

Maratha Vidya Prasarak Samaj's

**ARTS, COMMERCE & SCIENCE
COLLEGE, DINDORI, NASHIK-02**

(MAHARASHTRA)

Internal Quality Assurance Cell(IQAC)

**Energy Audit Report
(2019-20)**



Prepared by



SOLASTA

Energy Solutions, Services & Maintenance

Website : www.solasta.in

Contact: +91 8007552123

Email: solastasustain@gmail.com

Address: 7, Dattakunj Appt., Anand Nagar, Gangapur Road, Nashik-422013

Date: 30/06/2020

INDEX

Sr. No.	Particulars	Page No.
	Preface, Acknowledgement, Summary.	3
	Abbreviations	6
1	Chapter1: Introduction of Energy Audit	7
2	Chapter 2: About Institute	8
3	Chapter 3: Energy Consumption Profile	9
4	Chapter4: Data Analysis	12
5	Chapter 5: Actual Measurements and its Analysis	17
6	Chapter 6: Study Of Electrical System	20
7	Chapter 7: Air Conditioners	23
8	Chapter 8: Carbon Di-Oxide Emission	24
9	Chapter 9: Energy Conservation Proposals	26
10	Chapter 10: Energy Saving Recommendations	28
11	References	30
12	Work Completion Certificate	31
13	Energy Auditor Registration Certificate	32

Preface

Data collection for energy audit of the **MVP'S Arts, Commerce & Science College, Dindori, Nashik** was approved by team for the period of July 2019 to June 2020.

This audit was over sighted to inquire about convenience to progress the energy competence of the campus. Energy audit survey was completed by the firm **SOLASTA Energy Solutions, Services & Maintenance** with the help of faculty members of Physics Department. Data was collected for each classroom, laboratory, office, library and of the campus. 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 energy audit report of previous year (2018-19)**. 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 **Principal Dr. V.V.Thigale Madam and IQAC coordinator, NAAC** for motivating us and giving us the opportunity for energy audit. We would like to express our sincere thanks to **Dr. N. K. Nawale** Head Department of Physics, Special thanks to faculty members of Physics & Electronics Department such as **Prof. M. M. Bagul and Prof. A. A. Nikam** for their exceptional support, coordination in this audit and also all respected staff, faculty members and students who have taken part in this audit survey etc. of MVP'S Arts, Commerce and Science College, Dindori, Nashik. We tried our best to present this energy report as per requirements of college and our expertise work.



ANNEX Building

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 Arts, Commerce and Science College, Dindori, Nashik.

Uses energy in the following forms:

- a. **From MSEDCCL**
- b. **Generator**

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

1. The average cost of energy is around **₹13364 /Month.**
2. 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
MSEDCL	Maharashtra State Electricity Distribution Company Ltd.
MD	Maximum Demand

Chapter: 1

Introduction to Energy Audit

General:

MVP'S Arts, Commerce and Science College, Dindori, Nashik entrusted the work of conducting a detailed Energy Audit of campus with the main objectives as given below:

- ✓ 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, field trials and their 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. .

• 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 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 measurement and data analysis:

This step involves actual site measurement and field trials using various portable measurement instruments. 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 Arts , Commerce and Science College,Dindori, Nashik
2	Address:	PO-Dindori , Tal: Dindori, Dist: Nashik-422202 Maharashtra State, India.
3	Affiliation:	Affiliated to Savitribai Phule, Pune University,Pune-07 Affiliation ID No. PU/NS/ACS/69/2001
3	Year of Establishment:	2001
5	NAAC Accrediation:	NAAC REACCREDITED "B" GRADE with CGPA 2.34 AISHE: C-41332
6	Contact:	Phone : 02557-222333 FAX : 02557222277 Email :bcudmvpdindoricollege@gmail.com Website :www.mvpdindoricollege.com
4	Courses Offered:	Graduate / Post Graduate B. A./B.Com./B.Sc. M. A. English (2 years) M.COM.(2 Years)

