

Nutan Urja Solutions

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Date: 23/10/2022

CERTIFICATE

This is to certify that we have conducted Energy Audit at Brahma Valley College Of Engineering And Research Institute, Nashik as per the guidelines of Maharashtra Energy Development Agency (www.mahaurja.com) in the year 2021-22.

The College has already adopted **Energy Efficient** practices like:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Installation of **Solar Thermal Hot Water System**
- Installation of Solar PV street lights

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

Nutan Urja Solutions,

K G Bhatwadekar

K G Bhatwadekar,

Certified Energy Auditor,

EA - 22428



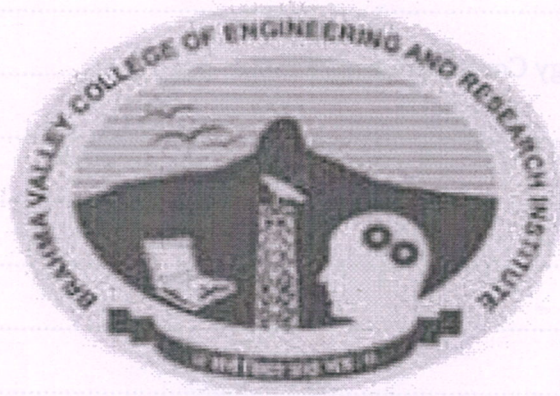
**Report
On
Energy Audit
At
Brahma Valley College Of Engineering And Research Institute,
Nashik
(Year 2021-22)**



Prepared by
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Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Brahma Valley College Of Engineering And Research Institute, Nashik for awarding us the assignment of Energy Audit of their college premises.

We are also thankful to various Head of Departments & other Staff members for helping us during the field measurements.

We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures through energy savings. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.

Sr no	Parameter	(Units)
1	Maximum	22.433
2	Minimum	9.382
3	Average	17.967
4	Total	212.609



5. Recommendations

Table no 1: Recommendations for energy savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 215 Nos T-8 fittings with 20W LED fittings	4,300	47,300	137,815	35
2	Replacement of 181 Nos Old Ceiling Fans with STAR rating fans	2,353	25,883	393,494	182
3	Installation of 100kW grid connected PV panel	150,000	1,650,000	5,000,000	36
	Total	156,653	1,723,183	5,531,309	39

6. Notes & Assumptions

1. Daily working hours-10 Nos
2. Annual working Days-300 Nos
3. Average Rate of Electrical Energy : Rs 11/- per kWh



1. Introduction

Brahma Valley Educational Campus is located in the outskirts of Anjaneri, (Trimbakeshwar High-Way Nashik) comprising a sprawling campus of about 35 acres land. The campus is situated in the valley surrounded by hills & reflects the beauty of nature. This place is also known as the birth place of Lord Hanuman and is close to Trimbakeshwar Temple which is one of the 12 Jyotirlingas of Lord Shiva which adds to the holiness and beauty of this area.

1.1 Objectives

1. To study present level of Energy Consumption
2. To Study Electrical Consumption
3. To assess the various equipment/facilities from Energy efficiency aspect
4. To study various measures to reduce the Energy Consumption

1.2 Audit Methodology:

1. Study of connected load
2. Study of various Electrical parameters
3. To prepare the Report with various Encon measures with payback analysis

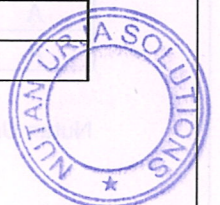
1.3 General Details of College

Table No-1.1: Details of college

No	Head	Particulars
1	Name of Institution	Brahma Valley College Of Engineering And Research Institute, Nashik
2	Address	Brahma Valley College Of Engineering And Research Institute, Anjaneri, Trimbak Road, Nashik, Maharashtra 422 213.
3	Affiliation	Savitribai Phule Pune University



