting is **31.94 %**.

### 6. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere
2. Energy saved by 100 LPD Solar Thermal Water Heating System in an year is **1500 kWh**
3. Annual working Days: For Solar Thermal Water Heating System in 21-22: **200 Nos**

### 7. References:

1. For CO<sub>2</sub> Emissions: [www.tatapower.com](http://www.tatapower.com)
2. For Energy saved by Solar Thermal Water Heating System : [www.mahaurja.com](http://www.mahaurja.com)

## **ABBREVIATIONS**

AC	:	Air conditioner
DES	:	Deccan Education Society
CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
LPD	:	Liters per Day
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
PC	:	Personal Computer
MT	:	Metric Ton

## CHAPTER-I INTRODUCTION

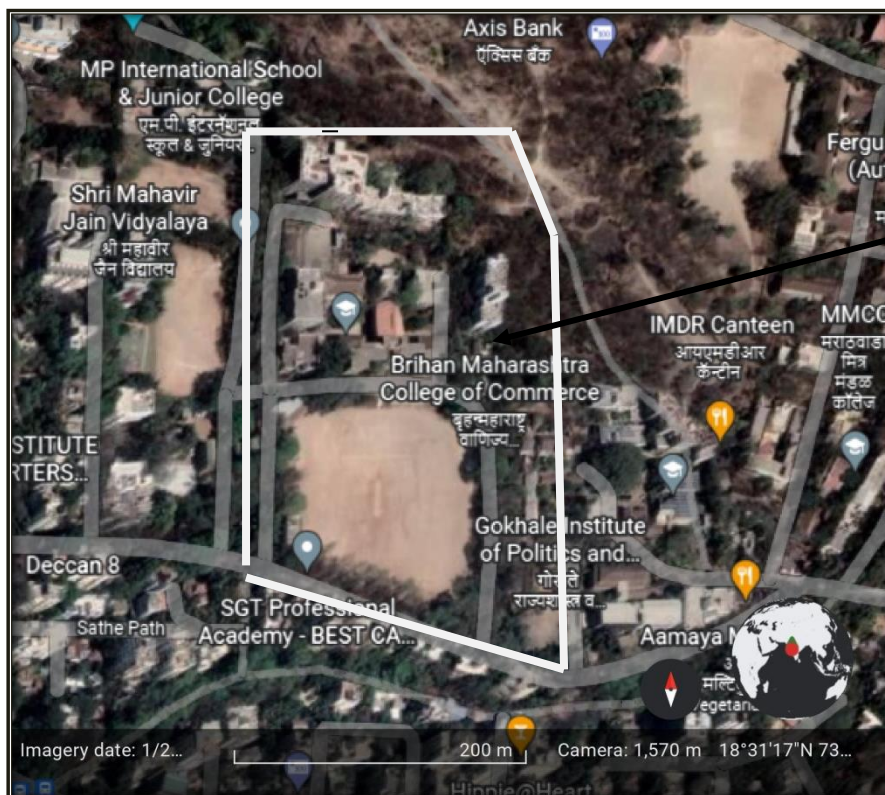
### 1.1 Objectives:

1. To study present level of Energy Consumption
2. To Study the present CO<sub>2</sub> emissions
3. To study Scope for usage of Alternate Energy
4. To study LED Lighting

### 1.2 Table No1: General Details of College:

No	Head	Particulars
1	Name	Deccan Education Society's The Brihan Maharashtra College
2	Address	545, Shivajinagar, Pune 411004
3	Year of Establishment	1943
4	Affiliation	Savitribai Phule Pune University

