7.1.3.2 ENERGY AUDIT

The energy audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programmes which are vital for utility activities. Such an audit will help to keep focus on variations which occur in the energy cost, availability and reliability of supply of energy, decide an appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation equipment etc. The primary objective of energy audit is to determine ways to reduce energy consumption per unit of product output or lower the operating cost.

Following are the Energy Audit Reports of K J College of Engineering and Management Research, Pune for last five years prepared by external expert of the government recognised organization.

COLLEGE OF ENGINEERING & MANAGEMENT RESEARCH ★ K J ★ PU/PN/ENGG 378/2009

Principal
KJ College of Engineering & Management Research
Sr No. 25 & 27, Bopdev Ghat,
Kondhawa - Saswad Road, Pune - 411 048

ENERGY AUDIT REPORT

of

KJ's Educational Institutes,
K J College of Engineering and Management Research,
Pune 411 048

Year: 2021-22

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com

ENGRESS SERVICES PUNE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 10th 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 **09th 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 PUNE

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/KJCOEMR/21-22/01 Date: 12/6/2022

CERTIFICATE

This is to certify that we have conducted Energy Audit at KJ's Educational Institutes, K J College of Engineering and Management Research, Pune in the year 2021-22.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated Equipment
- Maximum usage of Day Lighting
- Installation of 30 kWp Roof Top Solar PV Plant.

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

For Engress Services,

ENGRESS SERVICES * PUNE *

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of KJ's Educational Institutes, K J College of Engineering and Management Research, Pune for awarding us the assignment of Energy Audit of their campus for the Year: 2021-22.

We are thankful to all staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. KJ's Educational Institutes, K J College of Engineering and Management Research, Pune consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Energy Purchased & CO_2 Emissions:

No	Parameter /Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	80675	72.61
2	Maximum	10600	9.54
3	Minimum	5140	4.63
4	Average	6722.94	6.05

3. Various Majors Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Installation of 30 kWp Roof Top Solar PV Plant

4. Usage of Alternate / Renewable Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **30 kWp.**
- Energy purchased from MSEDCL in 21-22 is **80675 kWh.**
- Energy generated by Solar PV Plant in 21-22 is **36000 kWh.**
- Total Energy requirement is **116675 kWh.**
- % of usage of Alternate Energy to Total Energy Demand works out to be **31 %**

5. Usage of LED Lighting:

- The total Lighting Load is **18.88 kW,**
- The Total LED Lighting Load is **0.72 kW.**
- The % of Total Lighting Requirement met by LED Lighting is **3.81%.**

6. Assumptions:

- **1 kWh** (Unit) of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
- **1 kWp** Solar Roof Top Solar PV Plant generates **4 kWh** of Electrical Energy per Day
- Annual Solar Energy Generation Days: **300 Nos**

7. References:

1. For CO_2 Emissions: www.tatapower.com
2. For Solar PV Energy Generation: www.solarrooftop.gov.in

ABBREVIATIONS

AC	:	Air conditioner
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
D/L	:	Down Lighter
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study present Energy Consumption
3. To compute the CO_2 emissions
4. To study usage of Renewable Energy
5. To study Lighting

1.2 Table No1: General Details of College:

No	Head	Particulars
1	Name	KJ's Educational Institutes, K J College of Engineering and Management Research
2	Address	Sr. No.25 & 27, Pisoli, Near Bopdeo Ghat, Haveli, Dist: Pune 411 048
3	Year of Establishment	2009
4	Affiliation	Savitribai Phule Pune University

1.3 Google Earth Image:

CHAPTER-II
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads in the Academic Section as under.

Table No2: Study of Location Wise Electrical Equipment Load:

No	Location	40 W FTL	Ceiling Fan	20 W LED	16 W Square LED
	Ground Floor				
1	Admin Office	8	23	9	20
2	Admission Cell	5	11	1	
3	Porch	4			
4	Wash Room	2			
	Mechanical Department				
1	A-4	4	3		
2	A-13	4	2		
3	A-3	4	4		
4	Chemistry Lab	4	4		
5	Corridor	7			
6	Wash Rooms	4			
7	Class Rooms-4 Nos	32	32		
8	A-22		2	1	
9	A-15	2	1		
10	WorkShop-2 Nos	18	14		
	Library				
1	A-119	4	11	4	
2	A-120	8	7	3	
3	Wash Room	2			
4	Corridor			2	
	First Floor				
1	Computer Lab	12	10		
2	H T Lab	8	4		
3	Corridor	7			
4	Wash Rooms	4			
5	Class Rooms-4 Nos	32	32		
6	A-117	4	4		
7	A-113	4	4		
8	A-114	4	4		
9	A-115	4	4		

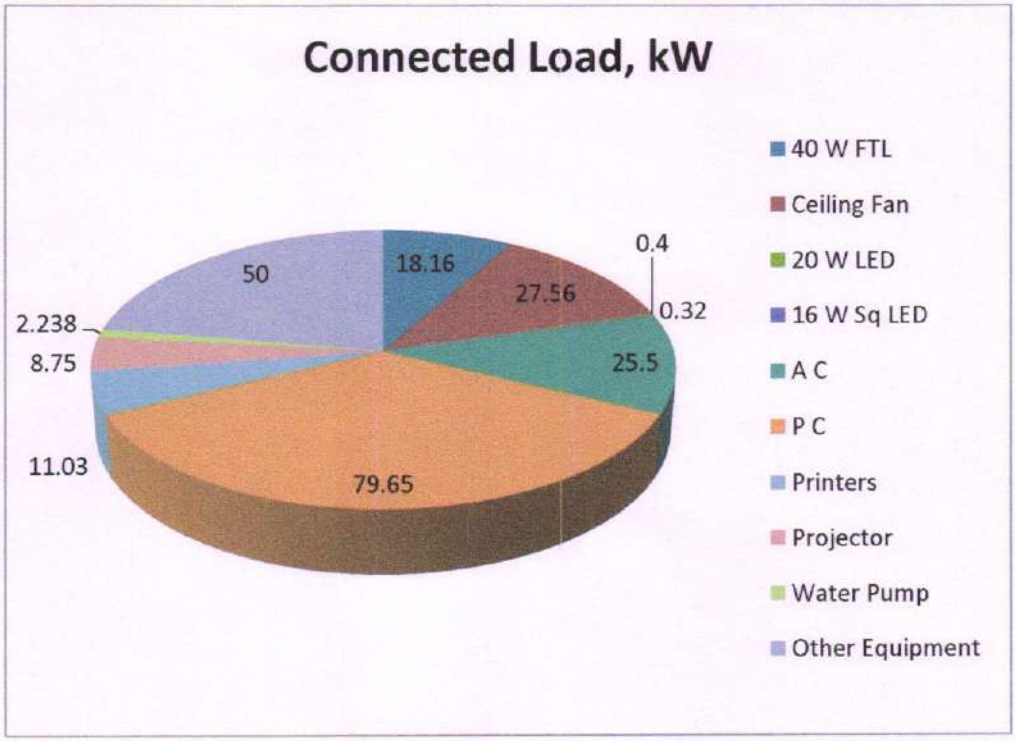
10	A-116	4	4		
	Second Floor				
1	Geology Lab	8	8		
2	Engg Mechanics Lab	8	8		
3	Surveying Lab	4	4		
4	A-220	4	4		
5	HOD Cabin	2	1		
6	Tutorial Room	1	2		
7	Wash Rooms	4			
8	Corridor	7			
9	Class Rooms-4 Nos	28	28		
10	Faculty Room	2	2		
11	A-202	4	4		
12	A-203	3	4		
	A-204	4	4		
	A-205	2	2		
	A-206	3	4		
	A-207	2	4		
	A-208	4	4		
	A-209	3	2		
	Third Floor				
1	A-301	2	2		
2	A-302	4	4		
3	A-303	3	4		
4	A-304	2	4		
5	A-305	2	2		
6	A-306	7	8		
7	A-307	4	4		
8	A-308	4	4		
9	Wash Rooms	2			
10	Class Rooms-4 Nos	28	28		
11	HOD Cabin	2	1		
12	A-321	1	2		
13	Communication Lab-1	3	4		
14	Communication Lab-2	3	4		
15	A-316	7	8		
16	Corridor	7			
	Fourth Floor				
1	A-401	2	2		
2	A-402	2	4		

