Maratha Vidya Prasarak Samaj's

INSTITUTE OF MANAGEMENT RESERCH & TECHNOLOGY (IMRT)

MVP CAMPUS, SHIVAJI NAGAR, GANGAPUR ROAD, NASHIK- 422002 (MAHARASHTRA)

NAAC Accredited "B+" grade with CGPA 2.68

Internal Quality Assurance Cell (IQAC)

Energy Audit Report

(2021-22)

Report By,

SOLASTA

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Date: 27/06/2022

I N D E X

Preface

Data collection for energy audit of the **MVP'S Institute of Management, Research & Technology, MVP campus, Nashik - 422002** was approved by team for the period of July 2021 to June 2022.

Energy audit survey was completed by the firm **SOLASTA Energy Solutions , Services & Maintenance** with the help of faculty members of IQAC, Management students. Data was collected for each classroom, laboratory, office, library and of the campus at previous years and updated year by year. The work is completed by considering how many tubes, fan, A.C.'s, electronic instruments, etc. installed in every room. While preparing the energy audit report, we have referred maintained record and college internal survey, New load /changes in load if any, and its participation in total electricity consumption was taken in consideration.

We really appreciate the effort put by MVP'S management for creating awareness of Energy Audit, Use of renewable energy such as solar energy and its roll in energy saving amongst all of us. We really appreciate Hon. Management of the college for encouraging us by providing this opportunity to do the energy audit and participate in the energy saving program. Through this, we have been cleared the vision of Institution towards the Green campus and save our nature. We really appreciate for various efforts taken by the college.

Main Building

Acknowledgement

We are very much thankful to Director Dr. D. K. Mukhedkar for motivating us and giving us the opportunity for energy audit. We would like to express our thanks to Dr. Sanjay A. Gaikwad , Dr. B. D. Ekade and all respected staff, faculty members and students who have taken part in this audit survey etc. of MVP'S Institute of Management, Research & Technology, MVP campus, Nashik. We tried our best to present this energy report as per requirements of college and our expertise work.

Energy Audit Committee

Sr.No.	Names	Designation
1	Dr. D. K. Mukhedkar	Chairperson
2	Dr. G. M. Ahire	Head Of Department
3	Dr. S. A. Gaikwad	IQAC Co-Ordinator
4	Mrs. Dr. V.N. Bhabad	Energy Audit Co-Ordinator
5	Prof. R. L. Pagar	Member

Summary

The objective of the audit was to study the energy consumption pattern of the college, identify the areas where potential for energy/cost saving exists and prepare proposals for energy/cost saving along with investment and payback periods.

The salient observations and recommendations are given below:

1. MVP'S Institute of Management, Research & Technology, MVP campus, Nashik.
Uses energy in the following forms:

a. **From MSEDCL**
b. **Electricity SOLAR Grid connected solar plant (15.3kWp)**
c. **High Speed Diesel Generator (HSDG)**

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

2. The average cost of energy is around Rs. **31144 / Month.**

3. After the measurement and analysis, we propose herewith following aspect regarding the efficient use of energy:

Abbreviations

AHU	Air handling unit
APFC	Automatic Power Factor Controller
DG	Diesel generator
ECP	Energy Conservation Proposal
GCV	Gross Calorific Value
HVAC	Heating, Ventilation and Air Conditioning
HSDG	High speed diesel Generator
PF	Power Factor
SEC	Specific Energy Consumption
TR	Tons of Refrigeration
UOM	Unit of Measurement
MAHADISCO	Maharashtra State Electricity Distribution Company

Chapter: 1
Introduction to Energy Audit

- **General:**

Nashik entrusted the work of conducting a walk through Energy Audit of campus with the main objectives as given bellow:

- ✓ To study the present pattern of energy consumption
- ✓ To identify potential areas for energy optimization
- ✓ To recommend energy conservation proposals with cost benefit analysis.