### 1.3 Google Earth Image:



BMCC  
Campus



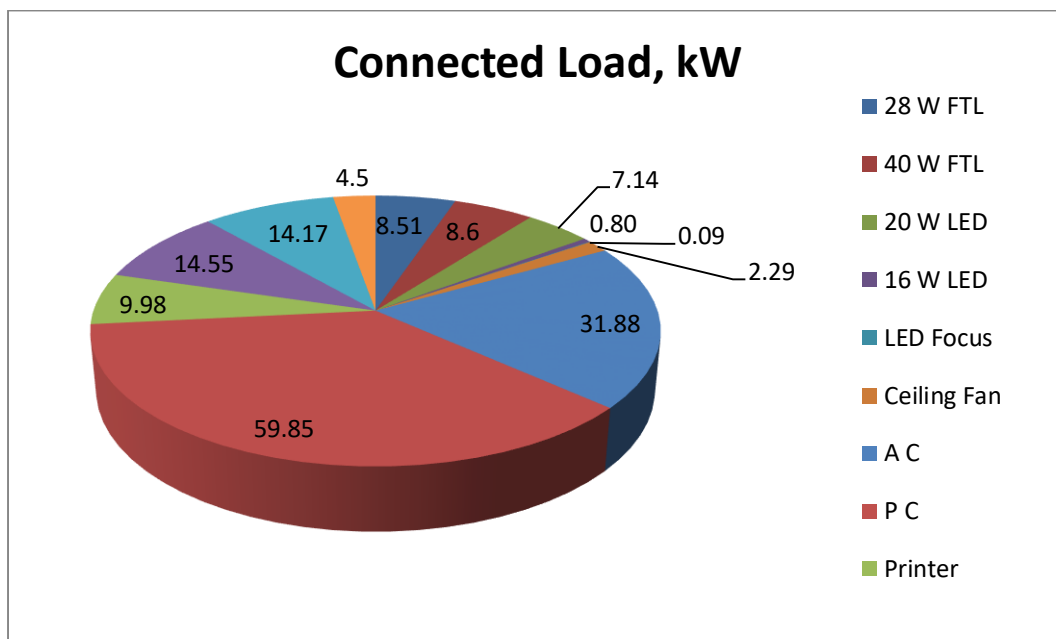
## CHAPTER-II STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

**Table No 2: Details of Equipment Wise Connected Load:**

No	Equipment	Qty	Load, W/Unit	Load, kW
1	28 W FTL	304	28	8.51
2	40 W FTL	215	40	8.6
3	20 W LED	357	20	7.14
4	16 W LED	50	16	0.80
5	LED Focus	13	7	0.09
6	Ceiling Fan	381	6	2.29
7	A C	17	1875	31.88
8	P C	399	150	59.85
9	Printer	57	175	9.98
10	Water Pumps load in HP	19.5	746	14.55
11	Lift	2	7087	14.17
12	Other Load	30	150	4.5
13	<b>Total</b>			<b>162</b>

**Chart No 1: Details of Connected Load:**



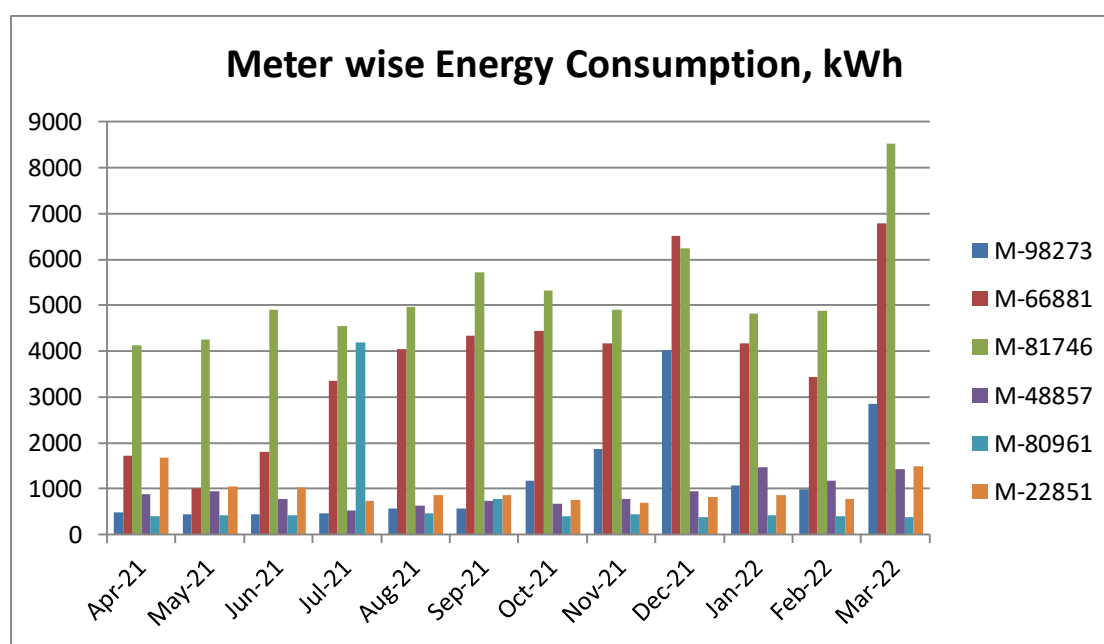
## CHAPTER-III STUDY OF ELECTRICAL ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Energy Consumption

