ENERGY AUDIT REPORT

of

Dakshin Solapur Taluka Shikshan Mandal's,

COLLEGE OF PHARMACY, SOLAPUR

Jule Solapur-1, Vijapur Road, Solapur

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

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
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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.

(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/DSTSCOP/17-18/01 Date: 14/6/2018

CERTIFICATE

This is to certify that we have conducted Energy Audit at Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur in the Year 2017-18.

The College has adopted Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant

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

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur for awarding us the assignment of Energy Audit of their Solapur Campus, for the Academic Year: 2017-18.

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

EXECUTIVE SUMMARY

1. Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur consumes Energy in the form of **Electrical Energy and LPG** used for various gadgets, office & other facilities.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	20197	266	16.87
2	Maximum	3017	38	2.46
3	Minimum	615	19	0.54
4	Average	1683.08	22.17	1.41

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**
- Annual Energy generated by Solar PV Plant is **12000 kWh**
- Energy Purchased in 17-18 is **20197 kWh**
- Total Annual Energy Demand of the College is **32197 kWh**
- Percentage of Usage of Alternated Energy to Total Energy Demand is **37.27 %.**

5. Usage of LED Lighting:

- The Total LED Lighting load of College is **2.948 kW.**
- The Total Lighting Load of the College is **13.151 kW.**
- The % of LED Lighting to Total Lighting Load is **22.42 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg** of CO_2into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO_2** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

7. Reference:

- Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
DSTS	Dakshin Solapur Taluka Shikshan
MSEDCL	Maharashtra Electricity Distribution Company Limited
kWh	Kilo Watt Hour
kWp	Kilo Watt Peak
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
LPG	Liquefied Petroleum Gas
FTL	Fluorescent Tube Light
LED	Light Emitting Diode

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 Alternate Energy
5. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of College	Solapur Taluka Shikshan Mandal's College of Pharmacy, Solapur
2	Address	Jule Solapur-1, Vijapur Road, Solapur 413 004
3	Affiliation	Punyashlok Ahilyadevi Holkar University, Solapur

CHAPTER-II
STUDY OF CONNECTED LOAD

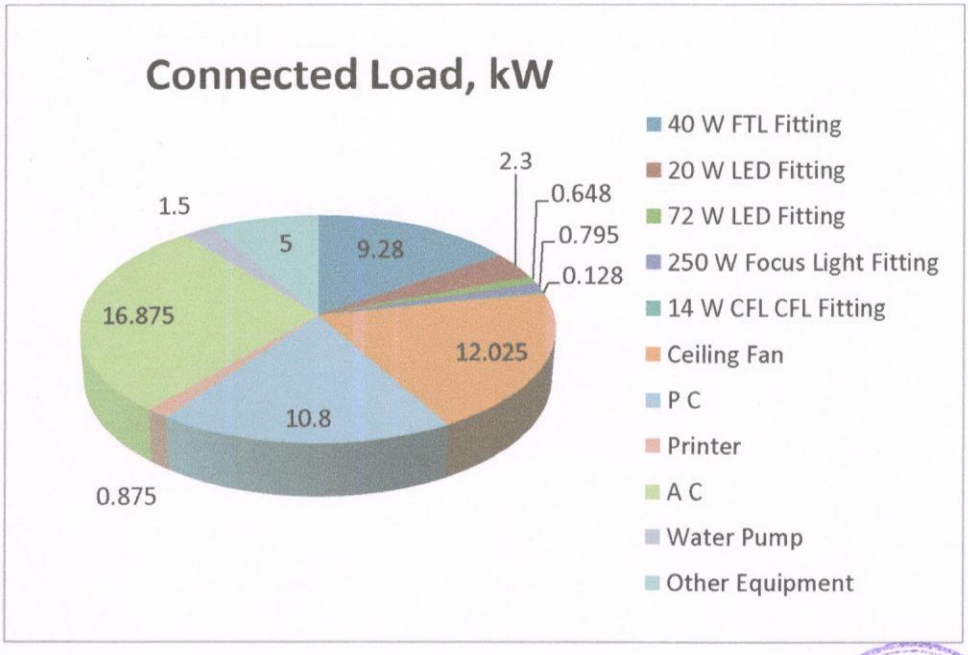
The major contributors to the connected load of the College are as under.

Table No 2: Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	232	40	9.28
2	20 W LED Fitting	115	20	2.3
3	72 W LED Fitting	9	72	0.648
4	250 W Focus Light Fitting	3	265	0.795
5	14 W CFL Fitting	8	16	0.128
6	Ceiling Fan	185	65	12.025
7	P C	72	150	10.8
8	Printer	5	175	0.875
9	A C	9	1875	16.875
10	Water Pump	1	1500	1.5
11	Other Equipment	20	250	5
12	**Total**			**60.23**

We present the above Data in a PIE Chart as under.

Chart No1: Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption

Table No. 3: Study of Electrical Energy & LPG Consumption: 17-18:

No	Month	Energy Purchased, kWh	LPG Consumption, Kg
1	Apr-17	1369	19
2	May-17	1405	19
3	Jun-17	1675	38
4	Jul-17	1702	19
5	Aug-17	1262	38
6	Sep-17	1196	19
7	Oct-17	3017	19
8	Nov-17	2020	19
9	Dec-17	1904	19
10	Jan-18	2446	19
11	Feb-18	615	19
12	Mar-18	1586	19
13	Total	20197	266
14	Maximum	3017	38
15	Minimum	615	19
16	Average	1683.08	22.17

Chart No 2: To study the variation of Monthly Electrical Energy Consumption:

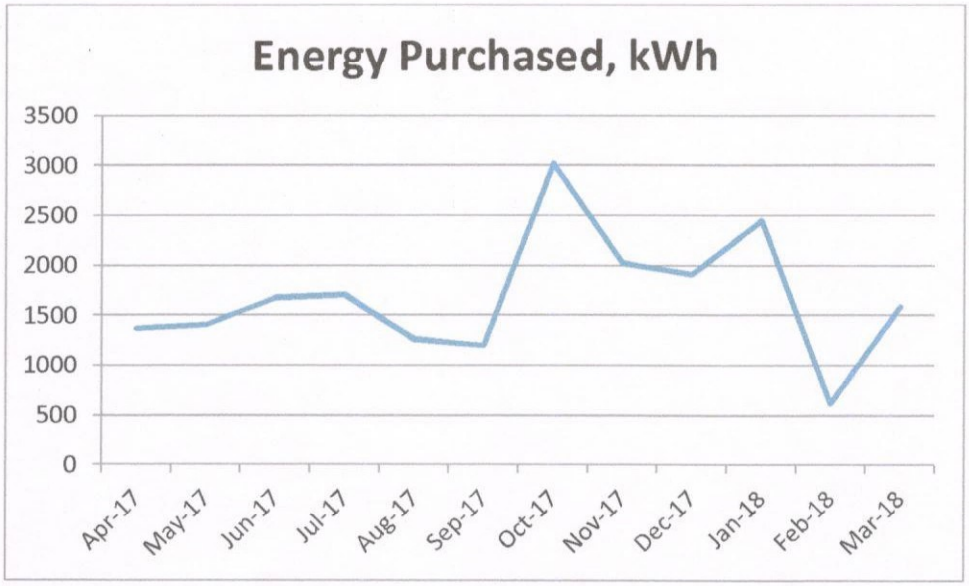


Chart No 3: Study of Month wise LPG Consumption:

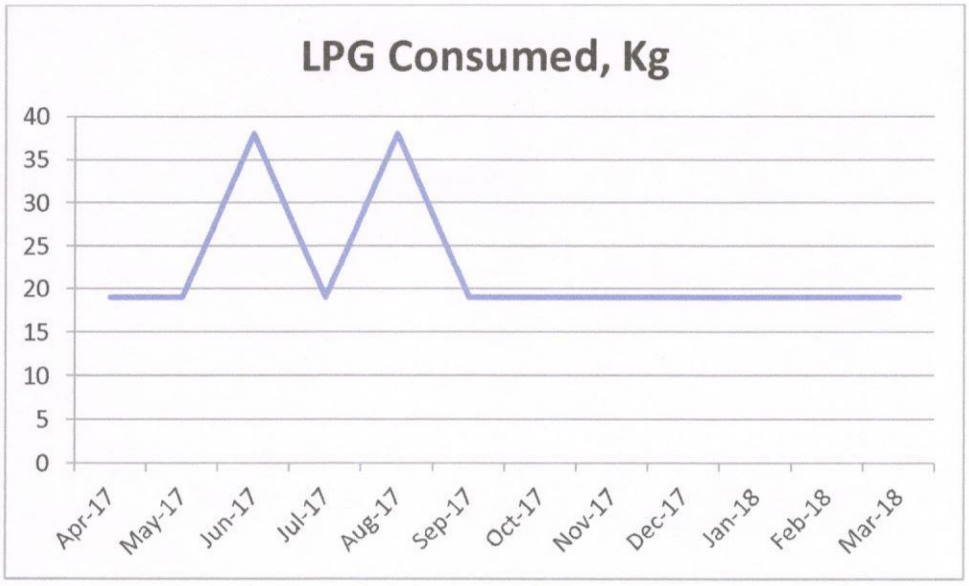


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg
1	Total	20197	266
2	Maximum	3017	38
3	Minimum	615	19
4	Average	1683.08	22.17

CHAPTER-IV
STUDY OF CO_2 EMISSION

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 two forms of Energy namely: Electrical Energy for various Electrical gadgets and LPG.