A001	Faculty Room	1				1
A002	Faculty Room	2			1	1
A003	HOD Mechanical Engg.		1		1	2
A004	Board Room	2		3		3
A005	RAC Lab.	6				4
A006	Class Room- B.E. Mech -A	6			1	4
A007	Thermodynamics Lab.	9				6
A009	Metallurgy Lab.	6			1	2
A010	Turbo Machines Lab.	4			1	2
A012	Fluid Mechanics Lab.	8				4
A013	BME Lab.	5			2	3
A014	MQC Lab.	8				4
A103	Heat Transfer Lab.	8				4
A104	Dynamics of Machinery Lab.	10				
A104	Theory of Machines Lab.				2	4
A105	Fluid Power Lab.	8				
A105	Mechatronics Lab.					3
A207	Tutorial Room			8		
A207	Class Room B.E. Mech.-B			8		
A209	Class Room S.E. Mech.-A			8		
A210	Class Room S.E. Mech.-B			4		
A211	Class Room T.E. Mech. -A			4		
A212	Class Room T.E. Mech. -B			4		
B207	Drawing Hall-I			4		
B208	Drawing Hall-II			4		
101A	Project Lab.					
101B	Programming Lab.-II					
106	Computer Center		2	29	60	7
A106	Programming Lab.-I	8			16	3
A107	Hardware Lab.	6			1	3
A108	HOD Computer Engg.	2			1	1
A109	Software Lab.-I	4			10	2
A110	Software Lab.-II					
A111	Database Lab.	2			18	1
A204	Class Room S.E. Comp.		8			3
A205	Class Room T.E. Comp.		4			
A206	Class Room B.E. Comp.		4			
A208	Tutorial Room					
B008	Language Lab.					



A	Passage (Second Floor)			10		
B	Passage (Ground Floor)	8	3			
B	Passage (First Floor)	3	7			
B	Passage (Second Floor)			16		
	Total	215	140	292	260	181

Apart from above load, the college has pumps, street lights. Individual fitting wise load is as under.

Table No 2.2: Equipment wise Connected Load

No	Equipment	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	215	40	8.6
2	LED Tube-20W	140	20	2.8
3	LED bulb	292	12	3.5
4	Computers	260	65	16.9
5	Ceiling Fan	181	65	11.8
6	LED focus Street light	20	35	0.7
8	Pumps (5HP)			3.7
	Total			16.2

Data can be represented in terms of PIE chart as under,

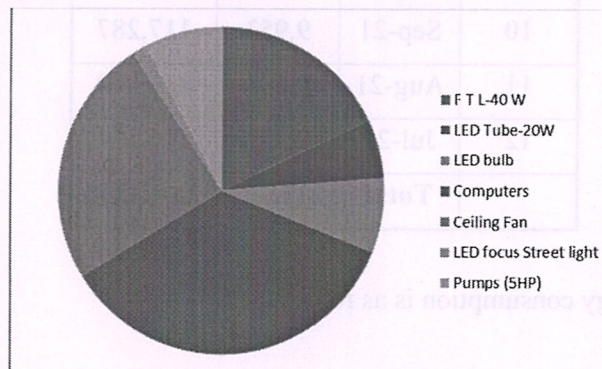


Figure 2.1: Distribution of connected load.

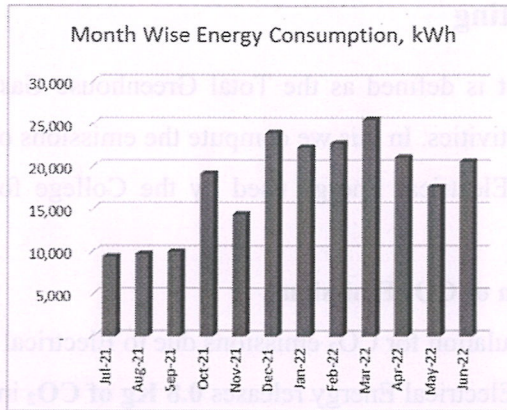


Figure 3.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

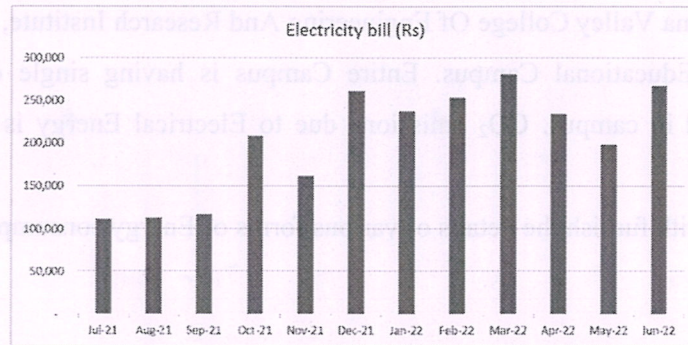


Figure 3.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 3.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	25,433	20.35
2	Minimum	9,382	7.51
3	Average	17,967	14.37
4	Total	215,609	172.49