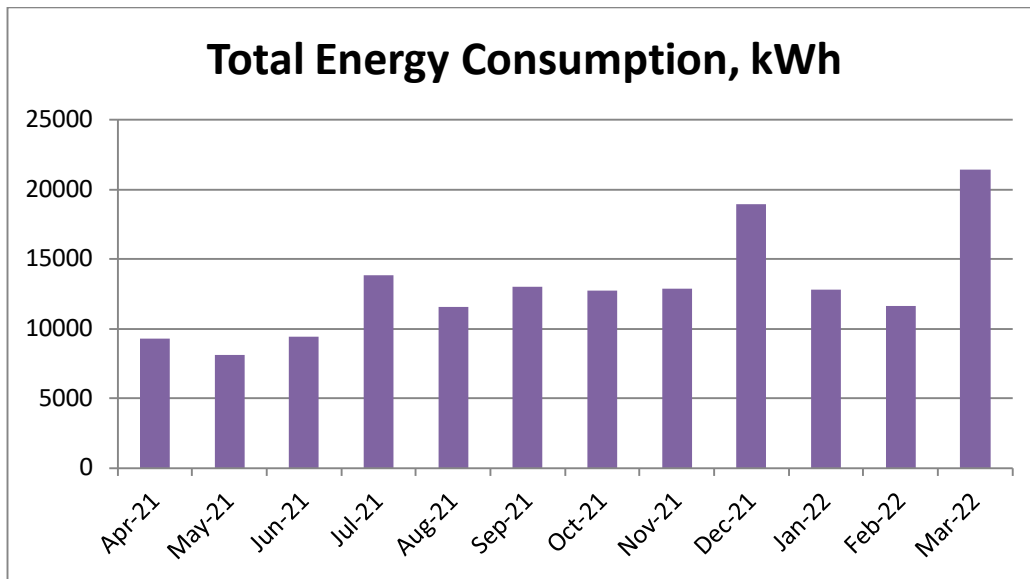
**Table No 3: Electrical Energy Consumption Analysis- 2021-22:**

No	Month	Meter wise Energy Consumed, kWh						Total Energy Consumed, kWh
		M-98273	M-66881	M-81746	M-48857	M-80961	M-22851	
1	Apr-21	485	1711	4134	876	408	1677	9291
2	May-21	450	1002	4247	952	420	1046	8117
3	Jun-21	443	1805	4912	776	422	1038	9396
4	Jul-21	463	3362	4537	523	4185	735	13805
5	Aug-21	564	4049	4970	625	462	857	11527
6	Sep-21	575	4331	5719	727	780	861	12993
7	Oct-21	1183	4436	5316	672	392	753	12752
8	Nov-21	1859	4172	4909	787	439	695	12861
9	Dec-21	4027	6508	6249	953	382	815	18934
10	Jan-22	1060	4172	4809	1464	416	853	12774
11	Feb-22	992	3429	4886	1167	392	768	11634
12	Mar-22	2858	6782	8520	1419	375	1497	21451
13	Total	14959	45759	63208	10941	9073	11595	155535
14	Maximum	4027	6782	8520	1464	4185	1677	21451
15	Minimum	443	1002	4134	523	375	695	8117
16	Average	1246.58	3813.25	5267.33	911.75	756.083	966.25	12961.25