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to LPG & Electrical Energy are as under

- **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere
- **1 Kg of LPG** releases **2.68 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	LPG Consumption, Kg	CO_2 Emissions, MT
1	Apr-17	1369	19	1.15
2	May-17	1405	19	1.17
3	Jun-17	1675	38	1.44
4	Jul-17	1702	19	1.41
5	Aug-17	1262	38	1.11
6	Sep-17	1196	19	1.01
7	Oct-17	3017	19	2.46
8	Nov-17	2020	19	1.67
9	Dec-17	1904	19	1.57
10	Jan-18	2446	19	2.01
11	Feb-18	615	19	0.54
12	Mar-18	1586	19	1.32
13	Total	20197	266	16.87
14	Maximum	3017	38	2.46
15	Minimum	615	19	0.54
16	Average	1683.08	22.17	1.41

Chart No 4: Representation of Month wise CO_2 Emissions:

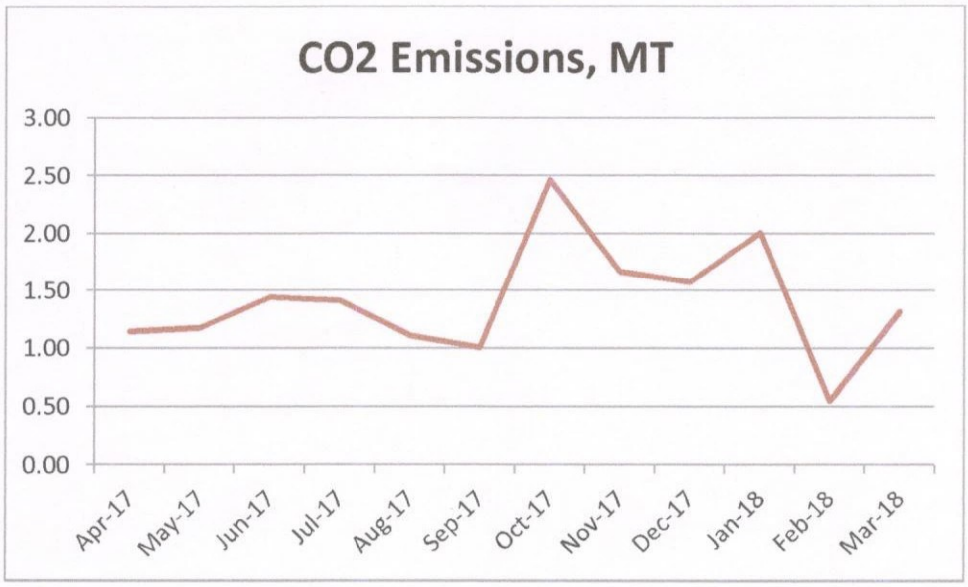


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	20197	266	16.87
2	Maximum	3017	38	2.46
3	Minimum	615	19	0.54
4	Average	1683.08	22.17	1.41

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

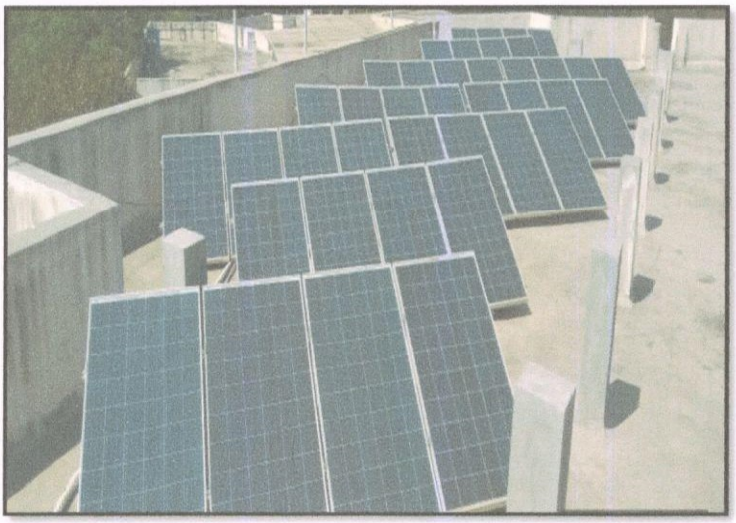
The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**

In the following Table, we present the percent usage of Renewable Energy to Total Annual Energy Demand of the College.

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

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	**20197**	kWh
2	Installed Roof Top Solar PV Plant Capacity	10	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	**12000**	kWh
6	Total Energy Demand = (1) + (5)	**32197**	kWh
7	% of Usage of Alternate Energy to Total Energy Demand= (5)*100/ (6)	**37.27**	%

Photograph of Roof Top Solar PV Plant:



CHAPTER VI
STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load..

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

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	232	Nos
2	Load per Unit of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fittings	**9.28**	kW
4	No of 20 W LED Fittings	115	Nos
5	Load per Unit of 20 W LED Fitting	20	W/unit
6	Total Load of 20 W LED Fittings	**2.3**	kW
7	No of 72 W LED Fittings	9	Nos
8	Load per Unit of 72 W LED Fitting	72	W/unit
9	Total Load of 72 W LED Fittings	**0.648**	kW
10	No of 14 W CFL Fittings	8	Nos
11	Load per Unit of 14 W CFL Fitting	16	W/unit
12	Total Load of 14 W CFL Fittings	**0.128**	kW
13	No of 250 W Focus Light Fittings	3	Nos
14	Load per Unit of 250 W Focus Light Fitting	265	W/unit
15	Total Load of 250 W Focus Light Fittings	**0.795**	kW
16	Total LED Lighting Load =6+9	**2.948**	kW
17	Total Lighting Load=3+6+9+12+15	**13.151**	kW
	.		
18	% usage of LED to Total Lighting Load=16*100/17	**22.42**	%

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Year: 2018-19

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Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174

19th September , 2018

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- This empanelment is valid till **31st March 2021** from the date of registration, to carry out energy audits under the Energy Conservation Programme
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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/DSTSCOP/18-19/01 Date: 24/6/2019

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This is to certify that we have conducted Energy Audit at Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur in the Year 2018-19.

The College has adopted Energy Efficient Practices:

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- Maximum usage of Day Lighting
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For Enrich Consultants,

ENRICH CONSULTANTS * PUNE *

A Y Mehendale,
Certified Energy Auditor
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1. Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur consumes Energy in the form of **Electrical Energy and LPG** used for various gadgets, office & other facilities.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	11657	266	10.04
2	Maximum	3127	57	2.55
3	Minimum	0	9	0.05
4	Average	971.42	22.17	0.84

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**
- Annual Energy generated by Solar PV Plant is **12000kWh**
- Energy Purchased in 18-19 is **11657 kWh**
- Total Annual Energy Demand of the College is **23657 kWh**
- Percentage of Usage of Alternated Energy to Total Energy Demand is **50.72 %**.

5. Usage of LED Lighting:

- The Total LED Lighting load of College is **3.53 kW**.
- The Total Lighting Load of the College is **12.283 kW.**
- The % of LED Lighting to Total Lighting Load is **28.66 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg** of CO_2into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO_2** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

7. Reference:

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Kg	Kilo Gram
MT	Metric Ton
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LPG	Liquefied Petroleum Gas
FTL	Fluorescent Tube Light
LED	Light Emitting Diode

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2. To study Present Energy Consumption
3. To compute the CO_2 Emissions
4. To study usage of Alternate Energy
5. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
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3	Affiliation	Punyashlok Ahilyadevi Holkar University, Solapur

CHAPTER-II
STUDY OF CONNECTED LOAD

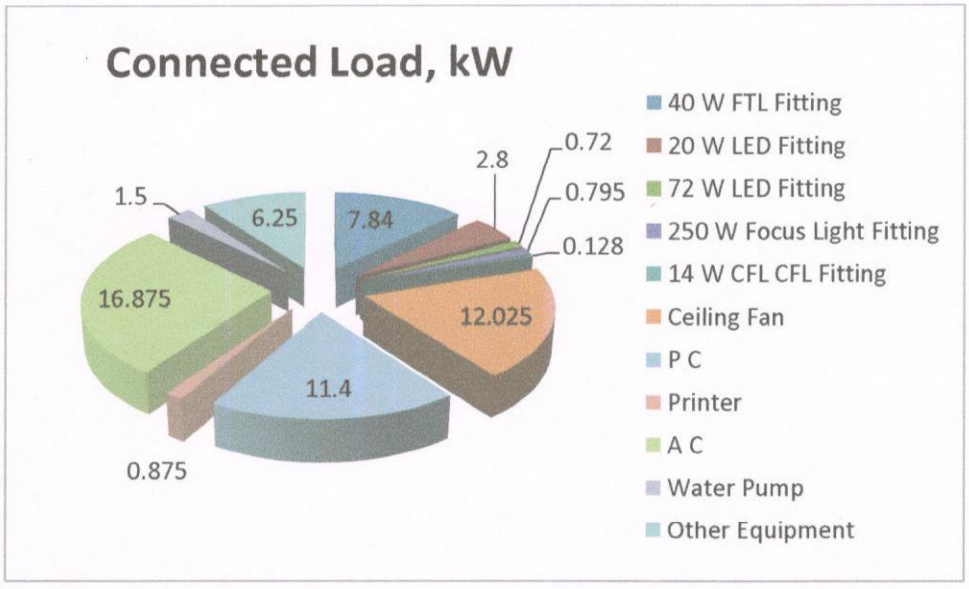
The major contributors to the connected load of the College are as under.