Table 4.1: Month wise Consumption of Electrical Energy & CO2 Emissions

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	Jun-22	20,521	16.42
2	May-22	17,499	14.00
3	Apr-22	20,976	16.78
4	Mar-22	25,433	20.35
5	Feb-22	22,635	18.11
6	Jan-22	22,185	17.75
7	Dec-21	23,893	19.11
8	Nov-21	14,360	11.49
9	Oct-21	19,078	15.26
10	Sep-21	9,953	7.96
11	Aug-21	9,694	7.76
12	Jul-21	9,382	7.51
	Total	215,609	172.49

In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

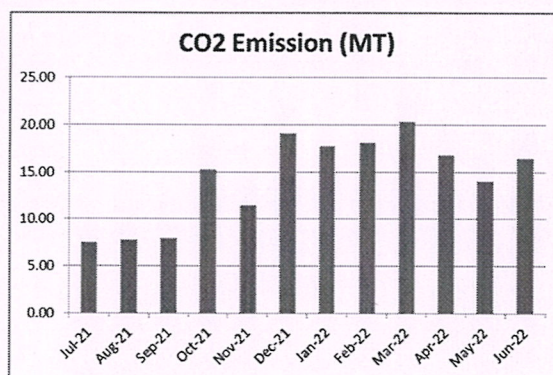


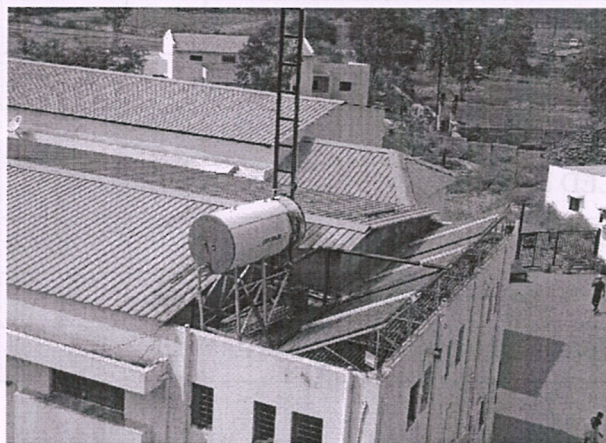
Figure 4.1: Month wise CO2 Emission



6. Study of usage of alternate energy

In this Chapter, we study the Usage of Alternate/Renewable Energy to Annual Energy Requirement of the College. The Brahma valley campus has installed Roof Top solar thermal hot water system of 2,000 liters capacity. The college have also installed 5 nos of solar PV street lights.

Photograph of Solar Thermal Hot Water System



8. Energy conservation proposals

8.1 Replacement of Old T-8 FTLs with 20 W LED fittings

In the facility, there are about 215 Nos, T-8, FTL fittings with Electronic/magnetic chokes. It is recommended to install the 20 W LED Tube light fittings in place of these old T-8 fittings. In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of T-8 fittings	215	Nos
2	Energy Demand of T-8 fitting	40	W/Unit
3	Energy Demand of 20 W LED fittin	20	W/Unit
4	Reduction in demad	20	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	17.2	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	4300	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	47300	Rs/Annum
11	Cost of 20 W LED Tube	641	Rs/Unit
12	Investment required	137815	Rs lump sum
13	Simple Payback period	35	Months



8.3 Installation of Solar PV panel

It is recommended to install 100 kW solar PV panel. In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Installation of 100kW PV unit	100	kW
2	Energy saving	150000	kWh/Annum
3	Rate of electrical energy	11	Rs
4	Annual monetary savings	1650000	Rs/ Annum
5	Investment required	5000000	Rs lump sum
6	Simple payback period	36	Months