**Chart No 2: Meter wise Energy Consumption:**



**Chart No 3: To study Month wise Total Energy Consumption, kWh:**



**Table No 4: Key Parameters:**

No	Parameter	Energy Consumed, kWh
1	Total	155535
2	Maximum	21451
3	Minimum	8117
4	Average	12961.25

## CHAPTER-IV

### CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the College for performing its day to day activities. The College uses Electrical Energy for various Electrical gadgets.

#### Basis for computation of CO<sub>2</sub> Emissions:

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy is:

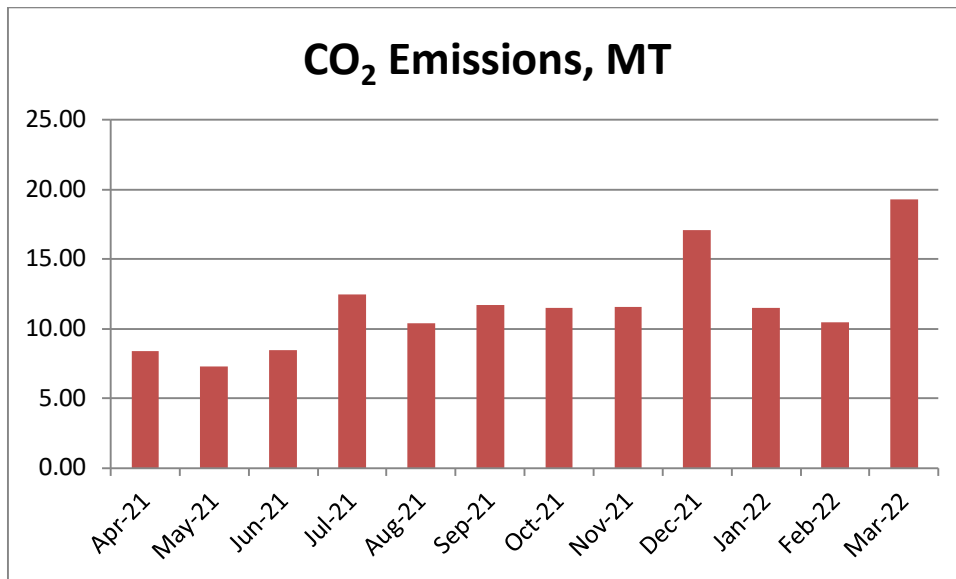
**1 kWh** of Electrical Energy releases **0.9 Kg of CO<sub>2</sub>** into atmosphere

Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations

**Table No 5: Month wise CO<sub>2</sub> Emissions:**

No	Month	Total Energy Consumed, kWh	CO <sub>2</sub> Emissions, MT
1	Apr-21	9291	8.36
2	May-21	8117	7.31
3	Jun-21	9396	8.46
4	Jul-21	13805	12.42
5	Aug-21	11527	10.37
6	Sep-21	12993	11.69
7	Oct-21	12752	11.48
8	Nov-21	12861	11.57
9	Dec-21	18934	17.04
10	Jan-22	12774	11.50
11	Feb-22	11634	10.47
12	Mar-22	21451	19.31
13	Total	155535	139.98
14	Maximum	21451	19.31
15	Minimum	8117	7.31
16	Average	12961.25	11.67

**Chart No 4: Month wise CO<sub>2</sub>Emissions:**



**Table No 6: Key Parameters:**

No	Parameter/ Value	Energy Purchased, kWh	CO <sub>2</sub> emissions, MT
1	Total	155535	139.98
2	Maximum	21451	19.31
3	Minimum	8117	7.31
4	Average	12961.25	11.67