Chapter: 3

Energy Consumption Profile

3.1 Source of Energy:

MVP'S Arts, Commerce and Science College, Dindori, Nashik uses Energy in following forms:

A. Electricity from MSEDCL :

MVP'S KSKW Arts , Commerce & Science College, Dindori receives Electricity from Nasik (U) Circle: 595 Of NASIK Rural DN.604 : Dindori (R) S/DN. : 270 1

B. Generator 2.5 KVA (HSDG) :

HSG is used as a fuel Generator which is run whenever power supply from MSEDCL is not available. Generator is of CHAMP make, 1phase , 230V AC and rated output Voltage is 2.5kVA OF 50Hz frequency, Maximum Output Voltage is 3.0 kVA. Champ generator is silent gas generator which can run on LPG or Natural Gas.



Generator (2.5kVA)



UPS

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

Computers

Xerox machines

CCTV

UPS

LCD Projector

Router system

Flood light

Printers

Lighting

Air-Conditioning systems

Fans

Flood light

Laboratory Equipment

Pumping Motor



Chemistry Lab



Physics Lab



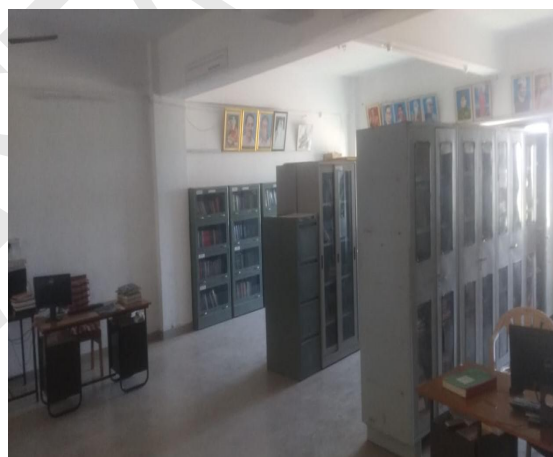
Computer Lab



Principal Office



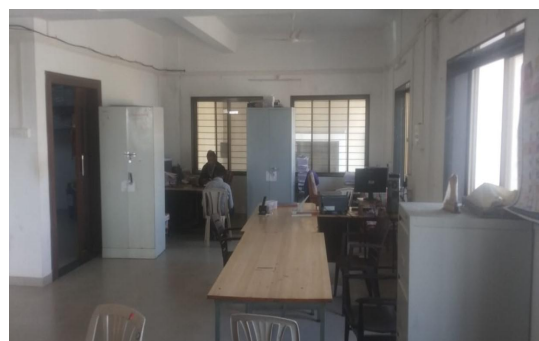
NAAC Room



Library



Exam Section



Administration Office

Chapter: 4

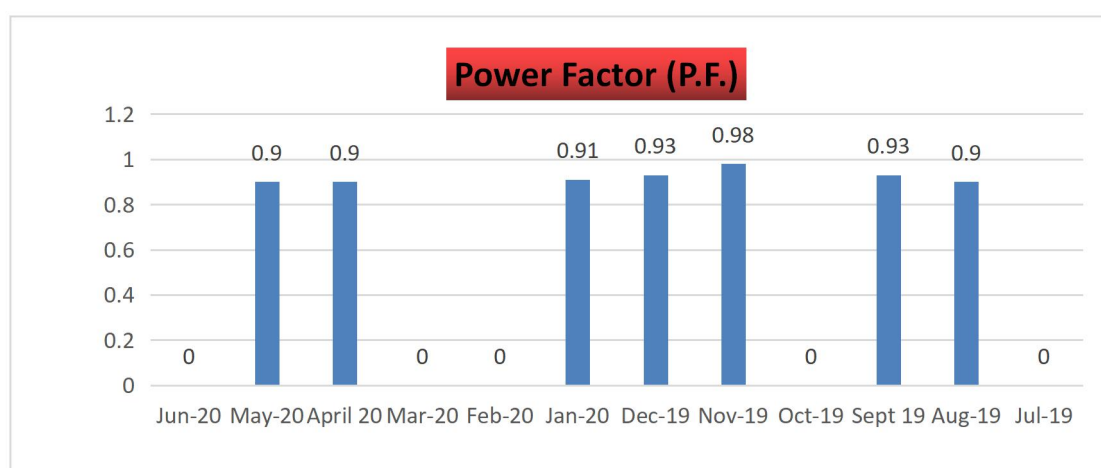
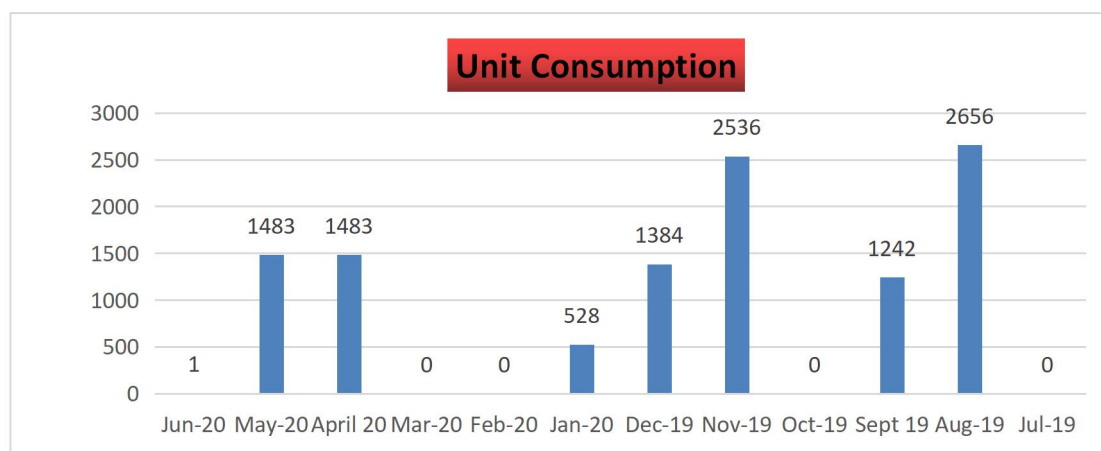
Data Analysis

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

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

Sr. No.	Month	No. Units kWh	Power Factor (P.F.)
1.	June 20	1	0.0
2.	May 20	1483	0.90
3.	April 20	1483	0.90
4.	Mar 20	0	0.0
5.	Feb 20	0	0.0
6.	Jan 20	528	0.91
7.	Dec 19	1384	0.93
8.	Nov 19	2536	0.98
9.	Oct 19	0	0.0
10.	Sept 19	1242	0.93
11.	Aug 19	2656	0.90
12.	July 19	0	0.0
	Total Units	11313	Avg. P.F. =0.53

MONTH WISE UNIT CONSUMPTION



MONTH WISE POWER FACTOR VARIATION

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.

4.2 Study of Month wise Electricity Bill Variation:

TABLE :2: Month wise Maximum Demand Variation:

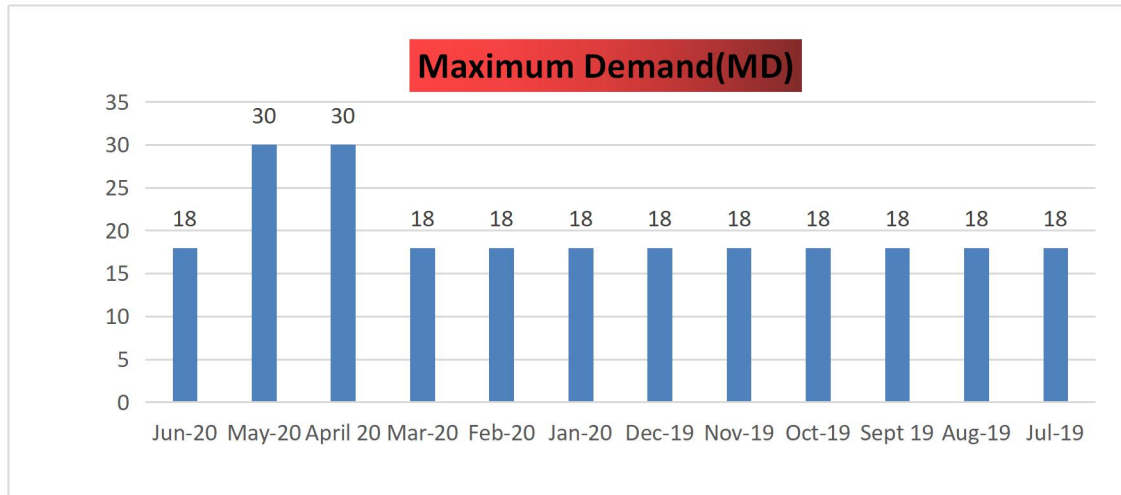
SR.No	Month	Electricity Bill Amount (Rs.)
1	June 20	0
2	May 20	22934
3	April 20	22761
4	Mar 20	5814
5	Feb 20	5814
6	Jan 20	10702
7	Dec 19	16996
8	Nov 19	24797
9	Oct 19	5814
10	Sept 19	14785
11	Aug 19	24136
12	July 19	5814
	Total Annual Bill=	₹ 160367/-
	Average Monthly Bill=	₹13364/-

Conclusion : Monthly Electricity Bill Variation has been identified.

4.3 Study of Month wise Maximum Demand Variation:

TABLE:3 Month wise Maximum Demand Variation:

Sr. No.	Month	Maximum Demand (kVA/Month)
1	June 20	18
2	May 20	30
3	April 20	30
4	Mar 20	18
5	Feb 20	18
6	Jan 20	18
7	Dec 19	18
8	Nov 19	18
9	Oct 19	18
10	Sept 19	18
11	Aug 19	18
12	July 19	18



Month wise Maximum Demand Variation

4.5 General Observations based on Electricity Bill:

1. For College Campus the Contract Demand (CD) is **46.00 kVA** and minimum billing Demand is 50% of the Contract Demand (i.e. **23.00 kVA**) or the 75% of previous Maximum Demand recorded whichever is higher. Since, the MD recorded is More than 23.00 **kVA**. i.e. 30 kVA in repetitive in two months **April 2020 & May 2020**
2. The average electricity cost is Rs. **4.30** considering the last twelve months. (Excluding TOD charges, MD and PF charges)
3. Average monthly Power Factor is maintained near **0.53 P.F.**
4. Average Monthly bill is Rs. **13364 /-**
5. Maximum Demand Recorded is **30 kVA** (Months Apr.20 & May 20)
6. Power factor is affected during January 20 to June 20 which is below and Similarly during August 19 ,which is need to improve power factor up to **0.95 or more.**

Chapter: 5
Actual Measurements and its Analysis

Summary:-

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	86	3440	6	20640
2	Fan	80	51	4080	6	24480
3	PC	60	21	1260	6	7560
4	Printer: Standby mode: 30-50w/	printing mode:300- 500w	11	330	2	660
5	LED 18 W	18	2	36	2	72
6	Xerox machine	650	1	650	2	1300
7	Fax machine	30	1	30	2	60
8	AC	3500	1	3500	2	7000
9	UPS	2-5KVA, 51 batteries of 80 Amp-hr	2	5000	1	5000
10	Water Cooler	2.8kwh/day	1	2800	1	2800
11	RO System	3-7 kWhr/m3	1	3000	1	3000
12	LCD Projector	282	1	282	1	282
13	Charging socket	23	4	92	2	184
14	P.A.System	560	1	560	1	560
15	Exhaust fan	60	3	180	6	1080
16	Electric bell	5	1	5	1	5
17	Refrigerator	2kwhr/day	1	2000	6	12000
18	Incubator	1500	1	1500	1	1500
19	Research Microscope	100	1	100	1	100
20	Lab Equip. for practical	300	10	3000	3	9000
21	Pumping motor	1.0 HP	1	746	2	1492
22	DG Gen set	2.5KVA	1	AS PER USE		AS PER USE