Table No 2: Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	196	40	7.84
2	20 W LED Fitting	140	20	2.8
3	72 W LED Fitting	10	72	0.72
4	250 W Focus Light Fitting	3	265	0.795
5	14 W CFL Fitting	8	16	0.128
6	Ceiling Fan	185	65	12.025
7	P C	76	150	11.4
8	Printer	5	175	0.875
9	A C	9	1875	16.875
10	Water Pump	1	1500	1.5
11	Other Equipment	25	250	6.25
12	**Total**			**61.21**

We present the above Data in a PIE Chart as under.

Chart No1: Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption

Table No. 3: Study of Electrical Energy & LPG Consumption: 18-19:

No	Month	Energy Purchased, kWh	LPG Consumption, Kg
1	Apr-18	1505	9
2	May-18	386	10
3	Jun-18	507	9
4	Jul-18	693	10
5	Aug-18	1446	57
6	Sep-18	1367	38
7	Oct-18	0	19
8	Nov-18	3127	19
9	Dec-18	496	38
10	Jan-19	378	19
11	Feb-19	741	19
12	Mar-19	1011	19
13	Total	11657	266
14	Maximum	3127	57
15	Minimum	0	9
16	Average	971.42	22.17

Chart No 2: To study the variation of Monthly Electrical Energy Consumption:

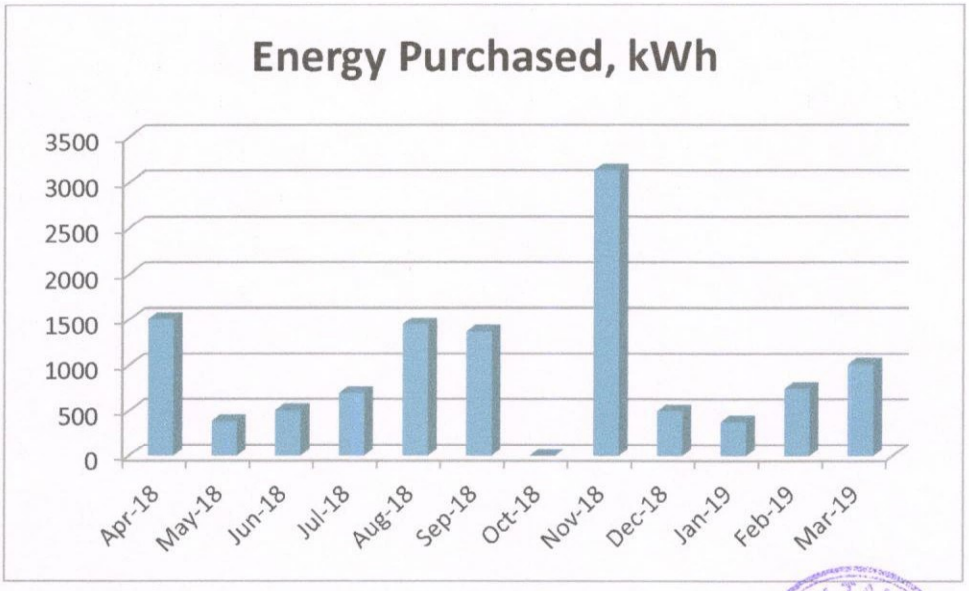


Chart No 3: Study of Month wise LPG Consumption:

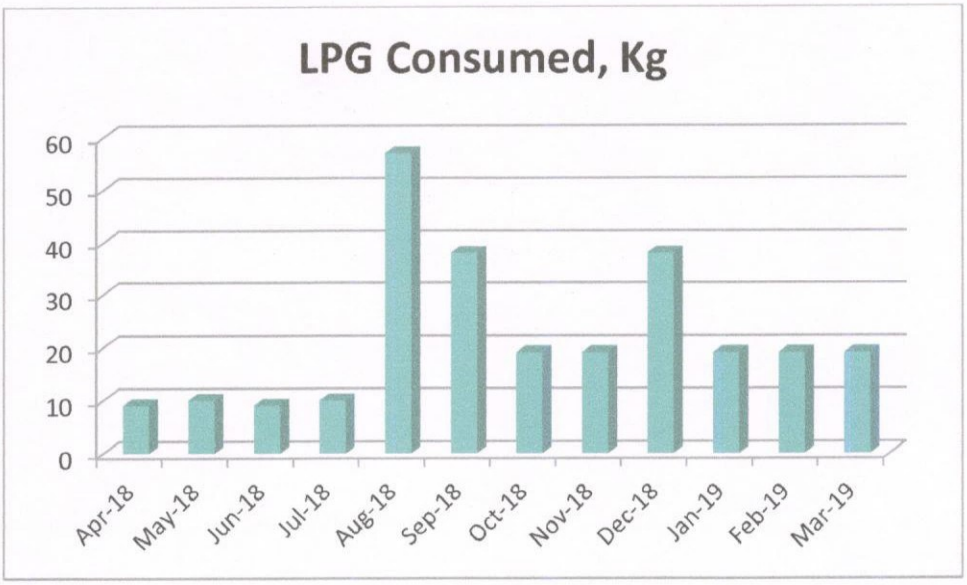


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg
1	Total	11657	266
2	Maximum	3127	57
3	Minimum	0	9
4	Average	971.42	22.17

CHAPTER-IV
STUDY OF CO_2 EMISSION

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 two forms of Energy namely: Electrical Energy for various Electrical gadgets and LPG.

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to LPG & Electrical Energy are as under

- **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere
- **1 Kg of LPG** releases **2.68 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	LPG Consumption, Kg	CO_2 Emissions, MT
1	Apr-18	1505	9	1.23
2	May-18	386	10	0.34
3	Jun-18	507	9	0.43
4	Jul-18	693	10	0.58
5	Aug-18	1446	57	1.31
6	Sep-18	1367	38	1.20
7	Oct-18	0	19	0.05
8	Nov-18	3127	19	2.55
9	Dec-18	496	38	0.50
10	Jan-19	378	19	0.35
11	Feb-19	741	19	0.64
12	Mar-19	1011	19	0.86
13	Total	11657	266	10.04
14	Maximum	3127	57	2.55
15	Minimum	0	9	0.05
16	Average	971.42	22.17	0.84

Chart No 4: Representation of Month wise CO_2 Emissions:

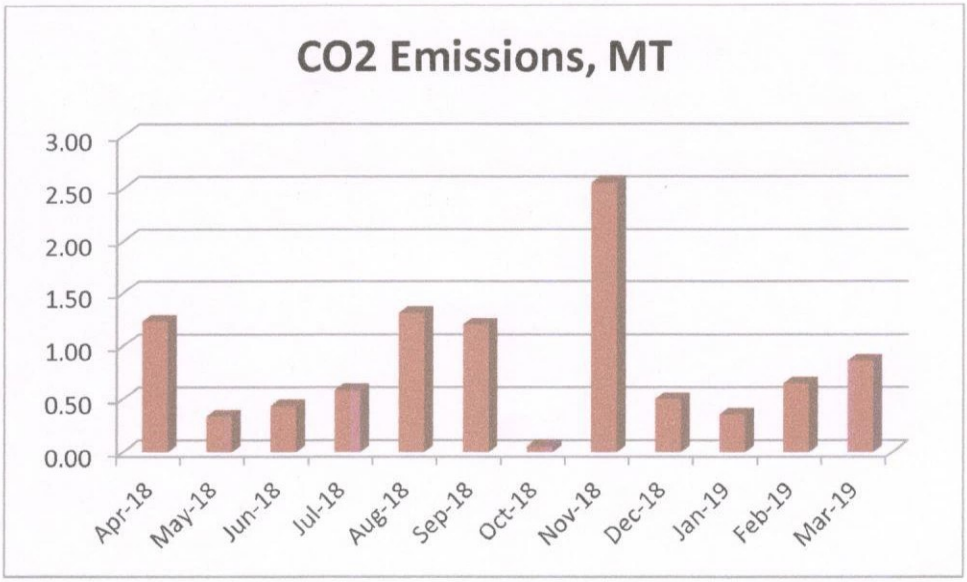


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	11657	266	10.04
2	Maximum	3127	57	2.55
3	Minimum	0	9	0.05
4	Average	971.42	22.17	0.84

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**

In the following Table, we present the percent usage of Renewable Energy to Total Annual Energy Demand of the College.