- **Scope of Work, Methodology and Approach:**

Scope of work and methodology were as per the proposal. While undertaking data collection, analysis, due care was always taken to avoid abnormal situations so as to generate normal/representative pattern of energy consumption at the facility.

- **Approach to Energy Audit:**

We focused our attention on energy management and optimization of energy efficiency of the systems, sub systems and equipments. The key to such performance evaluation lies in the sound knowledge of performance of equipments and system as a whole.

- **Energy Audit:**

The objective of Energy Audit is to balance the total energy inputs with its use and to identify the energy conservation opportunities in the stream. Energy Audit also gives focused attention to energy cost and cost involved in achieving higher performance with technical and financial analysis. The best alternative is selected on financial analysis basis.

Energy Audit Methodology: Energy Audit Study is divided into following steps:

1. **Historical Data Analysis:**

The historical data analysis involves establishment of energy consumption pattern to the established base line data on energy consumption and its variation with change in production volumes.

2. **Actual data analysis:**

This step involves actual trials measurement It also involves input to output analysis to establish actual operating equipment efficiency and finding out losses in the system.

3. **Identification and evaluation of Energy Conservation Opportunities:**

This step involves evaluation of energy conservation opportunities identified during the energy audit. It gives potential of energy saving and investment required to implement the proposed modifications with payback period.

Chapter: 2

About Institute

Sr. No.	Particulars	Details
1	Name of the Institute:	Maratha Vidya Prasarak Samaj's Institute of Management, Research & Technology (IMRT)
2	Address:	MVP Campus, Gangapur road, Shivaji nagar, Nashik - 422002
3	Affiliation:	Affiliated to Savitribai Phule Pune University Recognized by AICTE , New Delhi MSDTE Mumbai & Gov. Of Maharashtra. The AICTE has approved this Institute to run MBA / MBA-IT / MBA-H RD Courses vide its approval letter No. F-27-36/B-11/BOS/M/94/23346 dt March 31st, 1994.
4	Year of Establishment:	June 1986
5	NAAC Accreditation:	NAAC REACCREDITED "B+" GRADE with CGPA 2.68
6	Contact:	Phone : 0253-2571650, 2970894, Email : mvpimrt@gmail.com Website : www.imrt.ac.in
7	Courses Offered:	1. Masters Program 2. Pg Diploma Courses 3. Research Center 7. Research Activities 8. Imrt Faculty

Chapter: 3

Energy Consumption Profile

3.1 Source of Energy:

MVP'S Institute of Management, Research & Technology (IMRT) , MVP Campus , Nashik uses Energy in following forms:

A. Electricity from MSEDCL :

MVP'S Institute of Management, Research & Technology (IMRT) , MVP Campus , Nashik Electricity from Nashik (U) Circle: 595 Of NASIK URBAN DN. 1. : 040 , CITY /DN. : 250

B. High Speed Diesel Generator 32 kVA (HSDG) :

HSD is used as a backup power supply for Diesel Generator which run whenever power supply from MSEDCL is not available.

Kirloskar Diesel Generator (32 kVA)

C. Electricity SOLAR Grid connected solar plant (15.3kw):

Solar - On Grid Inverter System (15.3KW)

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

- Computers
- Lighting
- Air-Conditioning systems
- Fans
- Laboratory Equipment
- Printers
- Xerox machines
- UPS
- LCD Projector
- Router system
- Flood light
- Pumping motor

Library

Meeting Hall

Computer Lab

Administration Office

Chapter : 4

Data Analysis

4.1. Study of Variation of Monthly Units consumption & Power Factor:

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

TABLE 1: Variation in Units Consumption & Power Factor (PF):