Department wise total load consumption:

Sr. No.	Premises	Existing Load During (2018-19) in Watt	Additional Load during (2019-20) in Watt	Remark (Name Of Appliances)
1	Principal Office:	8170	145	LED TV
2	Administration Office:	6362	206	FAN, LED,CCTV
3	IQAC Office:	1140	10	CCTV
4	Store Room:	120	NIL	NIL
5	Staff Room:	960	NIL	NIL
6	Department OF IT,Comp.Centre,Lab Physics Battery Room:	13812	64	CCTV
7	Chemistry Lab:	53720	170	FAN, CCTV
8	Department Of Botany /Zoology:	5760	10	CCTV,
9	Dept.Of Commerce:	1440	46	LED T,CCTV
10	Basement, Seminar Hall, Library, , Porch, Staircases,Passage,Gymnasium, Open Premises:	21056	206	LED, FAN,CCTV
11	Marathi, Hindi, Maths, English, Geography, Total Classrooms:	26214	126	CCTV

Additional Load During (2019 - 20):

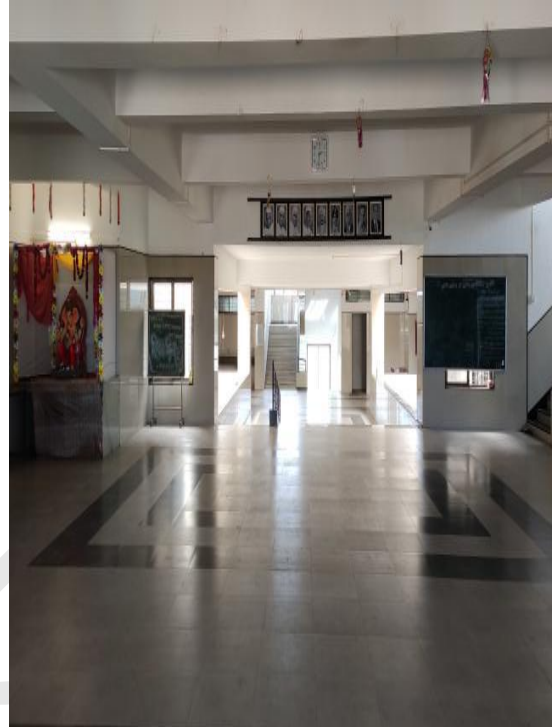
Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	c	D	E = C X D	F	G = E X F
1	CCTV	10	20	200	24	4800
2	FAN	80	7	560	6	3360
3	LED Tube	18	13	234	4	936

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

College Campus Photos:



Passage



Entrance Lobby



Seminar Hall

Chapter: 6

Study of Electrical Systems

6.1 Electrical Supply Details:

The electrical supply to MVP'S Arts ,Commerce and Science College, Dindori, Nashik Received from MSEDCL supply at 11 kV Express Feeder line, which is stepped down to 415 V by a transformer.

Details Of Energy Meter:

Make: Genus Infra. Ltd.