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

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	**11657**	kWh
2	Installed Roof Top Solar PV Plant Capacity	10	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	**12000**	kWh
6	Total Energy Demand = (1) + (5)	**23657**	kWh
7	% of Usage of Alternate Energy to Total Energy Demand= (5)*100/ (6)	**50.72**	%

Photograph of Roof Top Solar PV Plant:

CHAPTER VI
STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load..

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

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	196	Nos
2	Load per Unit of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fittings	**7.84**	kW
4	No of 20 W LED Fittings	140	Nos
5	Load per Unit of 20 W LED Fitting	20	W/unit
6	Total Load of 20 W LED Fittings	**2.8**	kW
7	No of 72 W LED Fittings	10	Nos
8	Load per Unit of 72 W LED Fitting	72	W/unit
9	Total Load of 72 W LED Fittings	**0.72**	kW
10	No of 14 W CFL Fittings	8	Nos
11	Load per Unit of 14 W CFL Fitting	16	W/unit
12	Total Load of 14 W CFL Fittings	**0.128**	kW
13	No of 250 W Focus Light Fittings	3	Nos
14	Load per Unit of 250 W Focus Light Fitting	265	W/unit
15	Total Load of 250 W Focus Light Fittings	**0.795**	kW
16	Total LED Lighting Load =6+9	**3.52**	kW
17	Total Lighting Load=3+6+9+12+15	**12.283**	kW
	.		
18	% usage of LED to Total Lighting Load=16*100/17	**28.66**	%

ENERGY AUDIT REPORT

of

Dakshin Solapur Taluka Shikshan Mandal's,

COLLEGE OF PHARMACY, SOLAPUR

Jule Solapur-1, Vijapur Road, Solapur

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

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/DSTSCOP/19-20/01 Date: 13/7/2020

CERTIFICATE

This is to certify that we have conducted Energy Audit at Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur in the Year 2019-20.

The College has adopted Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant
- Usage of BSS STAR Rated Energy Efficient Equipment

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

For Enrich Consultants,

A Mehendale

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENRICH CONSULTANTS * PUNE *

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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur for awarding us the assignment of Energy Audit of their Solapur Campus, for the Academic Year: 2019-20.

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

EXECUTIVE SUMMARY

1. Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur consumes Energy in the form of **Electrical Energy and LPG;** used for various gadgets, office & other facilities.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	13159	266	12.56
2	Maximum	1849	57	1.72
3	Minimum	258	9	0.26
4	Average	1096.58	22.17	1.05

3. Energy Conservation projects installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of **10 kWp** Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**
- Annual Energy generated by Solar PV Plant is **12000 kWh**
- Energy Purchased in 19-20 is **13159 kWh**
- Total Annual Energy Demand of the College is **25159 kWh**
- Percentage of Usage of Alternated Energy to Total Energy Demand is **47.70 %.**

5. Usage of LED Lighting:

- The Total LED Lighting load of College is **3.88 kW.**
- The Total Lighting Load of the College is **12.219 kW.**
- The % of LED Lighting to Total Lighting Load is **31.75 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO_2into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO_2** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

7. References:

- For CO_2 Emissions: www.tatapower.com
- Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
DSTS	Dakshin Solapur Taluka Shikshan
MSEDCL	Maharashtra Electricity Distribution Company Limited
kWh	Kilo Watt Hour
kWp	Kilo Watt Peak
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
LPG	Liquefied Petroleum Gas
FTL	Fluorescent Tube Light
LED	Light Emitting Diode

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 Alternate Energy
5. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of College	Solapur Taluka Shikshan Mandal's College of Pharmacy, Solapur
2	Address	Jule Solapur-1, Vijapur Road, Solapur 413 004
3	Affiliation	Punyashlok Ahilyadevi Holkar University, Solapur

CHAPTER-II
STUDY OF CONNECTED LOAD

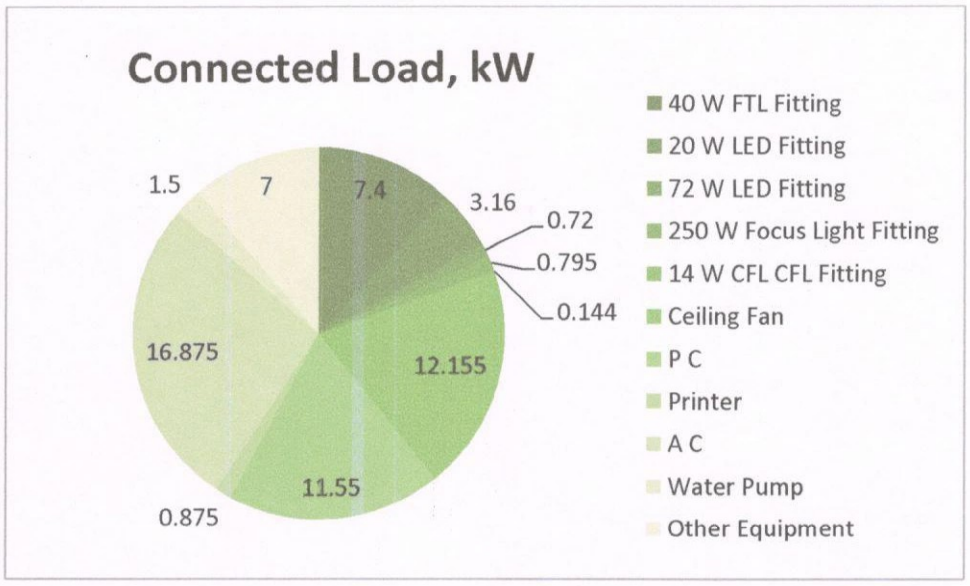
The major contributors to the connected load of the College are as under.

Table No 2: Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	185	40	7.4
2	20 W LED Fitting	158	20	3.16
3	72 W LED Fitting	10	72	0.72
4	250 W Focus Light Fitting	3	265	0.795
5	14 W CFL Fitting	9	16	0.144
6	Ceiling Fan	187	65	12.155
7	P C	77	150	11.55
8	Printer	5	175	0.875
9	A C	9	1875	16.875
10	Water Pump	1	1500	1.5
11	Other Equipment	28	250	7
12	**Total**			**62.17**

We present the above Data in a PIE Chart as under.

Chart No1: Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption

Table No. 3: Study of Electrical Energy & LPG Consumption: 19-20:

No	Month	Energy Purchased, kWh	LPG Consumption, Kg
1	Apr-19	1687	19
2	May-19	1619	19
3	Jun-19	852	11
4	Jul-19	258	9
5	Aug-19	1191	9
6	Sep-19	1322	57
7	Oct-19	1849	19
8	Nov-19	959	19
9	Dec-19	934	19
10	Jan-20	582	38
11	Feb-20	1099	38
12	Mar-20	807	9
13	Total	13159	266
14	Maximum	1849	57
15	Minimum	258	9
16	Average	1096.58	22.17

Chart No 2: To study the variation of Monthly Electrical Energy Consumption:

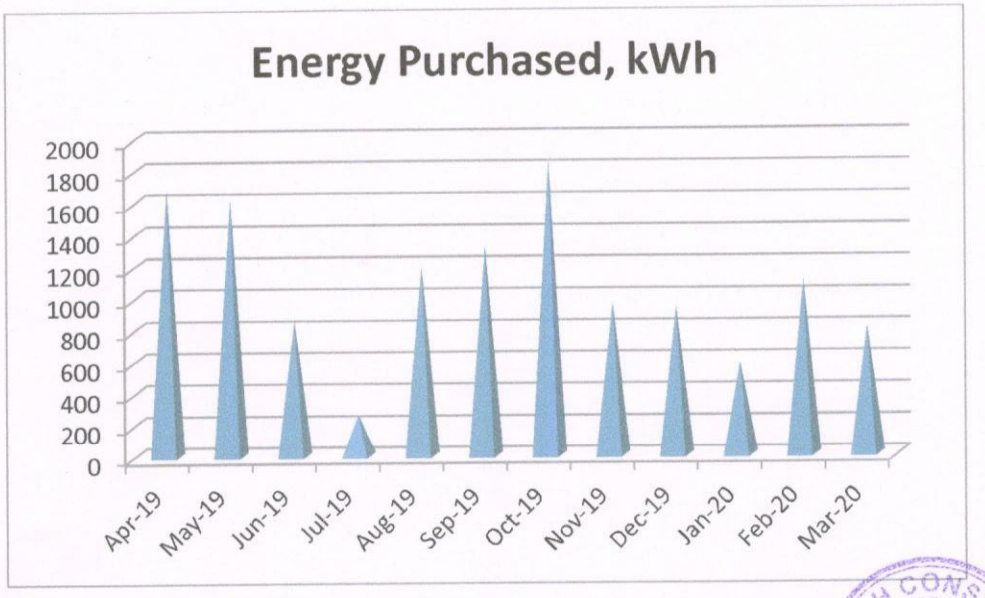


Chart No 3: Study of Month wise LPG Consumption:

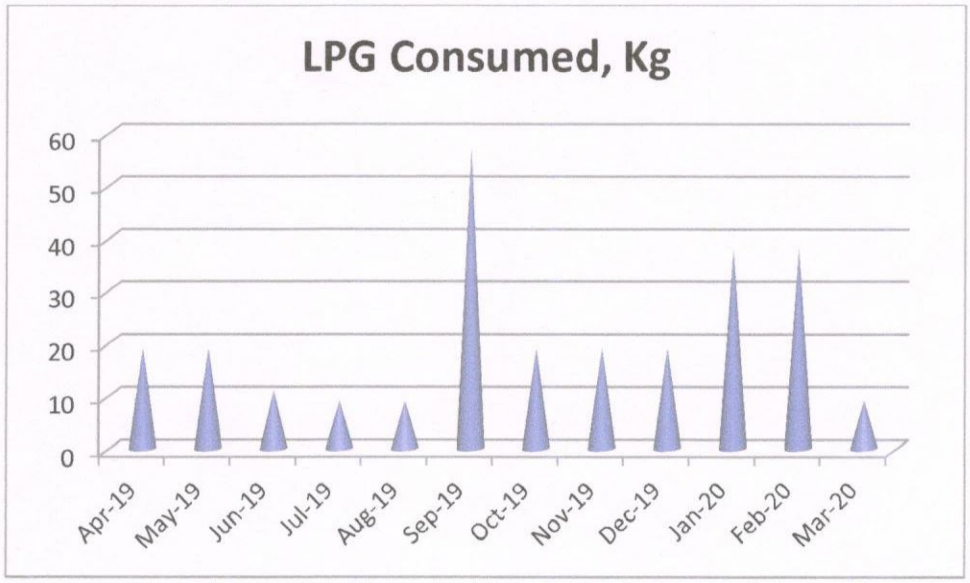


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg
1	Total	13159	266
2	Maximum	1849	57
3	Minimum	258	9
4	Average	1096.58	22.17

CHAPTER-IV
STUDY OF CO_2 EMISSION

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 two forms of Energy namely: Electrical Energy for various Electrical gadgets and LPG.

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to LPG & Electrical Energy are as under

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
- **1 Kg of LPG** releases **2.68 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	LPG Consumption, Kg	CO_2 Emissions, MT
1	Apr-19	1687	19	1.57
2	May-19	1619	19	1.51
3	Jun-19	852	11	0.80
4	Jul-19	258	9	0.26
5	Aug-19	1191	9	1.10
6	Sep-19	1322	57	1.34
7	Oct-19	1849	19	1.72
8	Nov-19	959	19	0.91
9	Dec-19	934	19	0.89
10	Jan-20	582	38	0.63
11	Feb-20	1099	38	1.09
12	Mar-20	807	9	0.75
13	Total	13159	266	12.56
14	Maximum	1849	57	1.72
15	Minimum	258	9	0.26
16	Average	1096.58	22.17	1.05

Chart No 4: Representation of Month wise CO_2 Emissions:

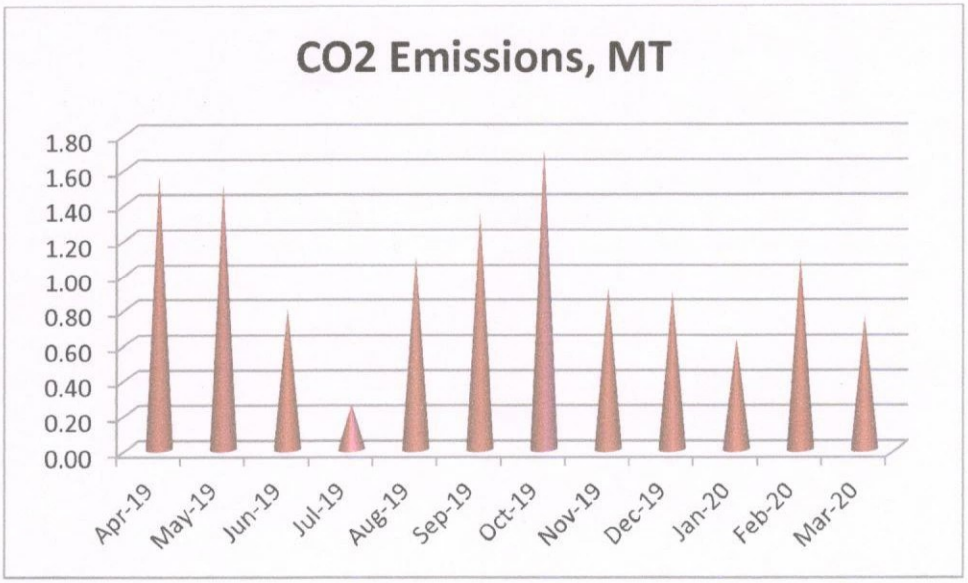


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	13159	266	12.56
2	Maximum	1849	57	1.72
3	Minimum	258	9	0.26
4	Average	1096.58	22.17	1.05

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

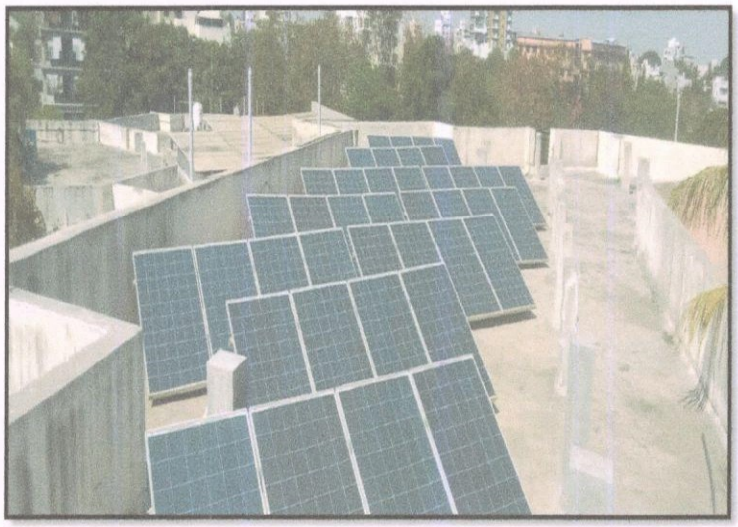
The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**

In the following Table, we present the percent usage of Renewable Energy to Total Annual Energy Demand of the College.

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

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	**13159**	kWh
2	Installed Roof Top Solar PV Plant Capacity	10	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	**12000**	kWh
6	Total Energy Demand = (1) + (5)	**25159**	kWh
7	% of Usage of Alternate Energy to Total Energy Demand= (5)*100/ (6)	**47.70**	%

Photograph of Roof Top Solar PV Plant:



CHAPTER VI
STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load..

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

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	185	Nos
2	Load per Unit of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fittings	**7.4**	kW
4	No of 20 W LED Fittings	158	Nos
5	Load per Unit of 20 W LED Fitting	20	W/unit
6	Total Load of 20 W LED Fittings	**3.16**	kW
7	No of 72 W LED Fittings	10	Nos
8	Load per Unit of 72 W LED Fitting	72	W/unit
9	Total Load of 72 W LED Fittings	**0.72**	kW
10	No of 14 W CFL Fittings	9	Nos
11	Load per Unit of 14 W CFL Fitting	16	W/unit
12	Total Load of 14 W CFL Fittings	**0.144**	kW
13	No of 250 W Focus Light Fittings	3	Nos
14	Load per Unit of 250 W Focus Light Fitting	265	W/unit
15	Total Load of 250 W Focus Light Fittings	**0.795**	kW
16	Total LED Lighting Load =6+9	**3.88**	kW
17	Total Lighting Load=3+6+9+12+15	**12.219**	kW
	.		
18	% usage of LED to Total Lighting Load=**16*100/17**	**31.75**	%

ENERGY AUDIT REPORT

of

Dakshin Solapur Taluka Shikshan Mandal's,

COLLEGE OF PHARMACY, SOLAPUR

Jule Solapur-1, Vijapur Road, Solapur

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

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RQ 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/DSTSCOP/20-21/01 Date: 18/6/2021

CERTIFICATE

This is to certify that we have conducted Energy Audit at Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur in the Year 2020-21.

