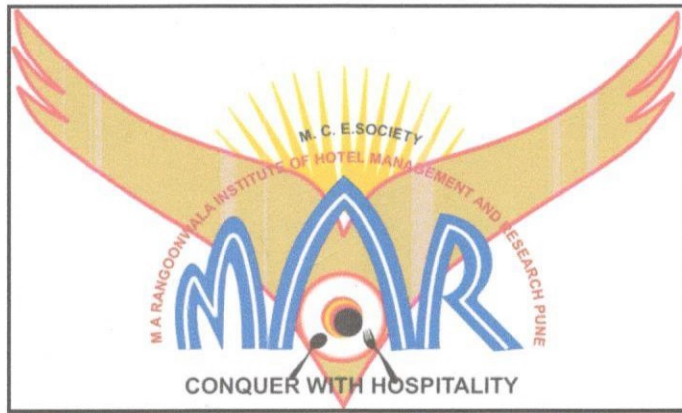


ENERGY AUDIT REPORT

of

Maharashtra Cosmopolitan Education Society's,
**M. A. RANGOONWALA INSTITUTE OF HOTEL
MANAGEMENT & RESEARCH PUNE**

Azam Campus, K B Hidaytullah Road, Camp, Pune 411 001

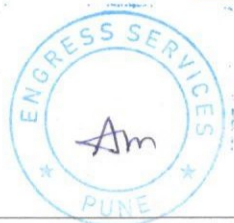


Year: 2021-22

Prepared by:

ENGRESS SERVICES



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



REGISTRATION CERTIFICATES

Regn. No. EA-8192		No. 2942
National Productivity Council (National Certifying Agency)		
PROVISIONAL CERTIFICATE		
This is to certify that Mr. / Ms. <u>Achyut Yashavant Mehendale</u> son / daughter of Mr. <u>Yashavant</u> has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.		
He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.		
He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.		
This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.		
Place : Chennai, India	 Controller of Examination	
Date : 10 th August 2007		

BEE AUDITOR CERTIFICATE

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	10 th 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 Muktagan English School, Parvati, Pune - 411 009.
Registration Category	: <i>Empanelled Consultant for Energy Conservation Programme for Class 'A'</i>
Registration Number	: <i>MEDA/ECN/2022-23/Class A/EA-32.</i>
<ul style="list-style-type: none"> 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 (FC)	

MEDA EMPANELMENT CERTIFICATE



ENGRESS SERVICES

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

Ref: ES/MARIHM/21-22/01

Date: 15/7/2022

CERTIFICATE

This is to certify that we have conducted an Energy Audit at Maharashtra Cosmopolitan Education Society's M. A. Rangoonwala Institute of Hotel Management & Research Pune, Camp, Pune 411 001, in the Year 2021-22.

The Institute 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 50 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,



A Y Mehendale,
Certified Energy Auditor
EA-8192



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of Maharashtra Cosmopolitan Education Society's M. A. Rangoonwala Institute of Hotel Management & Research Pune, Camp, Pune 411 001 for awarding us the assignment of Energy Audit of their Pune Campus for the Year: 2021-22.

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



EXECUTIVE SUMMARY

1. Maharashtra Cosmopolitan Education Society's M. A. Rangoonwala Institute of Hotel Management & Research Pune, Camp, Pune 411 001 consumes Energy in the form of **Electrical Energy & LPG**; used for various Equipment.

2. Present Energy, LPG Consumption & CO₂ Emission:

No	Parameter /Value	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ Emissions, MT
1	Total	25240	1330	26.28
2	Maximum	2365	139	2.43
3	Minimum	1896	95	1.97
4	Average	2103.33	110.83	2.19

3. Measures Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Installation of **50 kWp** Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The Institute has installed **50 kWp** Roof Top Solar PV Plant
- Energy generated by Solar PV Plant in 21-22 is **60000 kWh**
- Energy purchased from MSEDCL in 21-22 is **25240 kWh**
- Total Energy Consumption in 21-22 is **85240 kWh**
- % of Renewable Energy to Annual Energy Demand is **70.39 %**

5. Usage of LED Lighting:

- The Total LED Lighting Load is **2.332 kW**.
- The Total Lighting Load is **2.852 kW**.
- The % of LEDs to Total Lighting Load is **81.77 %**.