3 Phase, 4 Wire

Class: 1.0

3x(40-200)A

Category: "C2"

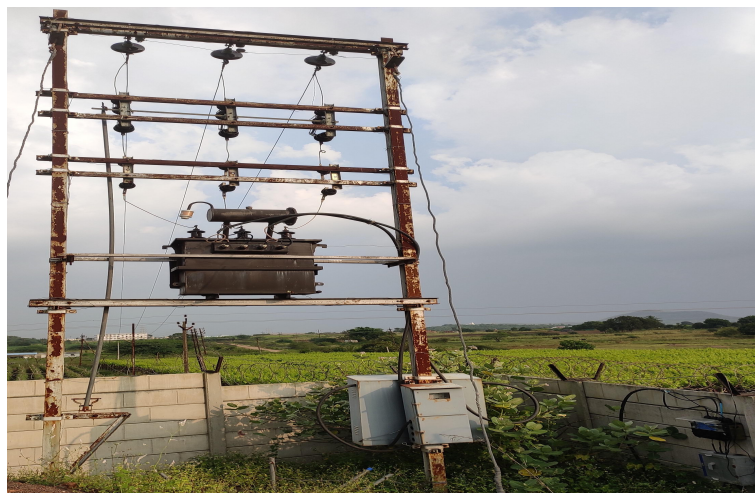
6.2 Study of Electrical Demand:

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	18 LT-X A II
	Meter No:	076-06199246	
1	Sanctioned Load	37.00	kW
2	Contract Demand	46.00	kVA
3	Recorded Maximum Demand	30	kVA

AS Per Previous energy Audit we suggested to upgrade 3 phase connection, here appreciable work has been done



6.3 Electrical Energy Cost Analysis

The electrical bills from MSEDCL for 12 months from July 2019 to June 2020 have been studied.

6.4 TOD Charges

For all LT consumers the Time of Day (TOD) tariff is applicable in Maharashtra for above 20HP. For this purpose the day has been divided into 4 different time Zones as given in table We studied the energy bill of 12 months from July 2019 to June 2020, and observe the following figures (Figures are from Oct 19 to June 2020):

Zone	Consumption during following hours of the day	Rate of Consumption	Energy Charge (Paise/unit)
A	2200 – 0600 Hrs	(-01.50 rate in addition to actual rate)	-0-992-269-148-0-0-0-371-0 =-1780
B	0600 – 0900Hrs & 1200 – 1800Hrs	(0 i.e same rate)	0+704+855+218+0+0+0+1483 +371+1=3632
C	0900 – 1200 Hrs	(0.80 rate in addition to actual rate))	0+233+117+90+0+0+0+371+0 =811
D	1800 – 2200 Hrs	(0.1.10 rate in addition to actual rate)	0+607+144+73+0+0+0+371+0 =1195

In addition to base tariff of Rs. 4.30 per unit consumed, TOD tariff as indicated is levied

6.5 Lighting System:

Observations and suggestions:

- It is found that FTL, Bulbs, are installed in the facility.
- It is recommended that some tube lights in this area be switched off when sufficient daylight is available.
- Presently there are no reflectors installed for tube lights.
- Every light or electric gadget left ON when not needed which is wasting energy and money and is causing pollution that is totally unnecessary.
- **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 $\frac{3}{4}$ 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.

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

- Lights
- Heaters and fans (or air-conditioning)
- Printers and scanners
- Battery and phone chargers
- Computers

Chapter: 7

Study of Air Conditioners

In the facility for air conditioning there is no centralized system with AHU (air handling unit), but mostly split air conditioners are installed.

7.1 Load of ACs was as follows:

Item	Rated Power (kW)	Qty	Voltage	Current Amp	Actual Power (kW)
ACs	4	1	406	8.4	3.5

7.2 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.