The College has adopted Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant
- Usage of BSS STAR Rated Energy Efficient Equipment

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

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

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EXECUTIVE SUMMARY

1. Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur consumes Energy in the form of **Electrical Energy and LPG** used for various gadgets, office & other facilities.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	4363	133	4.28
2	Maximum	807	38	0.75
3	Minimum	81	0	0.07
4	Average	363.58	11.08	0.36

3. Energy Conservation measures adopted:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**
- Annual Energy generated by Solar PV Plant is **12000 kWh**
- Energy Purchased in 20-21 is **4363 kWh**
- Total Annual Energy Demand of the College is **16363 kWh**
- Percentage of Usage of Alternated Energy to Total Energy Demand is **73.34 %.**

5. Usage of LED Lighting:

- The Total LED Lighting load of College is **3.88 kW.**
- The Total Lighting Load of the College is **12.219 kW.**
- The % of LED Lighting to Total Lighting Load is **31.75 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO_2** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

7. References:

- For CO_2 Emissions: www.tatapower.com
- Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
DSTS	Dakshin Solapur Taluka Shikshan
MSEDCL	Maharashtra Electricity Distribution Company Limited
kWh	Kilo Watt Hour
kWp	Kilo Watt Peak
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
LPG	Liquefied Petroleum Gas
FTL	Fluorescent Tube Light
LED	Light Emitting Diode

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 Alternate Energy
5. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of College	Solapur Taluka Shikshan Mandal's College of Pharmacy, Solapur
2	Address	Jule Solapur-1, Vijapur Road, Solapur 413 004
3	Affiliation	Punyashlok Ahilyadevi Holkar University, Solapur

CHAPTER-II
STUDY OF CONNECTED LOAD

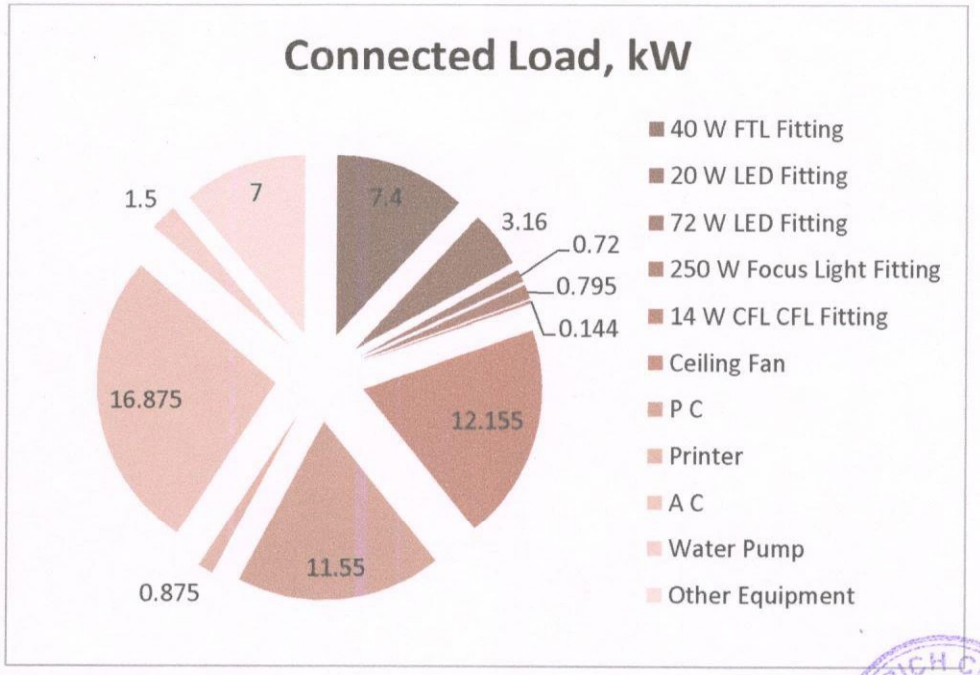
The major contributors to the connected load of the College are as under.

Table No 2: Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	185	40	7.4
2	20 W LED Fitting	158	20	3.16
3	72 W LED Fitting	10	72	0.72
4	250 W Focus Light Fitting	3	265	0.795
5	14 W CFL Fitting	9	16	0.144
6	Ceiling Fan	187	65	12.155
7	P C	77	150	11.55
8	Printer	5	175	0.875
9	A C	9	1875	16.875
10	Water Pump	1	1500	1.5
11	Other Equipment	28	250	7
12	**Total**			**62.17**

We present the above Data in a PIE Chart as under.

Chart No1: Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption

Table No. 3: Study of Electrical Energy & LPG Consumption: 20-21:

No	Month	Energy Purchased, kWh	LPG Consumption, Kg
1	Apr-20	807	9
2	May-20	81	0
3	Jun-20	81	0
4	Jul-20	288	9
5	Aug-20	261	19
6	Sep-20	282	38
7	Oct-20	468	19
8	Nov-20	336	9
9	Dec-20	180	9
10	Jan-21	494	6
11	Feb-21	512	9
12	Mar-21	573	6
13	Total	4363	133
14	Maximum	807	38
15	Minimum	81	0
16	Average	363.58	11.08

Chart No 2: To study the variation of Monthly Electrical Energy Consumption:

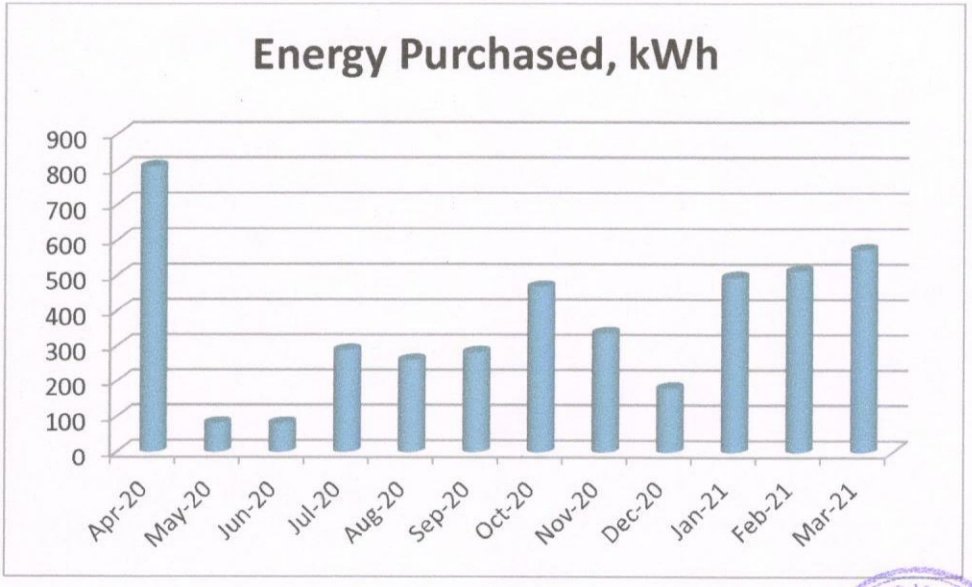


Chart No 3: Study of Month wise LPG Consumption:

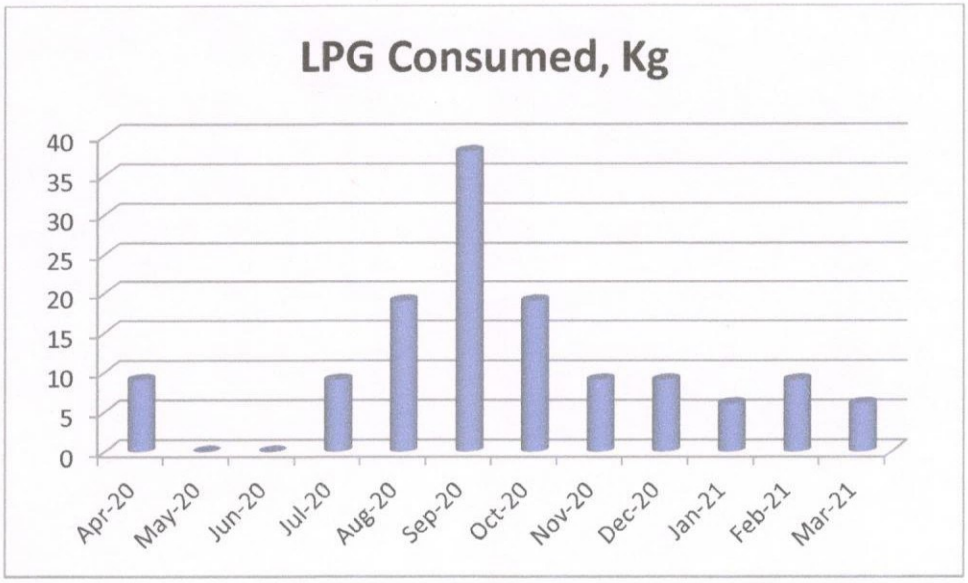


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg
1	Total	4363	133
2	Maximum	807	38
3	Minimum	81	0
4	Average	363.58	11.08

CHAPTER-IV
STUDY OF CO_2 EMISSION

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 two forms of Energy namely: Electrical Energy for various Electrical gadgets and LPG.