3	A-403	7	8		
4	A-404	2	2		
5	A-405	3	4		
6	A-406	3	4		
7	A-407	4	4		
8	Class Rooms-4 Nos	28	28		
9	Wash Rooms	4			
10	Corridor	7			
11	Programming Lab-II	3	4		
12	Research Lab	3	4		
13	A-415	5	4		
14	A-416	4	4		
15	A-417	4	4		
16	A-418	4	4		
	Total	**454**	**424**	**20**	**20**

Table No 3: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL	454	40	18.16
2	Ceiling Fan	424	65	27.56
3	20 W LED	20	20	0.4
4	16 W Sq LED	20	16	0.32
5	A C	17	1500	25.5
6	P C	531	150	79.65
7	Printers	63	175	11.03
8	Projector	35	250	8.75
9	Water Pump	1	2238	2.238
10	Other Equipment	200	250	50
11	**Total**			**224**

Chart No1: Details of Connected Load:



CHAPTER-III
STUDY OF ELECTRICAL ENERGY CONSUMPTION

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

Table No 4: Electrical Energy Consumed: 2021-22:

No	Month	Energy Purchased, kWh
1	Apr-21	5425
2	May-21	5140
3	Jun-21	5212
4	Jul-21	5696
5	Aug-21	5711
6	Sep-21	6236
7	Oct-21	6494
8	Nov-21	7147
9	Dec-21	7906
10	Jan-22	7615
11	Feb-22	7493
12	Mar-22	10600
13	Total	80675
14	Maximum	10600
15	Minimum	5140
16	Average	6722.94

Chart No 2: To study the variation of Month wise Energy Consumed, kWh:

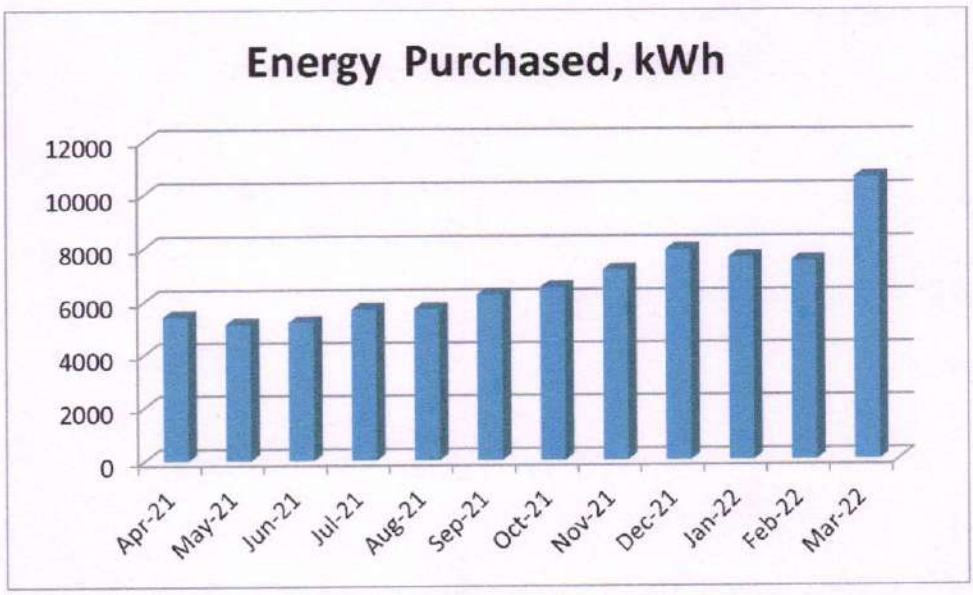


Table No 5: Key Parameters:

No	Parameter	Energy Purchased, kWh
1	Total	80675
2	Maximum	10600
3	Minimum	5140
4	Average	6722.94

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_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is:

1 Unit (kWh) of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No6: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-21	5425	4.88
2	May-21	5140	4.63
3	Jun-21	5212	4.69
4	Jul-21	5696	5.13
5	Aug-21	5711	5.14
6	Sep-21	6236	5.61
7	Oct-21	6494	5.84
8	Nov-21	7147	6.43
9	Dec-21	7906	7.12
10	Jan-22	7615	6.85
11	Feb-22	7493	6.74
12	Mar-22	10600	9.54
13	Total	80675	72.61
14	Maximum	10600	9.54
15	Minimum	5140	4.63
16	Average	6722.94	6.05

Chart No 3: Representation of Month wise CO_2 Emissions:

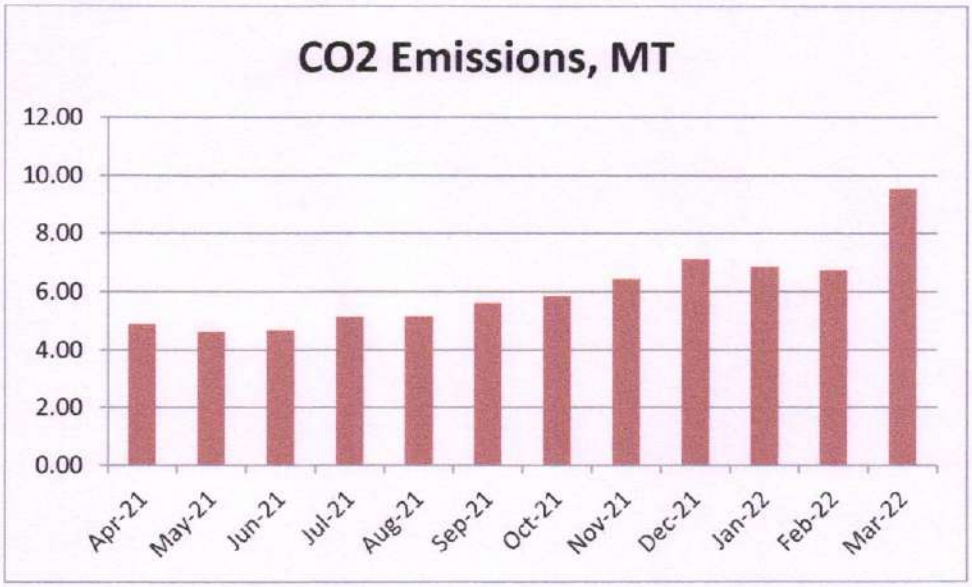


Table No 7: Key Parameters:

No	Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	80675	72.61
2	Maximum	10600	9.54
3	Minimum	5140	4.63
4	Average	6722.94	6.05

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed **30 kWp** Roof Top Solar PV Plant. In the following Table, we present the % of usage of Alternate Energy to Annual Energy Demand of the College.

Table No 8: Computation of % Usage of Alternate Energy to Annual Energy Demand:

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	**80675**	kWh
2	Installed Roof Top Solar PV Plant Capacity	30	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	**36000**	kWh
6	Total Energy Demand = **(1) + (5)**	**116675**	kWh
7	% of Usage of Alternate Energy to Total Annual Energy Demand= (5)*100/ (6)	**31**	%

Photograph of Roof Top Solar PV Plant:

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 9: Computation of %Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	Qty of 20 W LED Fittings	20	Nos
2	Electrical Demand of 20 W LED Fitting	20	W/Unit
3	Total Load of 20 W LED Fittings	**0.4**	kW
4	Qty of 16 W Square LED Fittings	20	Nos
5	Electrical Demand of 16 W Square LED Fitting	16	W/Unit
6	Total Load of 16 W Square LED Fittings	**0.32**	kW
7	Qty of 40 W FTL Fittings	454	Nos
8	Electrical Demand of 40 W FTL Fitting	40	W/Unit
9	Total Load of 40W FTL Fittings	**18.16**	kW
10	Total LED Lighting Load = 3+6	**0.72**	kW
11	Total Lighting Load= 3+6+9	**18.88**	kW
12	**% of LED Lighting Load to Total Lighting Load=10*100/11**	**3.81**	%

ENERGY AUDIT REPORT

of

KJ's Educational Institute,
K J College of Engineering and Management Research,
Pune 411 048

Year: 2020-21

Prepared by

ENRICH CONSULTANTS
Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com

ENRICH CONSULTANTS PUNE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RO 91 / 2462

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-14/1577 22nd April, 2021

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 Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School, Parvati,
Pune - 411009.

