



**Maratha Vidya Prasarak Samaj's**  
**Karmaveer Kakasaheb Wagh Arts, Science and**  
**Commerce College, Pimpalgaon (B.),**  
**Tal. Niphad, Dist. Nashik-422209**

# **ENERGY AUDIT REPORT**

## **PREPARED BY**

**Dr. Ahire S.N.**

**Mr. Jadhav V. S.**

**Ms. Kawale S. V.**

## **SUBMITTED TO**

**Dr. Mrs. S. S. Ghumare**

**Principal**

## Introduction

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.

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

## Objectives

The salient observations and recommendations are given below.

- To monitor the energy consumption in the college
- To survey and measure the use of renewable energy in the college
- To prepare a detailed report of energy consumption and its ration
- To report the variations in energy consumption of the college.

M. P. Samaj's K.K.Wagh Arts Science & Commerce College Pimpalgaon (B) uses energy in the following forms:

- a. Electricity from MSEDCL
- b. Diesel for generator

Electrical energy is used for various applications, like:

- Computers
- Lighting
- Air-Conditioning
- Fans
- Other Lab Equipment

2. The average cost of energy is around **Rs. 84275/month**
3. The average energy consumption is around **9445 unit (kwh)/month**

## HISTORICAL DATA ANALYSIS

### Study of Variation of Monthly Units consumption:

The details of the 12 month Electricity Bills is given in table below.

**Table No 1 Variation in Units Consumption**

Month	Meter no 1	Meter no 2	Meter no 3	Meter no 4	Meter no 5	Meter no 6	Meter no 7	Units kWh
Jul 2018	3,494	578	42	972	2,966	2,200	190	10,442
Jun 2018	2,910	367	59	901	1,317	1,920	566	8,040
May 2018	3,023	1,066	48	443	455	1,920	206	7,161
Apr 2018	3,251	522	60	846	2,398	2,200	206	9,483
Mar 2018	4,274	998	70	654	2,501	2,000	230	10,727
Feb 2018	3,024	490	95	592	2,267	2,000	211	8,679
Jan 2018	3,713	567	109	817	2,637	2,000	177	10,020
Dec 2017	3,032	396	91	633	2,116	2,000	230	8,498
Nov 2017	2,230	507	116	724	2,352	2,000	68	7,997
Oct 2017	2,168	528	321	1,077	3,210	2,000	386	9,690
Sep 2017	3,841	1,062	276	658	3,895	1,993	419	12,144
Aug 2017	4,013	348	283	614	2,991	2,005	209	10,463
<b>Total</b>	<b>38,973</b>	<b>7,429</b>	<b>1570</b>	<b>8,931</b>	<b>29,105</b>	<b>24,238</b>	<b>3098</b>	<b>113,344</b>
<b>Average</b>								<b>9445 unit(kwh)/month</b>

## Month wise Electricity Bill Variation:

**Table No 2 Variation in Electricity Bill**

Month	Meter no 1	Meter no 2	Meter no 3	Meter no 4	Meter no 5	Meter no 6	Meter no 7	Electricity Bill Amount (Rs.)
Jul 2018	22,583.25	5,200.00	150.00	6,190.00	19,250.00	26,543.10	1,240.00	81,156.35
Jun 2018	19,634.01	3,460.00	400.00	6,150.00	9,020.00	24,084.40	2,430.00	65,178.41
May 2018	20,120.64	5,090.00	520.00	2,950.00	3,220.00	23,736.77	1,360.00	56,997.41
Apr 2018	21,331.65	4,850.00	590.00	5,540.00	15,570.00	26,939.52	1,380.00	76,201.17
Mar 2018	27,508.97	4,710.00	620.00	4,350.00	16,900.00	24,066.95	1,530.00	79,685.92
Feb 2018	19,807.87	4,510.00	750.00	3,890.00	15,090.00	24,501.02	1,390.00	69,938.89
Jan 2018	24,258.71	5,190.00	820.00	5,310.00	17,510.00	24,381.38	2,920.00	80,390.09
Dec 2017	19,163.61	3,530.00	510.00	6,910.00	29,740.00	23,348.61	2,070.00	85,272.22
Nov 2017	13,484.42	4,450.00	650.00	7,700.00	32,060.00	23,224.47	360.00	81,928.89
Oct 2017	13,354.07	4,460.00	2,360.00	12,030.00	43,610.00	22,383.28	6,890.00	105,087.35
Sep 2017	24,665.75	6,890.00	2,170.00	7,180.00	17,060.00	23,885.37	3,770.00	85,621.12
Aug 2017	25,758.05	2,870.00	2,080.00	6,430.00	81,560.00	24,032.07	1,120.00	143,850.12
<b>Total</b>	251,671	55,210	11,620	74,630	300,590	291,126.94	26,460	<b>1,011,307.94</b>
	<b>Average</b>							<b>Rs. 84275/month</b>