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to LPG & Electrical Energy are as under

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
- **1 Kg of LPG** releases **2.68 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	LPG Consumption, Kg	CO_2 Emissions, MT
1	Apr-20	807	9	0.75
2	May-20	81	0	0.07
3	Jun-20	81	0	0.07
4	Jul-20	288	9	0.28
5	Aug-20	261	19	0.29
6	Sep-20	282	38	0.36
7	Oct-20	468	19	0.47
8	Nov-20	336	9	0.33
9	Dec-20	180	9	0.19
10	Jan-21	494	6	0.46
11	Feb-21	512	9	0.48
12	Mar-21	573	6	0.53
13	Total	4363	133	4.28
14	Maximum	807	38	0.75
15	Minimum	81	0	0.07
16	Average	363.58	11.08	0.36

Chart No 4: Representation of Month wise CO_2 Emissions:

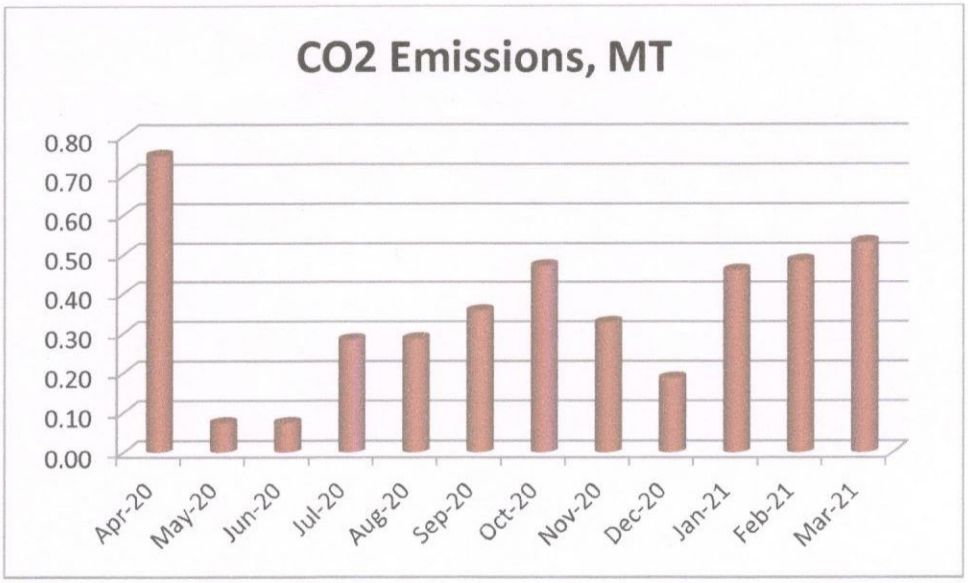


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	4363	133	4.28
2	Maximum	807	38	0.75
3	Minimum	81	0	0.07
4	Average	363.58	11.08	0.36

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**

In the following Table, we present the percent usage of Renewable Energy to Total Annual Energy Demand of the College.

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

No	Particulars	Value	Unit
1	Energy Purchased from MSEDCL	**4363**	kWh
2	Installed Roof Top Solar PV Plant Capacity	10	kWp
3	Average Daily Energy Generated	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated	**12000**	kWh
6	Total Energy Demand = (1) + (5)	**16363**	kWh
7	% of Usage of Alternate Energy to Total Energy Demand= (5)*100/ (6)	**73.34**	%

Photograph of Roof Top Solar PV Plant:

CHAPTER VI
STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load.

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

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	185	Nos
2	Load per Unit of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fittings	**7.4**	kW
4	No of 20 W LED Fittings	158	Nos
5	Load per Unit of 20 W LED Fitting	20	W/unit
6	Total Load of 20 W LED Fittings	**3.16**	kW
7	No of 72 W LED Fittings	10	Nos
8	Load per Unit of 72 W LED Fitting	72	W/unit
9	Total Load of 72 W LED Fittings	**0.72**	kW
10	No of 14 W CFL Fittings	9	Nos
11	Load per Unit of 14 W CFL Fitting	16	W/unit
12	Total Load of 14 W CFL Fittings	**0.144**	kW
13	No of 250 W Focus Light Fittings	3	Nos
14	Load per Unit of 250 W Focus Light Fitting	265	W/unit
15	Total Load of 250 W Focus Light Fittings	**0.795**	kW
16	Total LED Lighting Load =6+9	**3.88**	kW
17	Total Lighting Load=3+6+9+12+15	**12.219**	kW
	.		
18	% usage of LED to Total Lighting Load=**16*100/17**	**31.75**	%

ENERGY AUDIT REPORT

of

Dakshin Solapur Taluka Shikshan Mandal's,

COLLEGE OF PHARMACY, SOLAPUR

Jule Solapur-1, Vijapur Road, Solapur

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

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/DSTSCOP/21-22/01 Date: 12/6/2022

CERTIFICATE

This is to certify that we have conducted Energy Audit at Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur in the Year 2021-22.

The College has adopted Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant
- Usage of BEE STAR Rated Energy Efficient Equipment

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,

Mehendale

A Y Mehendale,
Certified Energy Auditor
EA-8192

ENGRESS SERVICES PUNE

INDEX

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur for awarding us the assignment of Energy Audit of their Solapur Campus, for the Academic Year: 2021-22.

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

EXECUTIVE SUMMARY

1. Dakshin Solapur Taluka Shikshan Mandal's, College of Pharmacy, Solapur consumes Energy in the form of **Electrical Energy and LPG** used for various gadgets, office & other facilities.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Purchased, kWh	LPG Consumed, Kg	CO_2 Emissions, MT
1	Total	2904	266	3.33
2	Maximum	745	57	0.72
3	Minimum	0	9	0.02
4	Average	242.00	22.17	0.28

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of 10 kWp Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **10 kWp.**
- Annual Energy generated by Solar PV Plant is **12000 kWh**
- Energy Purchased in 21-22 is **2904 kWh**
- Total Annual Energy Demand of the College is **14904 kWh**
- Percentage of Usage of Alternated Energy to Total Energy Demand is **80.52 %.**

5. Usage of LED Lighting:

- The Total LED Lighting load of College is **3.96 kW.**
- The Total Lighting Load of the College is **12.179 kW.**
- The % of LED Lighting to Total Lighting Load is **32.51 %.**

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of CO_2into atmosphere
2. **1 Kg** of LPG releases **2.68 Kg of CO_2** into atmosphere
3. **1 kWp** of Solar PV Plant generates **4 kWh** of Energy per Day
4. Annual Solar Energy generation Days: **300 Nos**

7. References:

- For CO_2 Emissions: www.tatapower.com
- Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

BEE	Bureau of Energy Efficiency
DSTS	Dakshin Solapur Taluka Shikshan
MSEDCL	Maharashtra Electricity Distribution Company Limited
kWh	Kilo Watt Hour
kWp	Kilo Watt Peak
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
LPG	Liquefied Petroleum Gas
FTL	Fluorescent Tube Light
LED	Light Emitting Diode

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 Alternate Energy
5. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of College	Solapur Taluka Shikshan Mandal's College of Pharmacy, Solapur
2	Address	Jule Solapur-1, Vijapur Road, Solapur 413 004
3	Affiliation	Punyashlok Ahilyadevi Holkar University, Solapur

1.3 Google Earth Image:

CHAPTER-II
STUDY OF CONNECTED LOAD

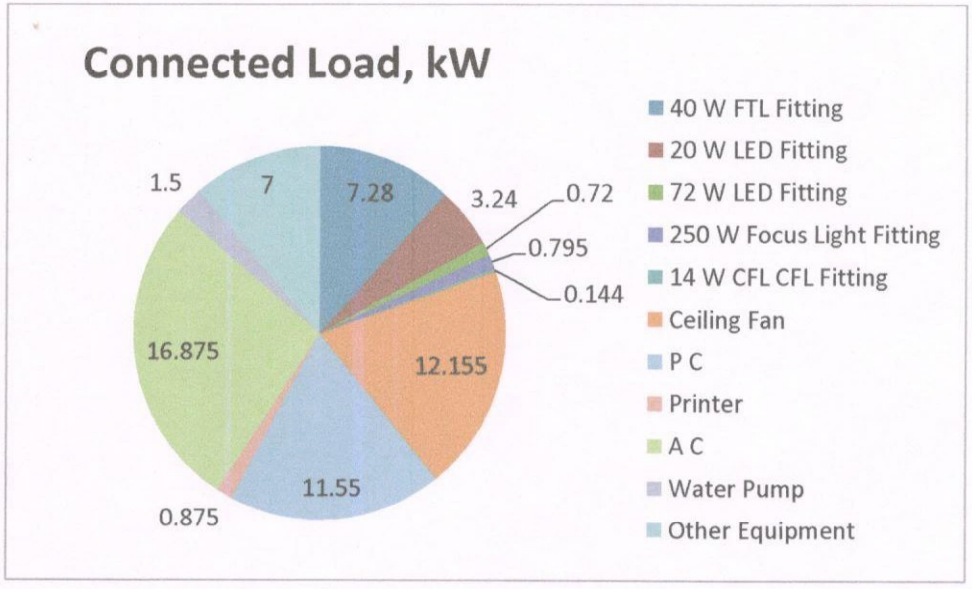
The major contributors to the connected load of the College are as under.