Sr. No.	Month	No. Units kWh	Power Factor (P.F.)
1.	June 22	2769	0.65
2.	May 22	2340	0.58
3.	April 22	2654	0.72
4.	Mar 22	2264	0.78
5.	Feb 22	1607	0.64
6.	Jan 22	1604	0.57
7.	Dec 21	2070	0.65
8.	Nov 21	1504	0.56
9.	Oct 21	1797	0.64
10.	Sept 21	2045	0.62
11.	Aug 21	2122	0.63
12.	July 21	2242	0.67
	Total Units	**25018**	**Average: 0.64**

4.2 Conclusion : Variation of PF

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

For power factor of 0.99, the effective incentive will amount to 5% (five percent) reduction in the energy bill and for unity power factor; the effective incentive will amount to 7% (seven percent) reduction in the energy bill. Here Above we observed average 0.52 p.f. for a year which is badly affected

Check for **power factor correction/improvement panel using capacitor bank Or APFC panel feasibility** with experts opinion.

Green Campus

4.3 Study of Month wise Electricity Bill Variation:

TABLE 2: Variation in Electricity Bill:

Sr. No.	Month	Electricity Bill Amount (Rs.)
1	June 22	42060
2	May 22	33648
3	April 22	38080
4	Mar 22	32720
5	Feb 22	25474
6	Jan 22	25546
7	Dec 21	30454
8	Nov 21	24443
9	Oct 21	27042
10	Sept 21	30591
11	Aug 21	31442
12	July 21	32228
	Total Annual Bill=	**373728**
	Average Monthly Bill=	**Rs. 31144**

Conclusion : Monthly Electricity Bill Variation has been identified.

4.4 Study of Month wise Billing Demand Variation:

TABLE:3 Month wise Billing Demand Variation:

Sr. No.	Month	Bill Demand (Recorded) (kVA/Month)
1	June 22	12
2	May 22	13
3	April 22	11
4	Mar 22	13
5	Feb 22	7
6	Jan 22	7
7	Dec 21	12
8	Nov 21	09
9	Oct 21	11
10	Sept 21	15
11	Aug 21	09
12	July 21	11

4.5 General Observations based on Electricity Bill:

1. For College Campus the Contract Demand (CD) is 33 kVA and minimum billing Demand is 50% of the Contract Demand (i.e. 16.50 kVA) or the 75% of previous Maximum Demand recorded whichever is higher.

2. The average electricity cost is Rs. 7.28 considering the last twelve months. (Excluding TOD charges, MD and PF charges)

3. Average monthly Power Factor (P.F.) not maintained to near **9** ,it is average 0.64 recorded which is poor and should be monitored, maintained close to unity on priority.

4. Average Monthly bill is Rs. 31144 /-

5. Maximum billing Demand Recorded is 15 kVA, where as actual billing demands is 13 kVA

Chapter: 5

5.1 Actual Measurements and its Analysis

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/ day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	98	3920	6	23520
2	Fan	80	117	9360	6	56160
3	PC	60	79	4740	6	28440
4	Printer: Standby mode: 30-50w/	printing mode:300-500w	24	7200	1	7200
5	LED 18 W	18	74	1332	6	7992
	LED 22 W	22	8	176	6	1056
6	CFL	20	4	80	6	480
7	Xerox machine	650	2	1300	2	2600
8	AC	3500	5	17500	4	70000
9	LED bulb	20	8	160	6	960
10	CCTV	10	21	210	24	5040
11	UPS	7.5KVA, batteries of 80 Amp-hr	4	3500	2	7000
12	Water Cooler	2.8kwh/day	2	5600	1	5600

13	RO System	3-7 kWhr/m3	1	3700	1	3700
14	LCD Projector	282	8	2256	2	4512
15	Internet Box with WiFi router W/Hr	850	2	1700	6	10200
16	Charging socket	23	43	989	2	1978
17	Weather Station	100w/day	1	100	1	100
18	P.A.System	560	2	1120	1	1120
19	Scanner	50	7	350	1	350
20	Electric bell	5	2	10	1	10
21	Flood light	400	6	2400	11	26400
22	Pumping motor	1.0 HP	2	1470	2	2940
23	DG Gen set	32 KVA	1	AS PER USE		AS PER USE
24	Grid connected solar plant	15.36kw	1	15.36kw	12	15.36kw
	It is expected to generate 60 units/day, 1800 units per month Approx. through Solar Rooftop On grid System 15.3kWp.					