**Annual power requirement met by renewable energy sources(KWH) Data Requirements (As per data template in section B):**

- power requirement met by renewable energy sources
- Total Power requirement.-

As 3000 watt of electrical heating coil of electrical gysar requires approximately 3.50kWh (units) to heat 100 liters of water at 50 to 60 C so for 6000 liters of water heating process requires  $60 \times 3.50 = 210 \text{ kWh}$

The solar water heater at College ladies hostel is of capacity 6000 lpd so that the energy consumption met by renewable energy source that means solar water heater is about 210kwh per day hence for 230 days(excluding holidays and rainy season) energy consumption is  $230 \times 210 = 48300 \text{ kwh}$

**Formula:**

$$\frac{\text{Annual power requirement met by renewable energy sources}}{\text{Annual power requirement}} \times 100$$

$$= (48300/113344) \times 100$$
$$= 42.61\%$$

**Data Template**

Specification: Jain Solar Water heating system(Sunrise model) Flat plate collector, closed loop(1500X4000) capacity 6000 LPD

Installation date 25/11/2010

**Percentage of annual lightning power requirements met through LED bulbs.  
(Current year Data)**

Annual lightning power requirements met through LED bulbs(in KWH)

Data Requirements (As per data template in section B):

- Lighting power requirement met through LED bulbs
- Total Lighting Power requirement.

**Formula:**

$$\frac{\text{Annual lightning power requirements met through LED bulbs}}{\text{Annual lightning power requirements}} \times 100$$

$$= (10190/113344) \times 100$$
$$= 8.99\%$$

**Replacing Fluorescent Tube Lights (FTL) with LED Tube Lights**

The 36 W FTLs are 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 40 000. (15 years considering 8 hours per day running) Following calculations are done for the 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

Yearly operating hours = 8 h/day x 300 = 2400 h/year/ Tube Light

Yearly savings = 2400 x 22 W = 52.8 kWh/year/Tube Light

For 193 tube lights yearly saving ,193\*52.8kWh=10190kWh

Average Cost of electricity = Rs. 8/ kWh

Saving= 52.8 kWh x 8 = Rs. 422.4/ year/ tube light

Approximate investment on single LED Tube lights = Rs. 1000

Number of Tube Lights to be replaced = 193

Total Yearly Saving = 193 x 422.4 = Rs. 81523/year

Total Investment = 193 x Rs. 1000 = Rs. 19300

### Details of LED tube lights Installed/ replaced

Sr no.	Section	Number of LED tubes
1	Principal cabin	28
2	NAAC room	6
3	English Department	2
4	Class room	2
5	Commerce Department	1
6	Jr. Chemistry lab	1
7	Ground floor premises	2
8	Staff room	1
9	Senior exam room	2
10	Class room	28
11	First floor premises	3
12	Micro-lab	9
13	Computer Lab	15
14	Physics and Electronics Lab	43
15	Botany	26
16	Zoology	24
<b>Total LED</b>		<b>193</b>

## Lighting System

### Observations:

- It is found that FTL, Bulbs, CFLs is 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.

### General Recommendations

1. All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors.
2. Most of the time, all the tube lights in a class room are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF.
3. All projectors to be kept OFF or in idle mode if there will be no presentation slides.
4. All computers to have power saving settings to turn off monitors and hard discs, say after 10 minutes/30 minutes.
5. The comfort air conditioning temperature to be set between 24°C to 26°C.
6. Lights in toilet area may be kept OFF during day time



**Dr. S. N. Ahire**  
Coordinator  
Energy Audit Committee



**Dr. Mrs. S. S. Ghumare**  
Principal  
**Principal**  
K. K. W. Arts, Science, &  
Commerce College, Pimpalgaon B  
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