Table No 2: Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	182	40	7.28
2	20 W LED Fitting	162	20	3.24
3	72 W LED Fitting	10	72	0.72
4	250 W Focus Light Fitting	3	265	0.795
5	14 W CFL CFL Fitting	9	16	0.144
6	Ceiling Fan	187	65	12.155
7	P C	77	150	11.55
8	Printer	5	175	0.875
9	A C	9	1875	16.875
10	Water Pump	1	1500	1.5
11	Other Equipment	28	250	7
12	**Total**			**62.13**

We present the above Data in a PIE Chart as under.

Chart No1: Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption

Table No. 3: Study of Electrical Energy & LPG Consumption: 21-22:

No	Month	Energy Purchased, kWh	LPG Consumption, Kg
1	Apr-21	384	10
2	May-21	0	9
3	Jun-21	0	9
4	Jul-21	0	19
5	Aug-21	0	38
6	Sep-21	0	38
7	Oct-21	0	57
8	Nov-21	233	19
9	Dec-21	745	19
10	Jan-22	584	19
11	Feb-22	418	10
12	Mar-22	540	19
13	Total	2904	266
14	Maximum	745	57
15	Minimum	0	9
16	Average	242.00	22.17

Chart No 2: To study the variation of Monthly Electrical Energy Consumption:

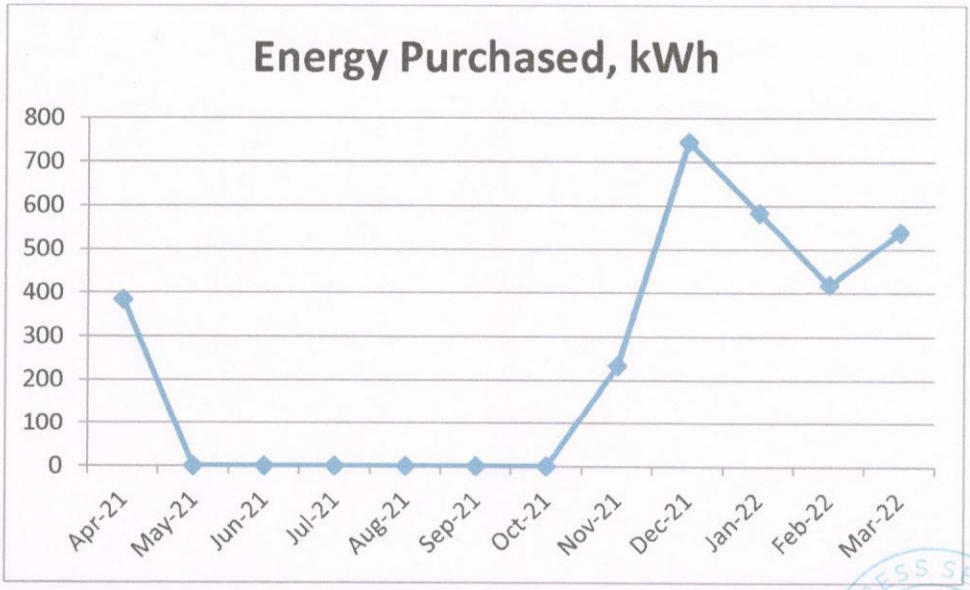


Chart No 3: Study of Month wise LPG Consumption:

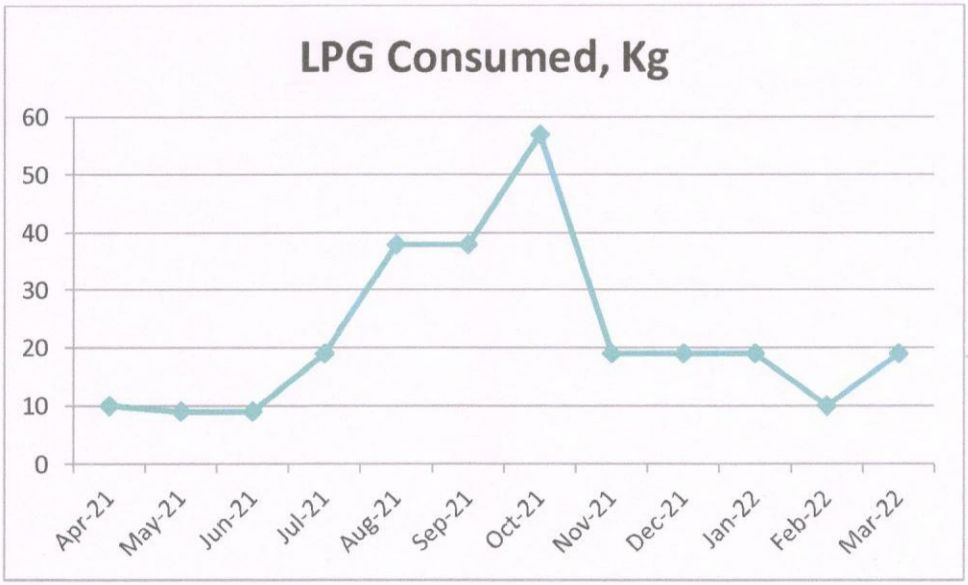


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	LPG Consumed, Kg
1	Total	2904	266
2	Maximum	745	57
3	Minimum	0	9
4	Average	242.00	22.17

CHAPTER-IV
STUDY OF CO_2 EMISSION

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 two forms of Energy namely: Electrical Energy for various Electrical gadgets and LPG.

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to LPG & Electrical Energy are as under

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere
- **1 Kg of LPG** releases **2.68 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	LPG Consumption, Kg	CO_2 Emissions, MT
1	Apr-21	384	10	0.37
2	May-21	0	9	0.02
3	Jun-21	0	9	0.02
4	Jul-21	0	19	0.05
5	Aug-21	0	38	0.10
6	Sep-21	0	38	0.10
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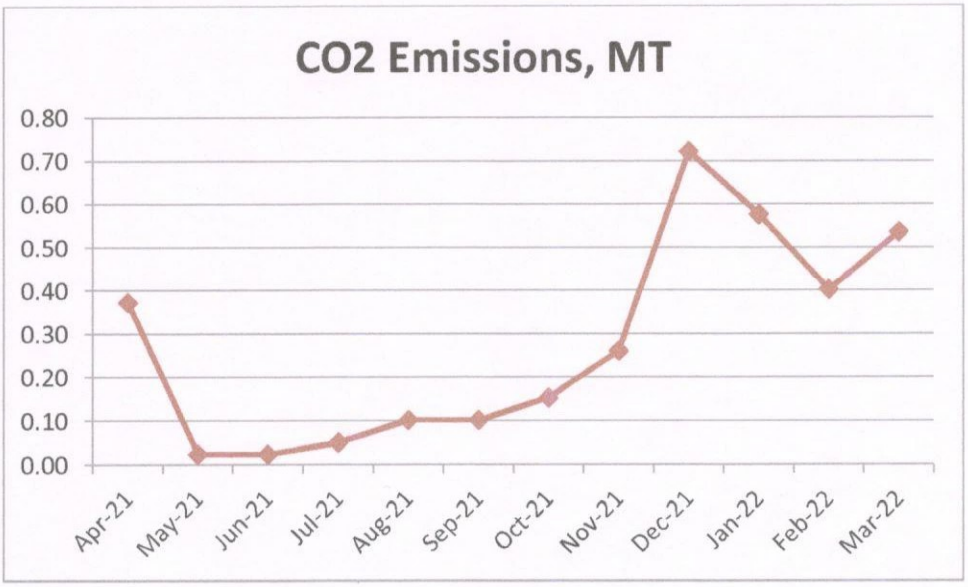

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In the following Table, we present the percent usage of Renewable Energy to Total Annual Energy Demand of the College.

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Photograph of Roof Top Solar PV Plant:

CHAPTER VI
STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load..

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	.		
18	% usage of LED to Total Lighting Load=**16*100/17**	**32.51**	%