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

Registration Number : ***MEDA/ECN/2021-22/Class A/EA-03***

- 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 **21st April, 2023** 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)

ENRICH CONSULTANTS PUNE

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/KJCOEMR/2020-21/01 Date: 12/5/2021

CERTIFICATE

This is to certify that we have conducted Energy Audit at KJ's Educational Institute, K J College of Engineering and Management Research, Pune in the year 2020-21.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 30 kWp Roof Top Solar PV Plant.

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

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of KJ's Educational Institute, K J College of Engineering and Management Research, Pune, for awarding us the assignment of Energy Audit of their campus for the Year: 2020-21.

We are thankful to all staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. KJ's Educational Institute, K J College of Engineering and Management Research, Pune consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Energy Consumption & CO_2 Emissions:

No	Parameter /Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	66853	60.17
2	Maximum	6282	5.65
3	Minimum	4565	4.11
4	Average	5571.12	5.01

3. Various Majors Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of **30 kWp** Roof Top Solar PV Plant

4. Usage of Alternate / Renewable Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **30 kWp.**
- Energy purchased from MSEDCL in 2020-21 is **66853 kWh.**
- Energy generated by Solar PV Plant in 2020-21 is **36000 kWh.**
- Total Energy requirement is **102853 kWh.**
- % of usage of Alternate Energy to Total Energy Demand works out to be **35 %**

5. Usage of LED Lighting:

- The total Lighting Load is **18.94 kW,**
- The Total LED Lighting Load is **0.54 kW.**
- The % of Total Lighting Requirement met by LED Lighting is **2.85 %.**

6. Assumptions:

- **1 kWh** (Unit) of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
- **1 kWp** Solar Roof Top Solar PV Plant generates **4 kWh** of Electrical Energy per Day
- Annual Solar Energy Generation Days: **300 Nos**

7. References:

1. For CO_2 Emissions: www.tatapower.com
2. For Solar PV Energy Generation: www.solarrooftop.gov.in

ABBREVIATIONS

AC	:	Air conditioner
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
D/L	:	Down Lighter
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study present Energy Consumption
3. To compute the CO_2 emissions
4. To study usage of Renewable Energy
5. To study Lighting

1.2 Table No1: General Details of College:

No	Head	Particulars
1	Name	KJ's Educational Institutes, K J College of Engineering and Management Research
2	Address	Sr. No.25 & 27, Pisoli, Near Bopdeo Ghat, Haveli, Dist: Pune 411 048
3	Year of Establishment	2009
4	Affiliation	Savitribai Phule Pune University

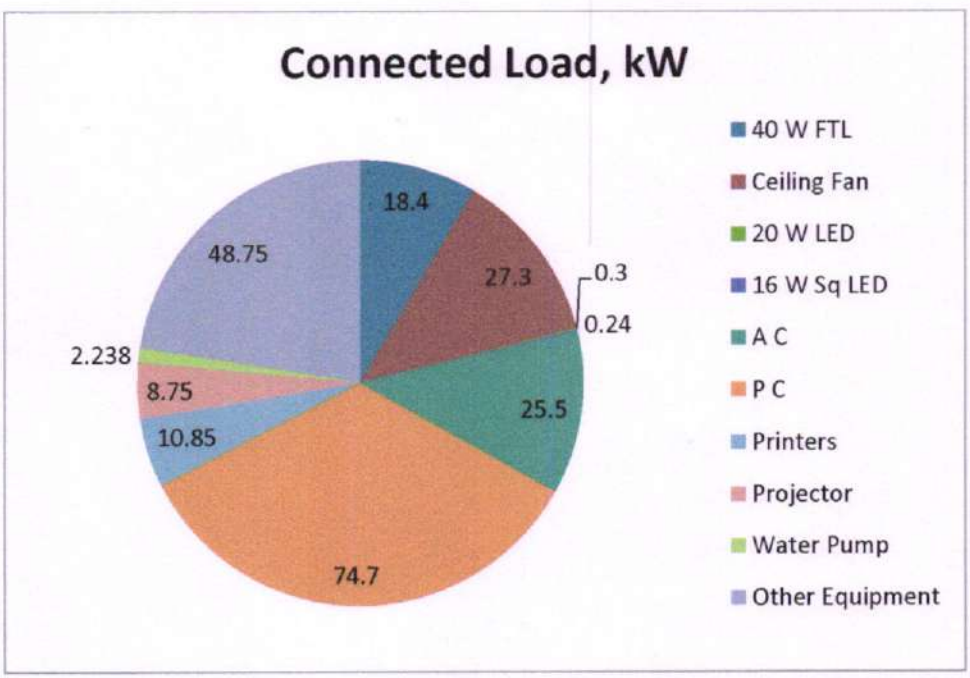
CHAPTER-II
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads in the campus.

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL	460	40	18.4
2	Ceiling Fan	420	65	27.3
3	20 W LED	15	20	0.3
4	16 W Sq LED	15	16	0.24
5	A C	17	1500	25.5
6	P C	498	150	74.7
7	Printers	62	175	10.85
8	Projector	35	250	8.75
9	Water Pump	1	2238	2.238
10	Other Equipment	195	250	48.75
11	**Total**			**217**

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.

Table No 3: Electrical Energy Purchased: 202020-21:

No	Month	Energy Purchased, kWh
1	Apr-20	4687
2	May-20	5118
3	Jun-20	5443
4	Jul-20	6166
5	Aug-20	6183
6	Sep-20	6236
7	Oct-20	5225
8	Nov-20	4565
9	Dec-20	5059
10	Jan-21	5996
11	Feb-21	6282
12	Mar-21	5893
13	Total	66853
14	Maximum	6282
15	Minimum	4565
16	Average	5571.12

Chart No 2: To study the variation of Month wise Energy Purchased, kWh:

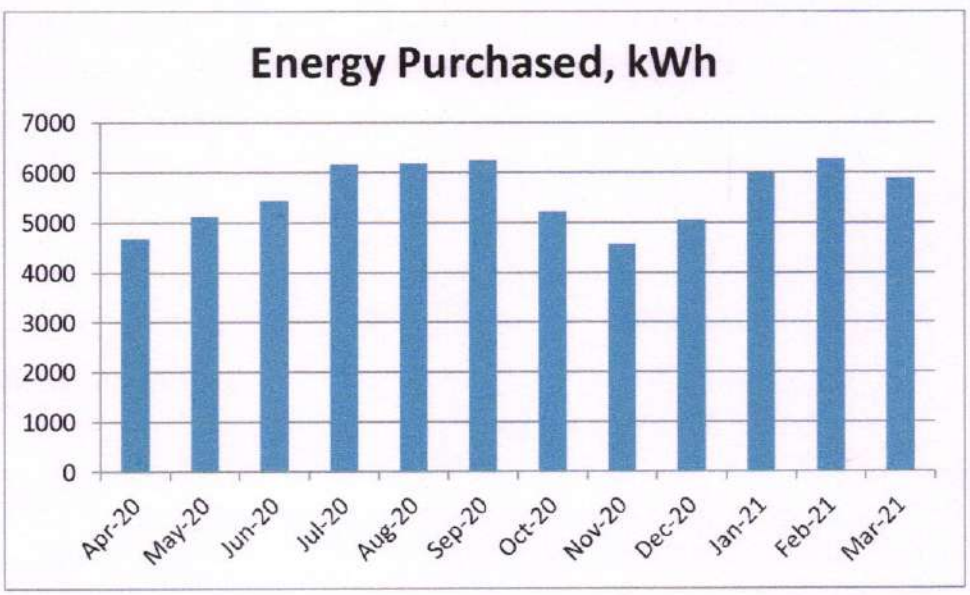


Table No 4: Key Parameters:

No	Parameter	Energy Purchased, kWh
1	Total	66853
2	Maximum	6282
3	Minimum	4565
4	Average	5571.12

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_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is:

1 Unit (kWh) of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 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_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-20	4687	4.22
2	May-20	5118	4.61
3	Jun-20	5443	4.90
4	Jul-20	6166	5.55
5	Aug-20	6183	5.56
6	Sep-20	6236	5.61
7	Oct-20	5225	4.70
8	Nov-20	4565	4.11
9	Dec-20	5059	4.55
10	Jan-21	5996	5.40
11	Feb-21	6282	5.65
12	Mar-21	5893	5.30
13	Total	66853	60.17
14	Maximum	6282	5.65
15	Minimum	4565	4.11
16	Average	5571.12	5.01

Chart No 3: Representation of Month wise CO_2 Emissions:

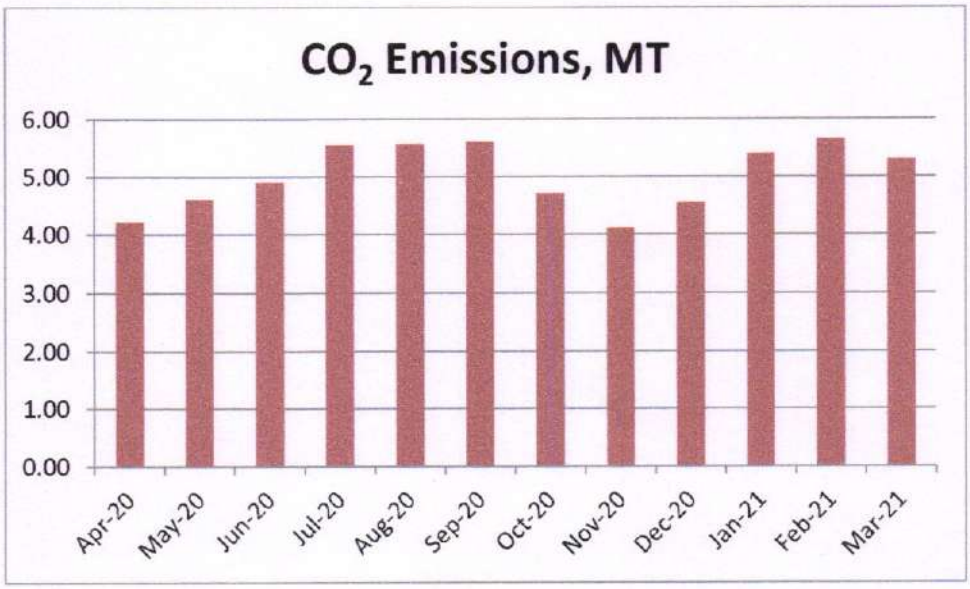


Table No 6: Key Parameters:

No	Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	66853	60.17
2	Maximum	6282	5.65
3	Minimum	4565	4.11
4	Average	5571.12	5.01

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed **30 kWp** Roof Top Solar PV Plant. In the following Table, we present the % of usage of Alternate 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	**66853**	kWh
2	Installed Roof Top Solar PV Plant Capacity	30	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	**36000**	kWh
6	Total Energy Demand = **(1) + (5)**	**102853**	kWh
7	% of Alternate Energy to Total Annual Energy Demand = **(5)*100/ (6)**	**35**	%

Photograph of Solar PV Plant:

CHAPTER VI
STUDY OF USAGE OF LED LIGHTS

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

Table No 8: Computation of Percentage of LED Usage to Total Lighting Load:

No	Particulars	Value	Unit
1	Qty of 20 W LED Fittings	15	Nos
2	Electrical Demand of 20 W LED Fitting	20	W/Unit
3	Total Load of 20 W LED Fittings	**0.3**	kW
4	Qty of 16 W Square LED Fittings	15	Nos
5	Electrical Demand of 16 W Square LED Fitting	16	W/Unit
6	Total Load of 16 W Square LED Fittings	**0.24**	kW
7	Qty of 40 W FTL Fittings	460	Nos
8	Electrical Demand of 40 W FTL Fitting	40	W/Unit
9	Total Load of 40W FTL Fittings	**18.4**	kW
10	Total LED Lighting Load = 3+6	**0.54**	kW
11	Total Lighting Load= 3+6+9	**18.94**	kW
12	**% of LED Lighting Load to Total Lighting Load=10*100/11**	**2.85**	%

ENERGY AUDIT REPORT

of

KJ's Educational Institute,
K J College of Engineering and Management Research,
Pune 411 048

Year: 2019-20

Prepared by

ENRICH CONSULTANTS
Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com

ENRICH CONSULTANTS PUNE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006,
Ph No: 020-26614393/266144403
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174 — 19th September , 2018

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	:	**Enrich Consultants** Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Energy Conservation Programme*
Registration Number	:	***MEDA/ECN/CR-05/2018-19/EA-03***

- 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 the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31stMarch 2021** 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.

19/9/18
(Smita Kudarikar)
General Manager (EC)

ENRICH CONSULTANTS * PUNE *

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/KJCOEMR/2019-20/01 Date: 14/7/2020

CERTIFICATE

This is to certify that we have conducted Energy Audit at KJ's Educational Institute, K J College of Engineering and Management Research, Pune in the year 2019-20.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 30 kWp Roof Top Solar PV Plant.

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

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENRICH CONSULTANTS * PUNE *

INDEX

ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of KJ's Educational Institute, K J College of Engineering and Management Research, Pune, for awarding us the assignment of Energy Audit of their campus for the Year: 2019-20.

We are thankful to all staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. KJ's Educational Institute, K J College of Engineering and Management Research, Pune consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Energy Consumption & CO_2 Emissions:

No	Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	118953	95.16
2	Maximum	11263	9.01
3	Minimum	8006	6.41
4	Average	9912.77	7.93

3. Various Majors Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of 30 kWp Roof Top Solar PV Plant

4. Usage of Alternate / Renewable Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **30 kWp.**
- Energy purchased from MSEDCL in 19-20 is **118953 kWh.**
- Energy generated by Solar PV Plant in 19-20 is **24000 kWh.**
- Total Energy requirement is **142953 kWh.**
- % of usage of Alternate Energy to Total Energy Demand works out to be **16.79 %**

5. Usage of LED Lighting:

- The total Lighting Load is **19.16 kW,**
- The Total LED Lighting Load is **0.36 kW.**
- The % of Total Lighting Requirement met by LED Lighting is **1.88 %.**

6. Assumptions:

1. 1 kWh of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere
2. **1 kWp** Solar PV system generates **4 kWh** of Electrical Energy per Day
3. Solar PV System installed in **August-2019.**
4. Annual Solar Energy Generation Days: **200 Nos**

7. Reference:

1. For Solar PV Energy Generation: www.solarrofftop.gov.in

ABBREVIATIONS

AC	:	Air conditioner
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
D/L	:	Down Lighter
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study present Energy Consumption
3. To compute the CO_2 emissions
4. To study usage of Renewable Energy
5. To study Lighting

1.2 Table No1: General Details of Institute:

No	Head	Particulars
1	Name	KJ's Educational Institutes, K J College of Engineering and Management Research
2	Address	Sr. No.25 & 27, Pisoli, Near Bopdeo Ghat, Haveli, Dist: Pune 411 048
3	Year of Establishment	2009
4	Affiliation	Savitribai Phule Pune University