Chapter: 8

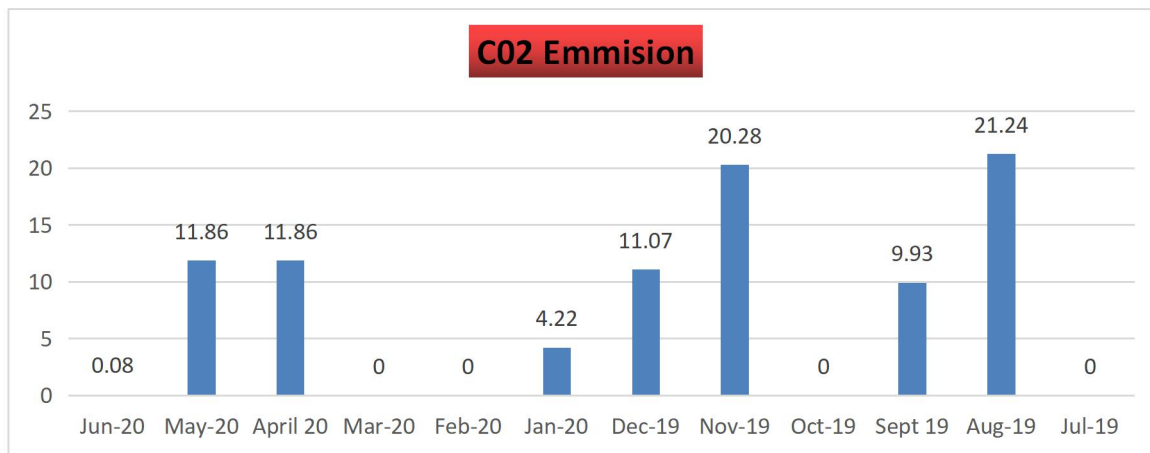
Carbon Di-Oxide Emission

In this Chapter we compute the CO₂ emissions. For consumption of 1 Unit (1 kWh) of Electricity, the CO₂ emitted is 0.8 Kg. OR the Emission is 0.8 Kg/kWh. In the following Table we present the total units consumed and CO₂ emitted as under Approximately:

8.1 CO₂ Emission Variation:

TABLE 6: Month wise CO2 Emission Chart

Sr. No.	Month	kWh	CO ₂ Emitted in Kg
1	June 20	1	0.08
2	May 20	1483	11.86
3	April 20	1483	11.86
4	Mar 20	0	0
5	Feb 20	0	0
6	Jan 20	528	4.22
7	Dec 19	1384	11.07
8	Nov 19	2536	20.28
9	Oct 19	0	0
10	Sept 19	1242	9.93
11	Aug 19	2656	21.24
12	July 19	0	0
	Total	11,313	Avg. Emission = 7.54



Carbon Di-Oxide Emission

8.2 Merits/Existing Features for Energy Saving

1. Staff vigilance.
2. Computers are connected in LAN.
3. Printers are shared in LAN.
4. Screen savers facility implemented for every computer.
5. ACs used are of three STARS.
6. Refrigerators are of three STARS.
7. Incandescent Bulbs are nowhere used.
8. They are replaced by CFL tubes with electronic choke.
9. Maximum use of natural light.
10. Cross Ventilation is provided in laboratory & class rooms.
11. Walls are painted with off white colour to have sufficient brightness
12. Solar powered street lamp is used.
13. LED flash light is used in Seminar hall.

Chapter: 9

Energy Conservation Proposals

Providing Energy Saver Circuit to the Air Conditioners:

The **energy saver circuits 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 7 split type air conditioners. It is Recommended that the old air conditioners are being replaced with new energy efficient BEE STAR labeled (3 Star and above) air conditioners in a phased manner.

- Considering the average compressor ON Time = 2h/day
- Power consumption by 2 TN compressor = 3.5kW
- Average daily consumption = $3.5 \times 2 = 7$ hr
- kWh/day/ air conditioner Yearly operating days = 300 days/year/ air conditioner
- Yearly electricity consumption = 2100 kWh/year/ air conditioner
- Considering a saving of 15%, total annual savings
= $15\% \times 2100 = 18$ kWh/year/ air conditioner

*Cost of electricity = Rs. 4.30 / kWh

- Total number of Air Conditioner =1

Summary For Energy Saver Circuit:

Total Cost of each energy saver circuit = Rs. 4500 x 1 = Rs. 4500/-

9.2 Replacing Fluorescent Tube Lights (FTL) with LED Tube Lights:

The 86Watt FTLs can be replaced with the LED tube lights 18 W. These changes can be made at the places where the life is higher. Usually minimum of 3 years warranty is given and approximate burning hours is 40000.