## CHAPTER-V STUDY OF USAGE OF ALTERNATE ENERGY

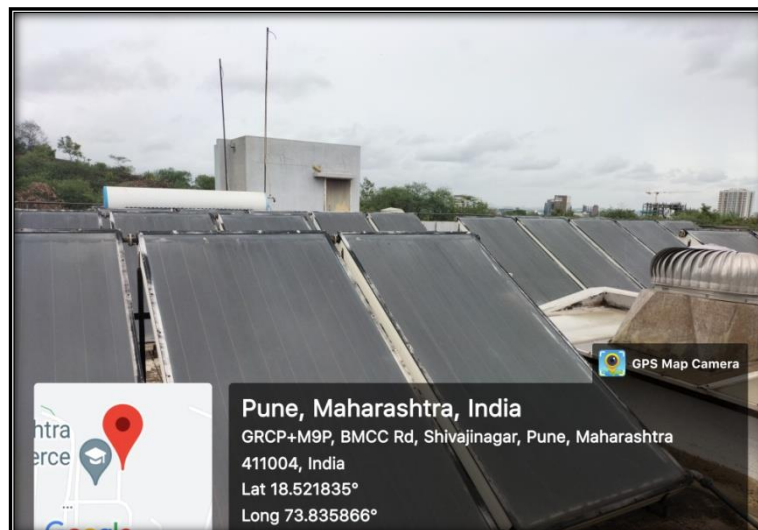
The College has installed **5500 LPD Solar Thermal Water heating system at Girls and Boys Hostel blocks.** (Total Installed Capacity)

In this Chapter, we compute the percentage of usage of Alternate / Renewable Energy to Annual Energy Demand of the College.

**Table No 7: Computation of % usage of Alternate Energy to Annual Energy Demand:**

No	Particulars	Value	Unit
1	Energy purchased from MSEDCL	155535	kWh
2	Installed Solar Thermal Water Heating Capacity	5500	LPD
3	Energy saved by 100 LPD System in 1 year	1500	kWh
4	Energy saved by 5500 LPD System= $1*2/100$	82500	kWh
5	System working days in 21-22	200	Nos
6	Energy saved by System in 21-22= $82500*200/365$	45205	kWh
7	Total Annual Energy Demand= $1+6$	200740	kWh
8	% of Usage of Alternate Energy to Total Energy Demand= $6*100/7$	22.52	%

### Photograph of Roof Top Solar Thermal Water Heating System:



## CHAPTER VI

### STUDY OF USAGE OF LED LIGHTS

In the following Table, we present the percentage of annual Lighting load met by LED lights.

**Table No 8: Computation of Percent Usage of Annual LED Usage to Annual Lighting Power Requirement:**

No	Particulars	Value	Unit
1	28 W FTL Fitting	304	Nos
2	40 W FTL Fitting	215	Nos
3	20 W LED Fitting	357	Nos
4	16 W LED Fitting	50	Nos
5	LED Focus Fitting	13	Nos
6	Demand of 28 W FTL Fitting	28	W/Unit
7	Demand of 40 W FTL Fitting	40	W/Unit
8	Demand of 20 W LED Fitting	20	W/Unit
9	Demand of 16 W LED Fitting	16	W/Unit
10	Demand of LED Focus Fitting	7	W/Unit
11	Load of 28 W FTL Fitting	8.512	kW
12	Load of 40 W FTL Fitting	8.6	kW
13	Load of 20 W LED Fitting	7.14	kW
14	Load of 16 W LED Fitting	0.8	kW
15	Load of LED Focus Fitting	0.091	kW
<b>16</b>	<b>Total Lighting Load =11+12+13+14+15</b>	<b>25.14</b>	<b>kW</b>
<b>17</b>	<b>Total LED Lighting Load = 13+14+15</b>	<b>8.03</b>	<b>kW</b>
18	% of Usage of LED Lighting Load to Annual Lighting Load = $17*100/16$	<b>31.94</b>	<b>%</b>