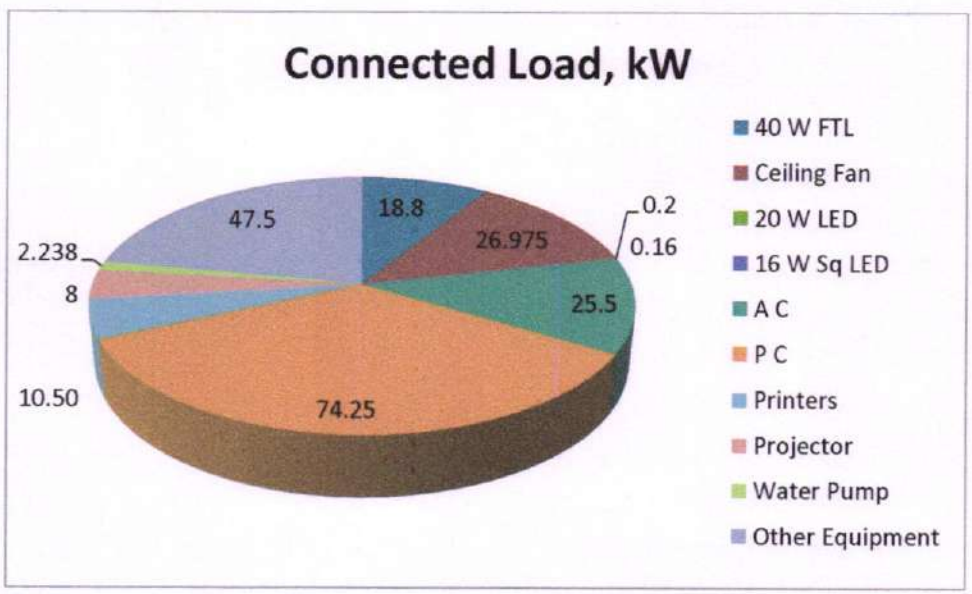
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL	470	40	18.8
2	Ceiling Fan	415	65	26.975
3	20 W LED	10	20	0.2
4	16 W Sq LED	10	16	0.16
5	A C	17	1500	25.5
6	P C	495	150	74.25
7	Printers	60	175	10.50
8	Projector	32	250	8
9	Water Pump	1	2238	2.238
10	Other Equipment	190	250	47.5
11	**Total**			**214**

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.

Table No 3: Electrical Energy Purchased: 2019-20:

No	Month	Energy Purchased, kWh
1	Apr-19	10928
2	May-19	9864
3	Jun-19	8006
4	Jul-19	9544
5	Aug-19	10134
6	Sep-19	11263
7	Oct-19	9928
8	Nov-19	9184
9	Dec-19	9432
10	Jan-20	10441
11	Feb-20	10115
12	Mar-20	10115
13	Total	118953
14	Maximum	11263
15	Minimum	8006
16	Average	9912.77

Chart No 2: To study the variation of Month wise Energy Purchased, kWh:

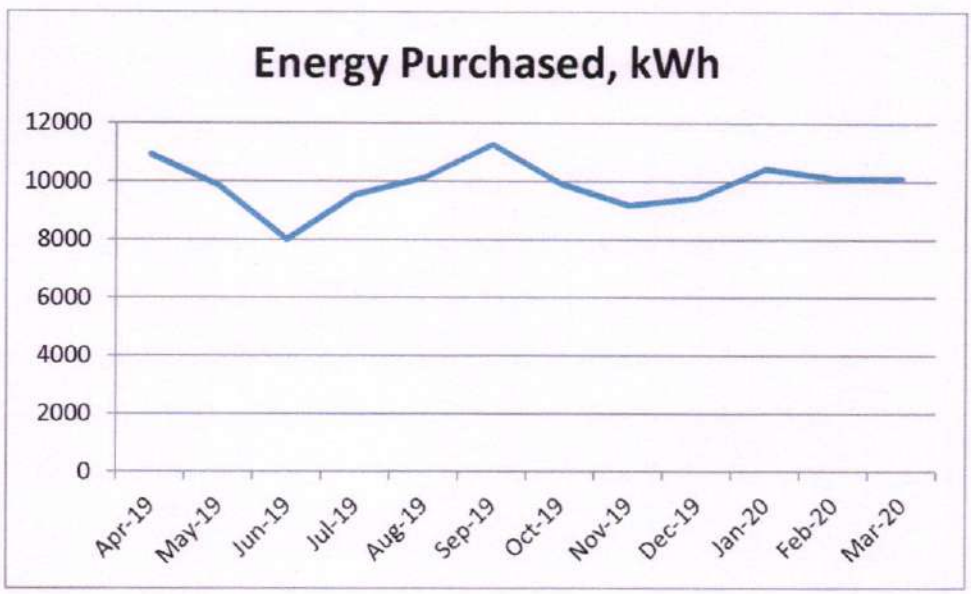


Table No 4: Key Parameters:

No	Parameter	Energy Purchased, kWh
1	Total	118953
2	Maximum	11263
3	Minimum	8006
4	Average	9912.77

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 Institute for performing its day to day activities

The Institute uses Electrical Energy for various Electrical gadgets.

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is:

1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the Institute due to its Day to Day operations

Table No 5: Month wise CO_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-19	10928	8.74
2	May-19	9864	7.89
3	Jun-19	8006	6.41
4	Jul-19	9544	7.63
5	Aug-19	10134	8.11
6	Sep-19	11263	9.01
7	Oct-19	9928	7.94
8	Nov-19	9184	7.35
9	Dec-19	9432	7.55
10	Jan-20	10441	8.35
11	Feb-20	10115	8.09
12	Mar-20	10115	8.09
13	Total	118953	95.16
14	Maximum	11263	9.01
15	Minimum	8006	6.41
16	Average	9912.77	7.93

Chart No 3: Representation of Month wise CO_2 Emissions:

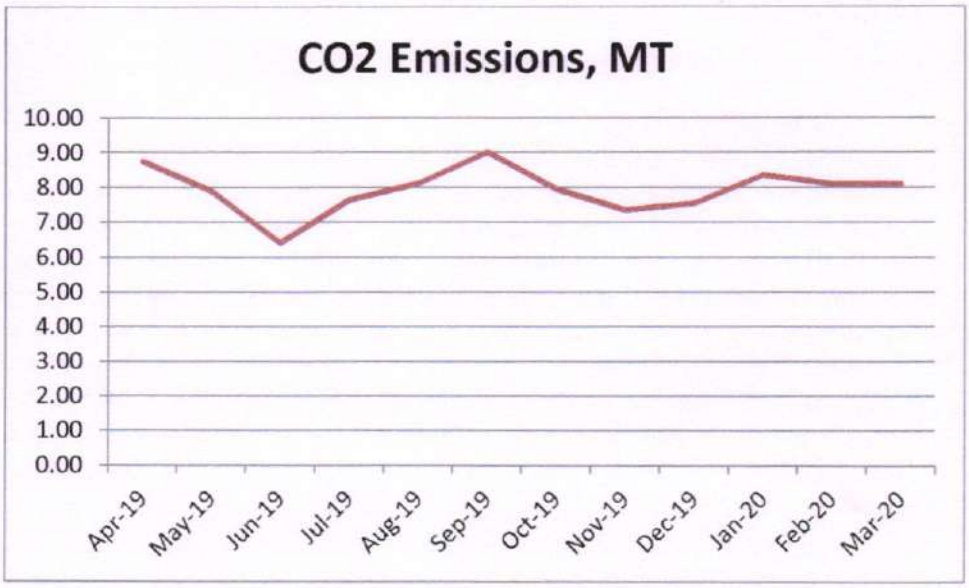


Table No 6: Key Parameters:

No	Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	118953	95.16
2	Maximum	11263	9.01
3	Minimum	8006	6.41
4	Average	9912.77	7.93

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed **30 kWp** Roof Top Solar PV Plant. The system was installed in August-2019. Hence, for Calculation purpose we consider the Solar Energy Generation Days in 19-20 to be 200 Nos. In the following Table, we present the % of usage of Alternate 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	**118953**	kWh
2	Installed Roof Top Solar PV Plant Capacity	30	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	200	Nos
5	Annual Solar Energy Generated	**24000**	kWh
6	Total Energy Demand = **(1) + (5)**	**142953**	kWh
7	% of Alternate Energy to Total Annual Energy Demand = **(5)*100/ (6)**	**16.79**	%

Photograph of Solar PV Plant:

CHAPTER VI
STUDY OF USAGE OF LED LIGHTS

In the following Table, we present the percentage of LED Lighting to Total Lighting Load of the Campus.