6. Assumptions:

1. Electrical Energy consumption is computed based on Capacity Utilization Factor
2. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
3. **1 Kg of LPG** releases **2.68 Kg of CO₂** into atmosphere
4. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
5. Annual Solar Energy generation Days: **300 Nos**

7. References:

- For CO₂ Emissions: www.tatapower.com
- For Solar PV Energy generation: www.solarrooftop.gov.in

ABBREVIATIONS

AC	:	Air conditioner
LPG	:	Liquefied Petroleum Gas
MSEDCL	:	Maharashtra Electricity Distribution Company Limited
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 level Energy Consumption
3. To Study the present CO₂ emissions
4. To study Usage of Alternate/Renewable Energy
5. To study usage of LED Lighting

1.2 Table No1: General Details of Institute:

No	Head	Particulars
1	Name	Maharashtra Cosmopolitan Education Society's, M. A. Rangoonwala Institute of Hotel Management & Research Pune
2	Address	K B Hidaytullah Road, Camp, Pune 411 001
3	Year of Establishment	2006

1.3 Google Earth Location Image:



Institute
Campus

CHAPTER-II

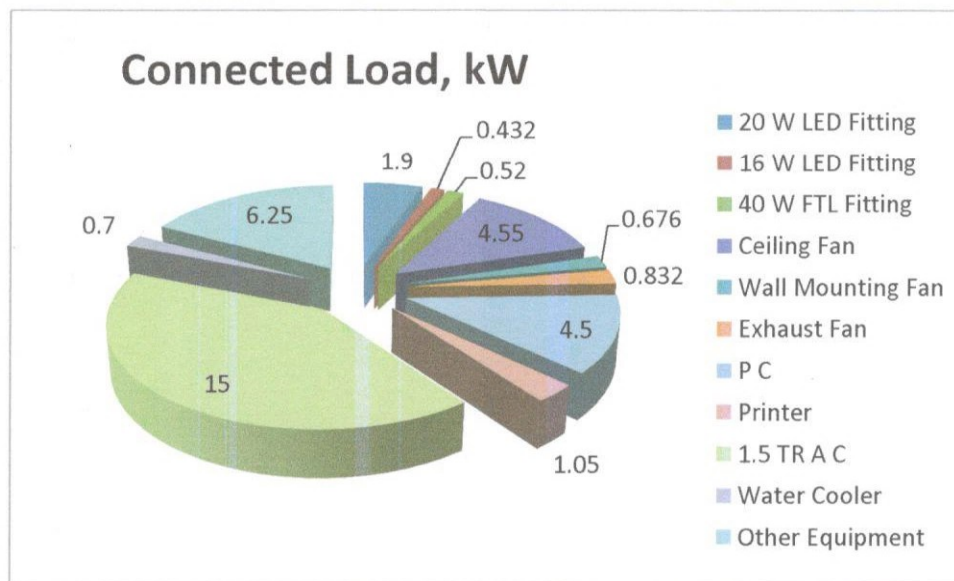
STUDY OF CONNECTED LOAD

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	20 W LED Fitting	95	20	1.9
2	16 W LED Fitting	27	16	0.432
3	40 W FTL Fitting	13	40	0.52
4	Ceiling Fan	70	65	4.55
5	Wall Mounting Fan	13	52	0.676
6	Exhaust Fan	16	52	0.832
7	P C	30	150	4.5
8	Printer	6	175	1.05
9	1.5 TR A C	8	1875	15
10	Water Cooler	2	350	0.7
11	Other Equipment	25	250	6.25
12	Total			36

Chart No-1: Details of Connected Load:



CHAPTER-III

STUDY OF ENERGY CONSUMPTION

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

Table No 3: Electrical Energy & LPG Purchase Analysis: 2021-22:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg
1	Apr-21	2190	114
2	May-21	2219	112
3	Jun-21	2115	113
4	Jul-21	2365	114
5	Aug-21	2164	116
6	Sep-21	2170	112
7	Oct-21	1936	116
8	Nov-21	2036	139
9	Dec-21	1996	106
10	Jan-22	1896	98
11	Feb-22	2036	95
12	Mar-22	2117	95
13	Total	25240	1330
14	Maximum	2365	139
15	Minimum	1896	95
16	Average	2103.33	110.83