(15 years considering 8 hours per day running)

Following calculations are done for 8 hours working:

- Power consumption by 36 W FTL with conventional choke = 40 W/ Tube Light
- Equivalent LED tube light = 18 W/ Tube Light
- Savings in power = 22 W/ Tube Light
- Operating hours = 6 h/day x 300 = 1800 h/year
- Tube Light Yearly savings = $1800 \times 22 \text{ W} = 39.6 \text{ kWh/year/Tube Light}$
- Average Cost of electricity = Rs.4.30/ kWh
- Saving = $39.6 \text{ kWh} \times 4.30 = \text{Rs.}170.28 / \text{year/ Tube light}$
- Approximate investment on single LED Tube lights = Rs. 200
- Number of Tube Lights to be replaced = 86

Summary For FTLs:

- ✓ Total Yearly Saving = $86 \times 170 = \text{Rs. } 14620 / \text{year}$
- ✓ Total Investment = $86 \times \text{Rs. } 200 = \text{Rs. } 17200 / \text{ONLY}$

CHAPTER: 10

Energy Saving Recommendations

General Recommendations:

- All Class Rooms and labs to have **Display Messages** regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity. **Display the stickers of save electricity**, save nature everywhere in the campus. So that all stakeholders encouraged to save the electricity
- Care should be taken to keep lights in classroom off and keep ON whenever necessary.
- Try to get the benefit of TOD time slot(Refer Pt.6.4) i.e. -01.50 rate at night in addition to actual rate for per unit consumption for **electric motor pumping purpose during 2200 – 0600 Hrs.**
- All projectors must be keep OFF when not in use or in stand by mode if there is No any presentation work is scheduled
- All computers to have power saving settings to turn off monitors and hard discs, say after 10 minutes/30 minutes.
- The Default air conditioning temperature must be set between 24°C to 26°C.
- Need to use power saver circuits for AC.
- Need to replace existing ordinary CRT monitor by LED where ever still in use.

Executive Recommendations:

1. There has to be Institute level student community that keeps track of the energy consumption Parameters of the various departments, class rooms, halls, areas, meters, etc
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.
3. Need to Create energy efficiency/ renewable energy awareness among the college . Solar Energy , wind Energy, Biogas energy. College should take initiative to arrange lectures, paper presentation competition among students and staff for general awareness.
4. Check Feasibility of Solar Net Metering (ON GRID) for college campus

11. References

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



Energy Solutions, Services & Maintenance

Website : www.solasta.in

Contact: +918007552123

Email: solastasustain@gmail.com

Address: 7, Dattakunj Appt., Anand Nagar, Gangapur Road, Nashik-422013

WORK COMPLETION REPORT

- Name of Work Project : Energy Audit of MVP'S Arts, Commerce and Science College, Dindori, Nashik-02
- Work Order Number : 2019-20
- Work Period : From 22/06/2020 To 29/06/2020

This is to Certify that SOLASTA Energy Solutions , Services & Maintenance has successfully completed Energy audit at Arts, Commerce and Science college, Dindori, Nashik -02. The work of energy audit is completed on 30/06/2020 for year 2019-20.

Thanking you and assuring you for our best service always.

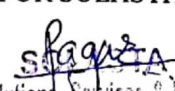
Audit Report BY,


Er. Anil S. Dubey

BEE Certified Energy

Regn.No.EA-4973

FOR SOLASTA,


Energy Solutions, Services & Maintenance

Mr. Pushendra P. Pagar
Proprietor



Page 1

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

Shri Chidambaram
Controller of Examination