Table No 8: Computation of Percent Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	Qty of 20 W LED Fittings	10	Nos
2	Electrical Demand of 20 W LED Fitting	20	W/Unit
3	Total Load of 20 W LED Fittings	**0.2**	kW
4	Qty of 16 W Square LED Fittings	10	Nos
5	Electrical Demand of 16 W Square LED Fitting	16	W/Unit
6	Total Load of 16 W Square LED Fittings	**0.16**	kW
7	Qty of 40 W FTL Fittings	470	Nos
8	Electrical Demand of 40 W FTL Fitting	40	W/Unit
9	Total Load of 40W FTL Fittings	**18.8**	kW
10	Total LED Lighting Load = 3+6	**0.36**	kW
11	Total Lighting Load= 3+6+9	**19.16**	kW
12	**% of LED Lighting Load to Total Lighting Load=10*100/11**	**1.88**	%

ENERGY AUDIT REPORT

of

KJ's Educational Institute,
K J College of Engineering and Management Research,
Pune 411 048

Year: 2018-19

Prepared by

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com

ENRICH CONSULTANTS * PUNE *

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006,
Ph No: 020-26614393/266144403
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174

19th September , 2018

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	:	**Enrich Consultants** Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Energy Conservation Programme*
Registration Number	:	***MEDA/ECN/CR-05/2018-19/EA-03***

- 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 the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31st March 2021** 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.

19/9/18

(Smita Kudarikar)
General Manager (EC)

ENRICH CONSULTANTS * PUNE *

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/KJCOEMR/2018-19/01 Date: 14/5/2019

CERTIFICATE

This is to certify that we have conducted Energy Audit at K J's Educational Institute, K J College of Engineering and Management Research, Pune in the year 2018-19.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting

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

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENRICH CONSULTANTS * PUNE *

INDEX

ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of KJ's Educational Institute, K J College of Engineering and Management Research, Pune, for awarding us the assignment of Energy Audit of their campus for the Year: 2018-19.

We are thankful to all staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. KJ's Educational Institute, K J College of Engineering and Management Research, Pune consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Energy Consumption & CO_2 Emissions:

No	Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	117218	93.77
2	Maximum	12121	9.70
3	Minimum	7978	6.38
4	Average	9768.15	7.81

3. Various Majors Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Maximum Usage of Day Lighting

4. Usage of Alternate / Renewable Energy:

- The College has yet to install the Roof Top Solar PV Plant.
- The % of usage of Alternate Energy to Annual Energy Demand works out to be Nil.
- It is recommended to install Roof Top Solar PV Plant.

5. Usage of LED Lighting:

- The total Lighting Load is **19.58 kW,**
- The Total LED Lighting Load is **0.18 kW.**
- The % of Total Lighting Requirement met by LED Lighting is **0.92%.**

6. Assumption:

- **1 kWh** (Unit) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

ABBREVIATIONS

AC	:	Air conditioner
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
D/L	:	Down Lighter
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study present Energy Consumption
3. To compute the CO_2 emissions
4. To study usage of Renewable Energy
5. To study Lighting

1.2 Table No1: General Details of College:

No	Head	Particulars
1	Name	KJ's Educational Institute, K J College of Engineering and Management Research
2	Address	Sr. No.25 & 27, Pisoli, Near Bopdeo Ghat, Haveli, Dist: Pune 411 048
3	Year of Establishment	2009
4	Affiliation	Savitribai Phule Pune University

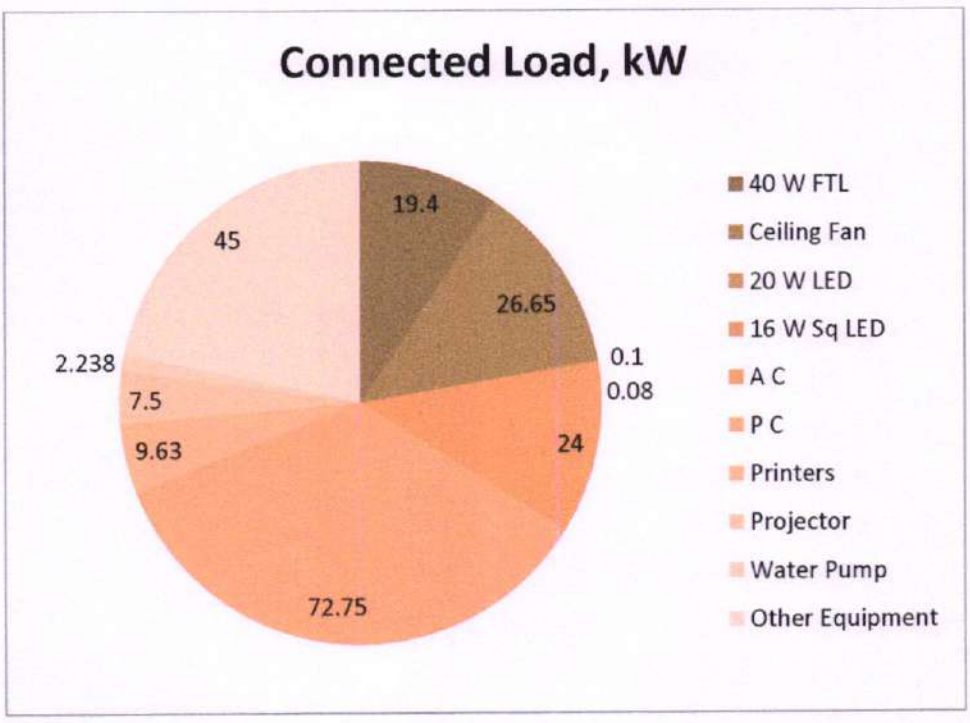
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL	485	40	19.4
2	Ceiling Fan	410	65	26.65
3	20 W LED	5	20	0.1
4	16 W Sq LED	5	16	0.08
5	A C	16	1500	24
6	P C	485	150	72.75
7	Printers	55	175	9.63
8	Projector	30	250	7.5
9	Water Pump	1	2238	2.238
10	Other Equipment	180	250	45
11	**Total**			**207**

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.

Table No 3: Electrical Energy Purchased: 2018-19:

No	Month	Energy Purchased, kWh
1	Apr-18	12002
2	May-18	9763
3	Jun-18	7978
4	Jul-18	8860
5	Aug-18	9259
6	Sep-18	10042
7	Oct-18	12121
8	Nov-18	8080
9	Dec-18	8503
10	Jan-19	9765
11	Feb-19	9913
12	Mar-19	10931
13	Total	117218
14	Maximum	12121
15	Minimum	7978
16	Average	9768.15

Chart No 2: To study the variation of Month wise Energy Purchased, kWh:

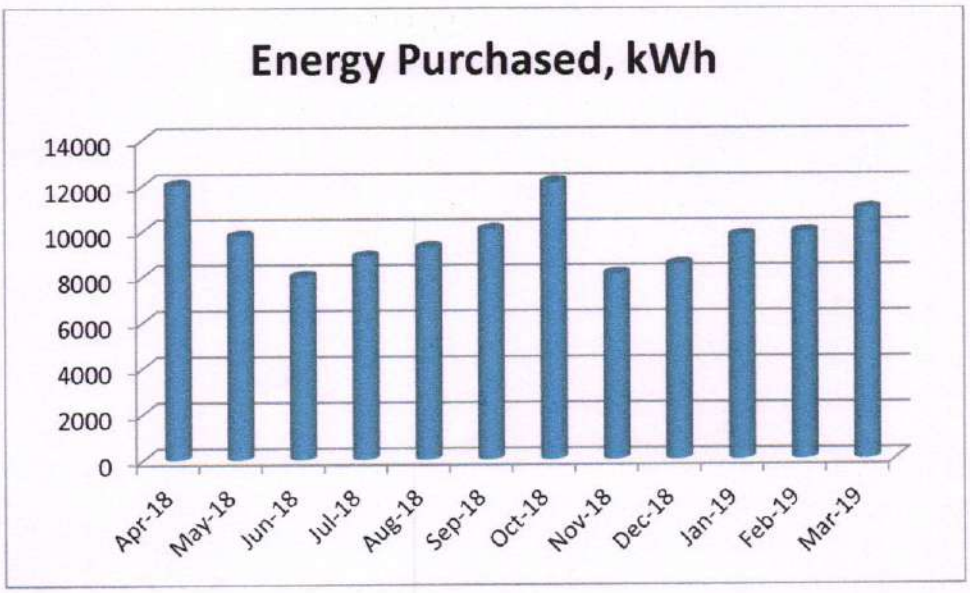


Table No 4: Key Parameters:

No	Parameter	Energy Purchased, kWh
1	Total	117218
2	Maximum	12121
3	Minimum	7978
4	Average	9768.15

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_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is:

1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 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_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-18	12002	9.60
2	May-18	9763	7.81
3	Jun-18	7978	6.38
4	Jul-18	8860	7.09
5	Aug-18	9259	7.41
6	Sep-18	10042	8.03
7	Oct-18	12121	9.70
8	Nov-18	8080	6.46
9	Dec-18	8503	6.80
10	Jan-19	9765	7.81
11	Feb-19	9913	7.93
12	Mar-19	10931	8.75
13	Total	117218	93.77
14	Maximum	12121	9.70
15	Minimum	7978	6.38
16	Average	9768.15	7.81

Chart No 3: Representation of Month wise CO_2 Emissions:

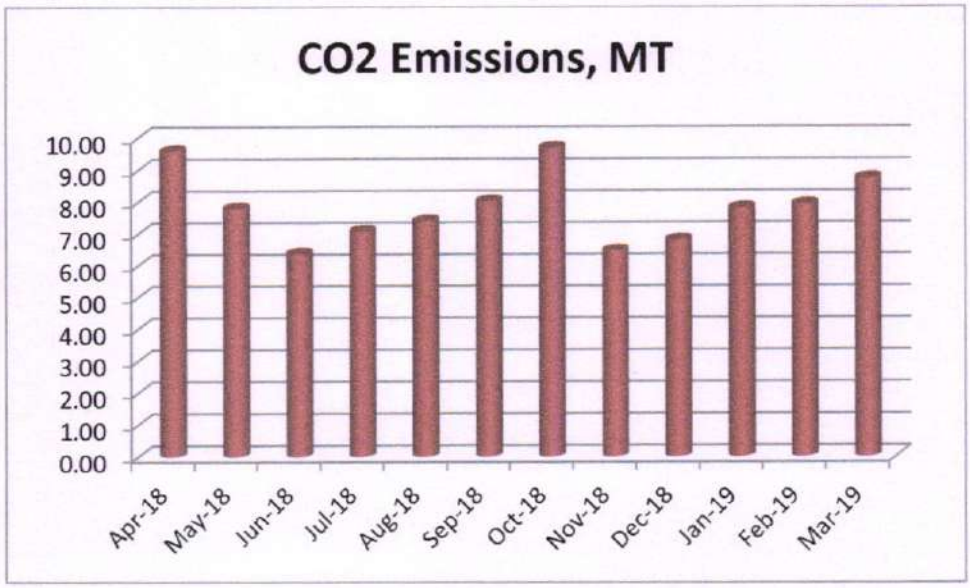


Table No 6: Key Parameters:

No	Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	117218	93.77
2	Maximum	12121	9.70
3	Minimum	7978	6.38
4	Average	9768.15	7.81

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

- The College has yet to install the Roof Top Solar PV Plant.
- The % of usage of Alternate Energy to Annual Energy Demand works out to be Nil.
- It is recommended to install Roof Top Solar PV Plant.

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 7: Computation of Percent Usage of LED Lighting to Total Lighting:

No	Particulars	Value	Unit
1	Qty of 20 W LED Fittings	5	Nos
2	Electrical Demand of 20 W LED Fitting	20	W/Unit
3	Total Load of 20 W LED Fittings	**0.1**	kW
4	Qty of 16 W Square LED Fittings	5	Nos
5	Electrical Demand of 16 W Square LED Fitting	16	W/Unit
6	Total Load of 16 W Square LED Fittings	**0.08**	kW
7	Qty of 40 W FTL Fittings	485	Nos
8	Electrical Demand of 40 W FTL Fitting	40	W/Unit
9	Total Load of 40W FTL Fittings	**19.4**	kW
10	Total LED Lighting Load = 3+6	**0.18**	kW
11	Total Lighting Load= 3+6+9	**19.58**	kW
12	**% of LED Lighting Load to Total Lighting Load=10*100/11**	**0.92**	%

ENERGY AUDIT REPORT

of

KJ's Educational Institute,
K J College of Engineering and Management Research,
Pune 411 048

Year: 2017-18

Prepared by

ENRICH CONSULTANTS

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com

ENRICH CONSULTANTS * PUNE *

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006
Ph No: 020-26614393/266144403, Fax No: 020-26615031
Email: econ@mahaurja.com , Web: www.mahaurja.com

ECN/2017-18/CR-01/5726 30th November 2017

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 under Save Energy Programme of MEDA.

Name and Address of the firm	:	Enrich Consultants Yashashree, Plot No. 26,Nirmal Baug Society,Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Save Energy Programme.*
Registration Number	:	***MEDA/ECN/CR-01/2017-18/EA-37***

- The Save Energy 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 the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid upto **3 year** from the date of registration, to carry out energy audits under the Save Energy Programme of MEDA.
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

30/11

(Smita Kudarikar)
Manager (EC)

ENRICH CONSULTANTS PUNE

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/KJCOEMR/2017-18/01 Date: 14/5/2018

CERTIFICATE

This is to certify that we have conducted Energy Audit at KJ's Educational Institute, K J College of Engineering and Management Research, Pune in the year 2017-18.

The College has adopted following Energy Efficient Practices:

- Maximum usage of Day Lighting

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

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENRICH CONSULTANTS PUNE

INDEX

ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of KJ's Educational Institute, K J College of Engineering and Management Research, Pune, for awarding us the assignment of Energy Audit of their Campus for the Year: 2017-18.

We are thankful to all staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. KJ's Educational Institute, K J College of Engineering and Management Research, Pune consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Energy Consumption & CO_2 Emissions:

No	Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	116983	93.59
2	Maximum	12097	9.68
3	Minimum	7962	6.37
4	Average	9749	7.80

3. Various Majors Adopted for Energy Conservation:

- Maximum Usage of Day Lighting

4. Usage of Alternate / Renewable Energy:

- The College has yet to install the Roof Top Solar PV Plant.
- The % of usage of Alternate Energy to Annual Energy Demand works out to be Nil.
- It is recommended to install Roof Top Solar PV Plant.

5. Usage of LED Lighting:

The Light Fittings are of FTL Type. There are no LED Light Fittings. It is recommended to install LED Fittings. Hence as on Date, the % of Total Lighting Requirement met by LED Lighting is Nil.