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

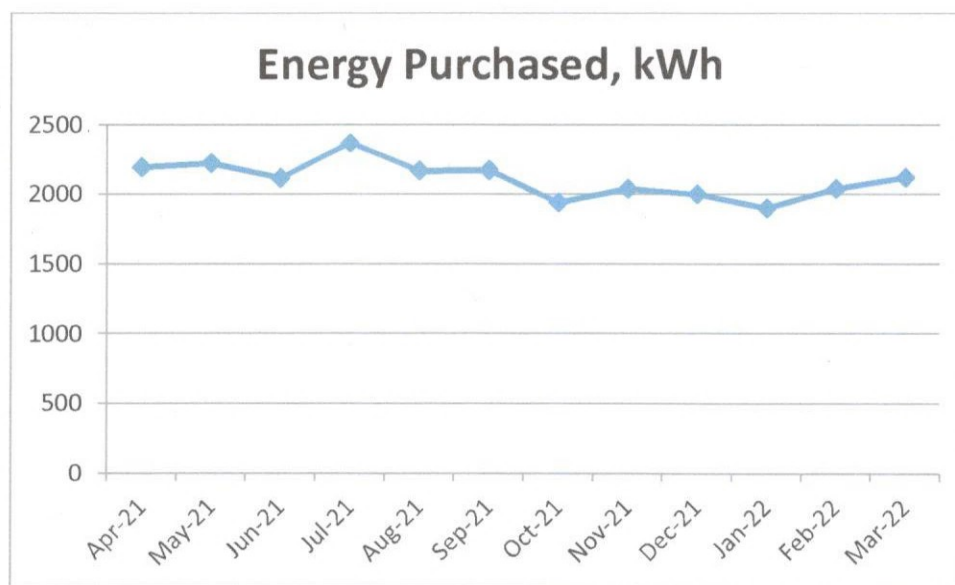


Chart No 3: To study the variation of Month wise LPG Consumed, kWh:

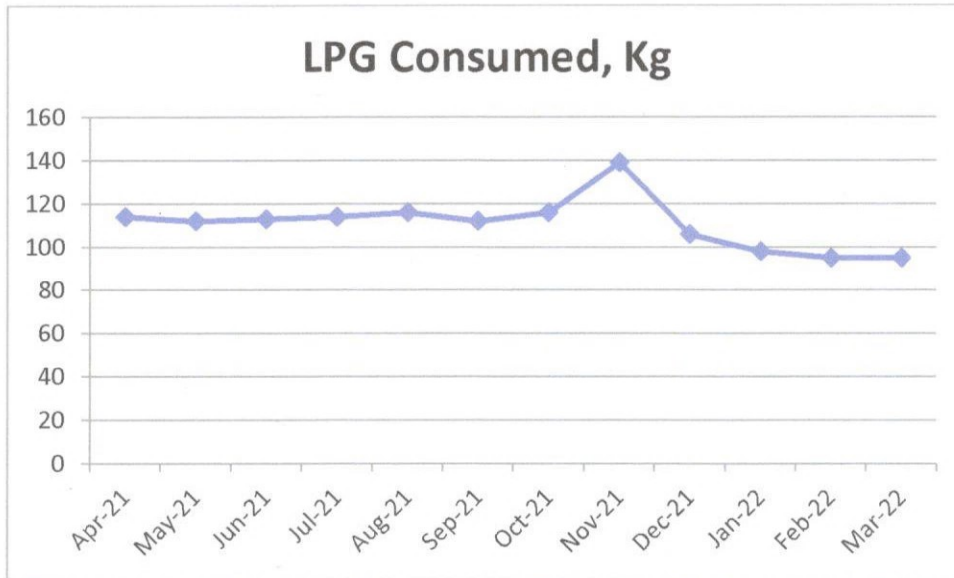


Table No 4: Key Parameters:

No	Parameter	Energy Purchased, kWh	LPG Consumed, Kg
1	Total	25240	1330
2	Maximum	2365	139
3	Minimum	1896	95
4	Average	2103.33	110.83

CHAPTER-IV

STUDY OF CARBON FOOT PRINTING

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 CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy & LPG is:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
- 1 Kg of LPG releases 2.68 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the Institute due to its Day to Day operations

Table No 5: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ Emissions, MT
1	Apr-21	2190	114	2.28
2	May-21	2219	112	2.30
3	Jun-21	2115	113	2.21
4	Jul-21	2365	114	2.43
5	Aug-21	2164	116	2.26
6	Sep-21	2170	112	2.25
7	Oct-21	1936	116	2.05
8	Nov-21	2036	139	2.20
9	Dec-21	1996	106	2.08
10	Jan-22	1896	98	1.97
11	Feb-22	2036	95	2.09
12	Mar-22	2117	95	2.16
13	Total	25240	1330	26.28
14	Maximum	2365	139	2.43
15	Minimum	1896	95	1.97
16	Average	2103.33	110.83	2.19

Chart No 4: Representation of Month wise CO₂ emissions:

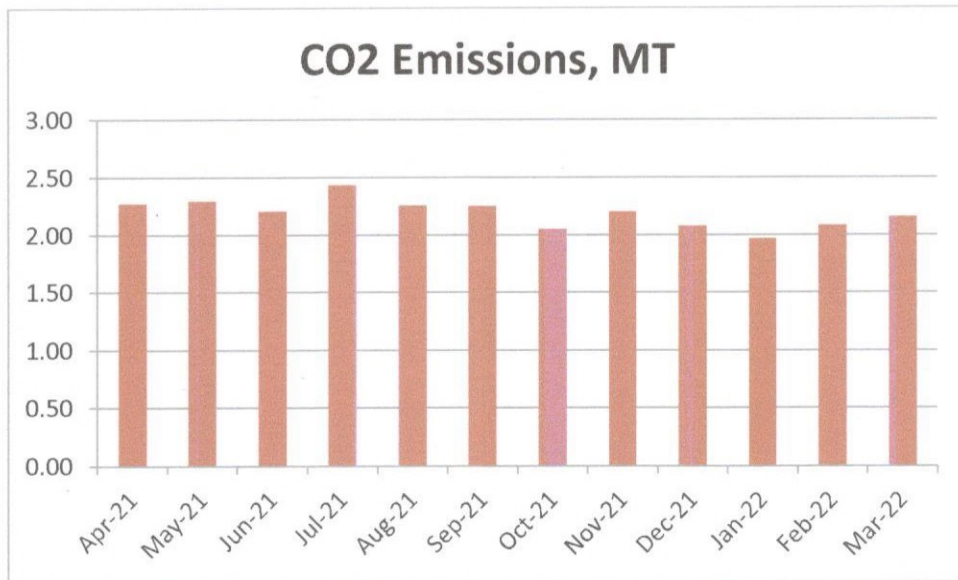


Table No 6: Key Parameters:

No	Value	Energy Purchased, kWh	LPG Consumed, Kg	CO ₂ emissions, MT
1	Total	25240	1330	26.28
2	Maximum	2365	139	2.43
3	Minimum	1896	95	1.97
4	Average	2103.33	110.83	2.19



CHAPTER-V

STUDY OF USAGE OF ALTERNATE ENERGY

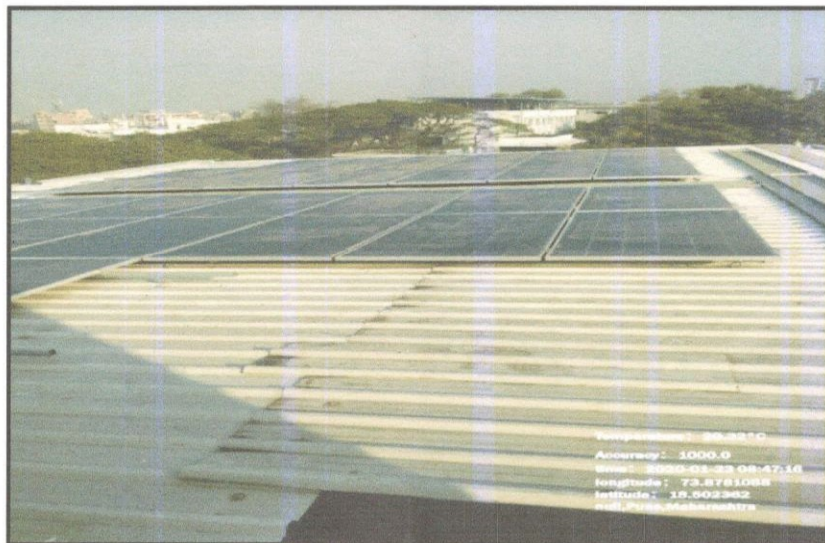
The Institute has installed Roof Top Solar PV Plant of Capacity 50 kWp.

In the following Table, we compute the percentage of Usage of Alternate Energy to Annual Energy Demand of the Institute.

Table No 7: Computation of % Annual Energy Demand met by Alternate Energy:

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	25240	kWh/Annum
2	Installed Capacity of Solar PV Plant	50	kWp
3	Average Energy Generated by Solar PV Plant	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Total Solar Energy Generated= $2*3*4$	60000	kWh
6	Total Energy Demand= (1)+(5)	85240	kWh
7	% of Alternate Energy to Annual Requirement = $(5)*100/(6)$	70.39	%

Photograph of Roof Top Solar PV Plant:



CHAPTER VI

STUDY OF USAGE OF LED LIGHTING

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

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

No	Particulars	Value	Unit
1	No of 20 W LED Fitting	95	Nos
2	Load/unit of 20 W LED Fitting	20	W
3	Total Load of 20 W LED Fittings	1.9	kW
4	No of 16 W LED Fitting	27	Nos
5	Load/unit of 16 W LED Fitting	16	W
6	Total Load of 16 W LED Fittings	0.432	kW
7	No of 40 W FTL Fitting	13	Nos
8	Load/unit of 40 W FTL Fitting	40	W
9	Total Load of 40 W FTL Fittings	0.52	kW
10	Total LED Lighting Load = 3+6	2.332	kW
11	Total Lighting Load = 3+6+9	2.852	kW
12	% of LED to Total Lighting Load = $10 \times 100 / 11$	81.77	%