5.2 Department wise load Consumption:

A) Old Building, New Building:

Sr. No.	Premises	Existing Load During (2020-21) in Watt	Additional Load in Watt (2021-22)	Particulars
1	Principal Office	30696		
2	Administration Office:	8780		
3	IQAC Office:	1620		
4	Computer, IT, server room, exam section,staff room,placement cell, research, ups room, reading room, botany, zoology Lab and all other	71240	3120	10 LED 4 FAN
5	Auditorium, meeting hall, library, room	24760		
6	All Classrooms, store room, porch, campus, staircase and all other	29640		

**** This is total load consumption considered approximately. Actual load consumption might be different according to actual use of power for particular time period.***

Chapter: 6

Study of Electrical Systems

6.1 Electrical Supply Details:

The electrical supply to MVP'S Institute of Management, Research & Technology (IMRT) , MVP Campus , Nashik receives from MSEDCL supply at 11 kV, which is stepped down to 415 V by a transformer.

6.2 Study of Electrical Demand:

There is a single meters installed in the premises. The details of meters are as under:

Energy Meter Details:

Sr. No.	Details of Electricity Demand	Tariff	LT-VII B I (88)
	Consumr No:	**049016800359**	
1	Sanctioned Load:	35.00	kW
2	Contract Demand:	16.50	K VA
3	Recorded Maximum Demand:	21.52	K VA

Thus we observe that:

Total Sanctioned Load is 35kW while the recorded Maximum Demand is 13 k VA.

6.3 Lighting System:

Observations and suggestions:

- It is found that FTL, Bulbs, CfLs are installed and replacing preferably with LEDs
- light or electric gadget left ON when not needed which is wasting energy and money, causing pollution that is totally unnecessary , we can surely avoid this.
- **Stand-by power can use up to 8% of a household's total electricity.**

For most homes a 10% reduction in electricity consumption can save 15000 a more a year off our electricity bill and nearly ¾ of a tone of CO2 pollution. A 20% reduction on average consumption will save over Approximately 30,000 and over 1.5 tones of CO2.

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

- Lights
- Projectors
- Air Conditions
- Exhaust and ceiling or table fan
- Printers and scanners
- Battery and phone chargers
- Computers
- TV
- PA Systems
- Pantry /Canteen gadgets such as blenders, kettles, toasters , Induction etc.

Chapter: 7

Study of Air Conditioners

In the facility for air conditioning there is no centralized system with AHU (air handling unit), mostly spilt air conditioners are installed. The **energy saver circuits / inverter Based Air Conditioners for the air conditioners, intelligently reduces the operating hours** of the compressors either by timing or temperature difference logic without affecting the human comfort.

This can save around 15% to 30% of the electricity depending on the weather conditions and temperature settings.There are total 5 split type air conditioners. It is observed that the air conditioners are with new energy efficient BEE STAR labeled (3 Star and above) air conditioners and are in minimum operational whenever necessary.

7.1 Observations and Suggestions:

1. Normal air conditioning temperature should be kept as high as possible (i.e.24 Deg.cels.). By thumb rule, increase in 3 degrees in indoor air temperatures can save 1% of electricity.

2. The ventilation in area can be provided with installation of natural ventilation. Natural ventilation will also minimize the requirement of exhaust fans.