6. Assumption:

1. 1 kWh of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

ABBREVIATIONS

AC	:	Air conditioner
LED	:	Light Emitting Diode
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 Connected Load
2. To study present Energy Consumption
3. To compute the CO_2 emissions
4. To study usage of Renewable Energy
5. To study Lighting

1.2 Table No1: General Details of College:

No	Head	Particulars
1	Name	KJ's Educational Institute, K J College of Engineering and Management Research
2	Address	Sr. No.25 & 27, Pisoli, Near Bopdeo Ghat, Haveli, Dist: Pune 411 048
3	Year of Establishment	2009
4	Affiliation	Savitribai Phule Pune University

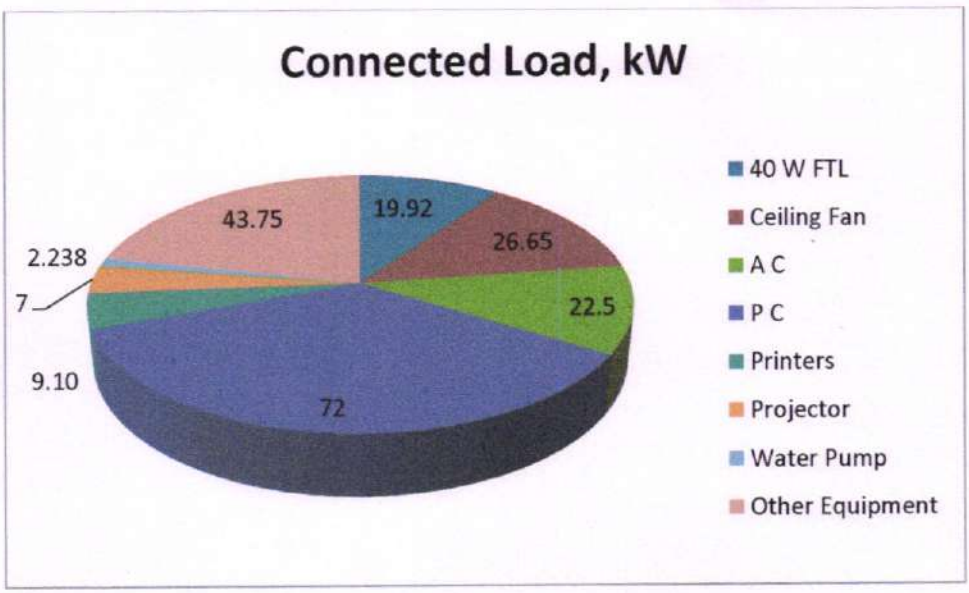
CHAPTER-II
STUDY OF CONNECTED LOAD

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

Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL	498	40	19.92
2	Ceiling Fan	410	65	26.65
3	A C	15	1500	22.5
4	P C	480	150	72
5	Printers	52	175	9.10
6	Projector	28	250	7
7	Water Pump	1	2238	2.238
8	Other Equipment	175	250	43.75
9	**Total**			**203**

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.

Table No 3: Electrical Energy Purchased: 2017-18:

No	Month	Energy Purchased, kWh
1	Apr-17	11978
2	May-17	9744
3	Jun-17	7962
4	Jul-17	8842
5	Aug-17	9241
6	Sep-17	10022
7	Oct-17	12097
8	Nov-17	8064
9	Dec-17	8486
10	Jan-18	9745
11	Feb-18	9893
12	Mar-18	10910
13	Total	116983
14	Maximum	12097
15	Minimum	7962
16	Average	9749

Chart No 2: To study the variation of Month wise Energy Purchased, kWh:

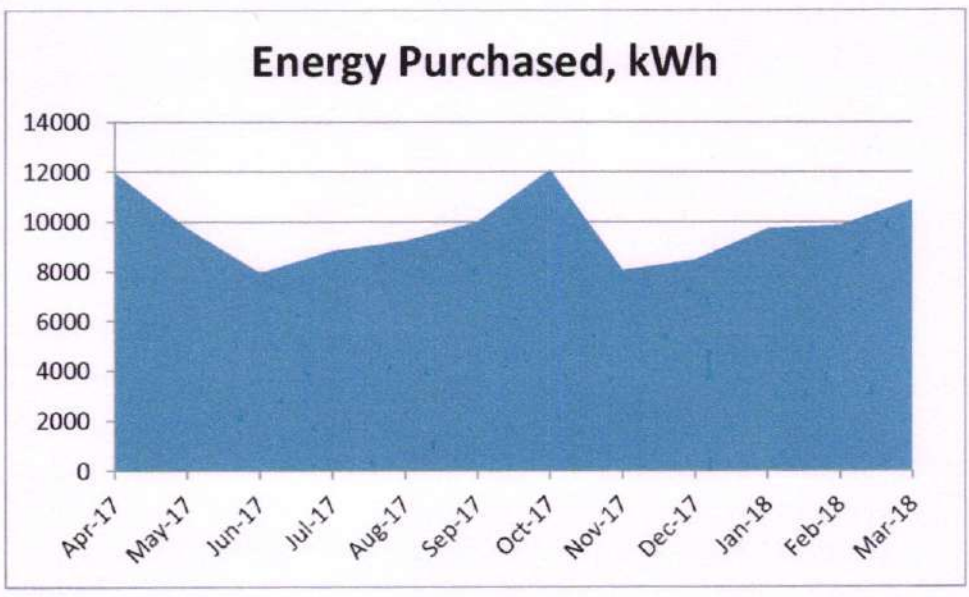


Table No 4: Key Parameters:

No	Parameter	Energy Purchased, kWh
1	Total	116983
2	Maximum	12097
3	Minimum	7962
4	Average	9749

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_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is:

1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 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_2 Emissions:

No	Month	Energy Purchased, kWh	CO_2 Emissions, MT
1	Apr-17	11978	9.58
2	May-17	9744	7.79
3	Jun-17	7962	6.37
4	Jul-17	8842	7.07
5	Aug-17	9241	7.39
6	Sep-17	10022	8.02
7	Oct-17	12097	9.68
8	Nov-17	8064	6.45
9	Dec-17	8486	6.79
10	Jan-18	9745	7.80
11	Feb-18	9893	7.91
12	Mar-18	10910	8.73
13	Total	116983	93.59
14	Maximum	12097	9.68
15	Minimum	7962	6.37
16	Average	9749	7.80

Chart No 3: Representation of Month wise CO_2 Emissions:

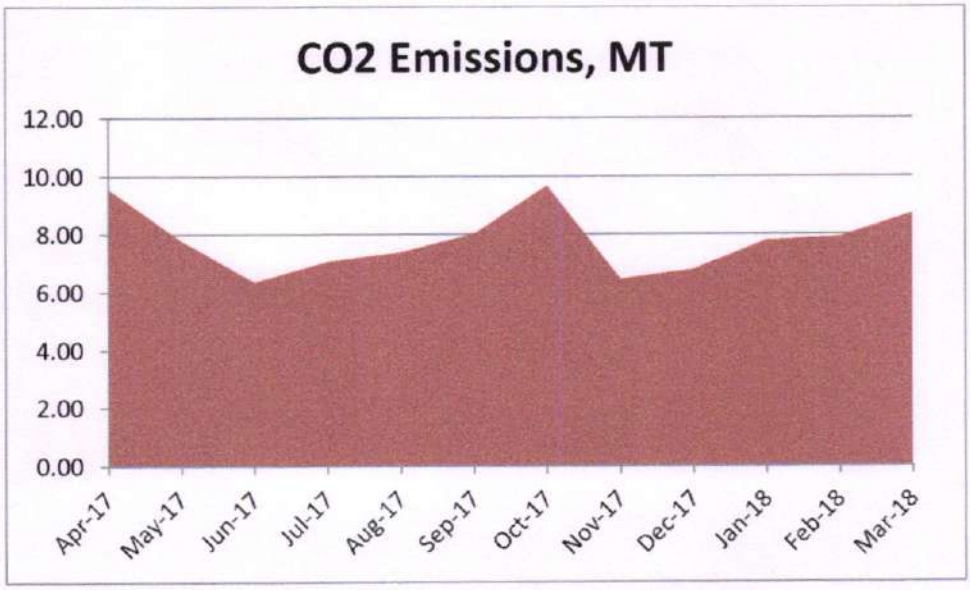


Table No 6: Key Parameters:

No	Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	116983	93.59
2	Maximum	12097	9.68
3	Minimum	7962	6.37
4	Average	9749	7.80

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

- The College has yet to install the Roof Top Solar PV Plant.
- The % of usage of Alternate Energy to Annual Energy Demand works out to be Nil.
- It is recommended to install Roof Top Solar PV Plant.

CHAPTER VI
STUDY OF USAGE OF LED LIGHTS

The Light Fittings are of FTL Type. There are no LED Light Fittings. It is recommended to install LED Fittings. Hence as on Date, the % of Total Lighting Requirement met by LED Lighting is Nil.