3. Regular maintenance & servicing should be kept scheduled for air conditioners.

Chapter: 8

Energy Conservation Proposals

8.1 Energy Efficiency Improvement:

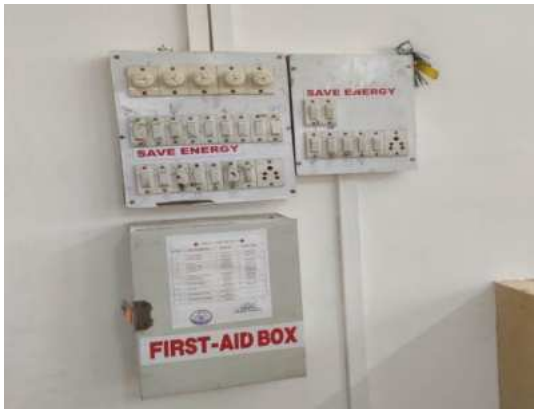
Sr. No.	Recommendations	Annual Saving Potential (Rs.)	Estimated Investment (Rs.)	Pay Back period (Years)	Remarks (Feasibility)
1.	Auto power factor correction panel (APFC)	At Actual	20000	1.5 Years	Mid -Term
2.	Check feasibility for solar street light, solar high mast in premises	At actual	50000	At actual	Mid term
3.	Solar rooftop system should be audited, monitored and maintained on priority.	At actual	Check with expert	At actual	Short term
	Total Amount	At Actual	Rs. 70000/-	3 Years	Mid -Term

- **The total energy cost with an overall payback period of approx 3 Years**

For technical and economical feasibility.

8.2 College appreciable Initiatives:

College took a some good initiatives for green, clean n sustainable campus Awareness , few Below are chalk down :



CHAPTER: 9

Energy Saving Recommendations

General Recommendations:

- Use Solar Street Light, Solar High mast , Solar Garden Light in Premises.
- **Solar Rooftop System need to audited , maintained & monitored on priority basic for optimum use and reducing excess electricity bill.**
- **Form Institute level student community that keeps track of the energy consumption Parameters of the various departments, class rooms, halls, areas, meters, etc.**

Actiom Taken Report:

Sr. No.	Recommendations (2020-21)	Action Taken
1.	Energy Audit should be done on regular basis	Energy audit is done on next year also
2.	Display Slogans and create awareness	Appreciable action taken by management

10. References

1) "Energy Management, Audit and Conservation" by Barun Kumar De

2) "Guide to Energy Management" by Barney L

3) "Energy Audits: A Workbook for Energy Management in Buildings" by Tarik Al–Shemmeri

4) "Fundamentals of Energy Conservation and Audit" by Agarkar Santosh Vyankatro and Mateti Naresh Kumar

5) "Industrial Energy Conservation (UNESCO Energy Engineering)" by Charles MGottschalk

6) Msedcl Energy Bills/ CPL

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Address: 7, Dattakunj Appt., Anand Nagar, Gangapur Road, Nashik-422013
SOLAR Rooftop Energy, Energy Auditing.

WORK COMPLETION REPORT

- Name of Work Project : Energy Audit of MVP'S Institute of Management, Research & Technology (IMRT), Nashik-422002
- Work Order Number : 2021-22
- Work Period : From 13/06/2022 To 24/06/2022

This is to Certify that SOLASTA Energy Solutions, Services & Maintenance has successfully completed Energy audit at MVP'S Institute of Management, Research & Technology (IMRT), Nashik . The work of energy audit is Completed on 27/06/2022 for year 2021-22.

Thanking you and assuring you for our best service always.

Audit Report BY,

Er. Anil S. Dube
BEE Certified Energy
Auditor
Regn.No.EA-4973

FOR SOLASTA,

Energy Solutions, Services & Maintenance
Mr. Pushpendra P. Pagar
Proprietor

Date: 27/06/2022
Place: Nashik

Regn. No. EA-4973

No. 2487

National Productivity Council

(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Anil Siddhanarayan Dube

son / daughter of Mr. Siddhanarayan Dube

has passed the National Certification Examination for Energy Auditors in 2006, 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

Date : 30th April 2007

Controller of Examination