

# Nutan Urja Solutions

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Date: 21/08/2019

## 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](http://www.mahaurja.com)) in the year 2018-19.

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,

Certified Energy Auditor,

EA - 22428



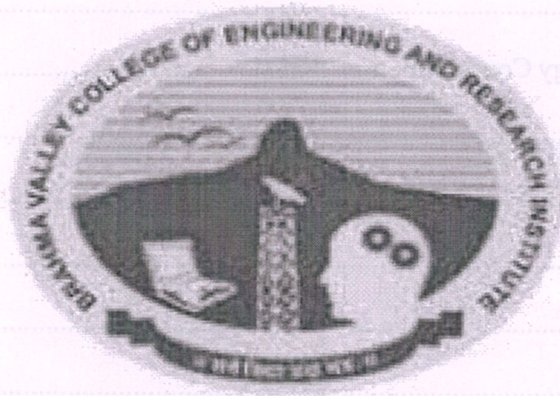
**Report  
On  
Energy Audit  
At  
Brahma Valley College Of Engineering And Research Institute,  
Nashik  
(Year 2018-19)**



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	38.630
2	Minimum	14.314
3	Average	28.134
4	Total	3.41.503



## 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
	<b>Total</b>	<b>156,653</b>	<b>1,723,183</b>	<b>5,531,309</b>	<b>39</b>

## 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

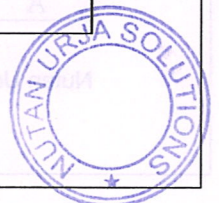
### 1.3 General Details of College

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.					



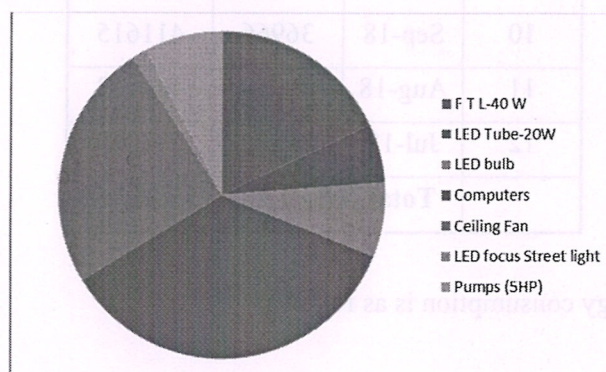
A	Passage (Second Floor)			10		
B	Passage (Ground Floor)	8	3			
B	Passage (First Floor)	3	7			
B	Passage (Second Floor)			16		
	<b>Total</b>	<b>215</b>	<b>140</b>	<b>292</b>	<b>260</b>	<b>181</b>

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
	<b>Total</b>			<b>16.2</b>

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



**Figure 2.1: Distribution of connected load.**



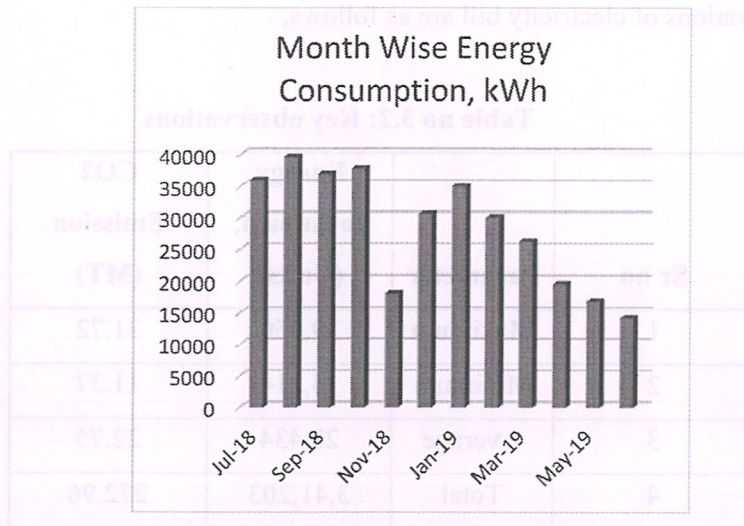


Figure 3.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

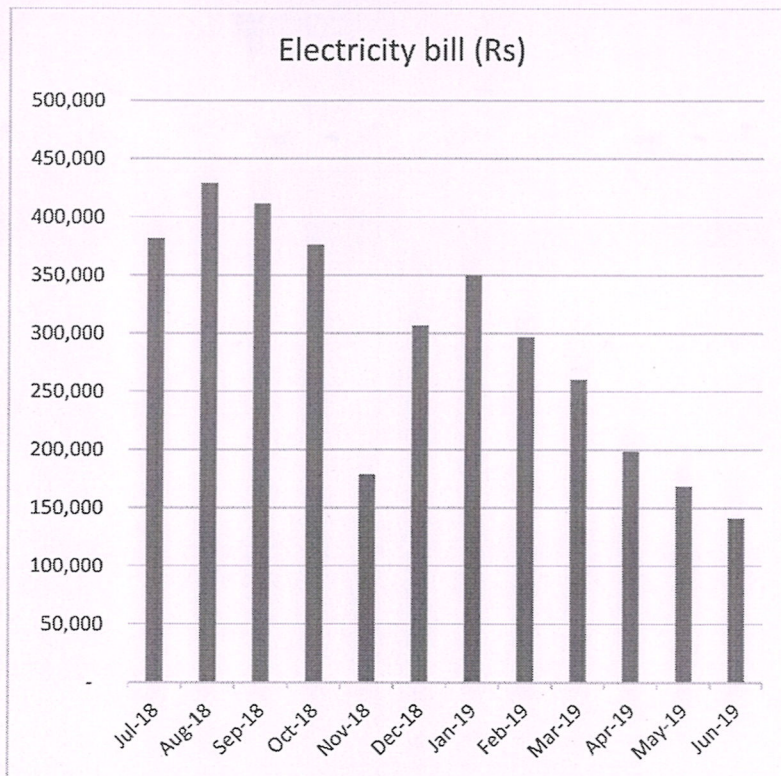


Figure 3.2: Month wise electricity bill



#### 4. Carbon Foot printing

1. A **Carbon Foot print** is defined as the Total Greenhouse Gas emissions (CO<sub>2</sub> emissions), emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

##### 2. Basis for computation of CO<sub>2</sub> Emissions:

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy is as under

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO<sub>2</sub>** into atmosphere.

Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations

The Brahma Valley College Of Engineering And Research Institute, Nashik is situated in Brahma Valley Educational Campus. Entire Campus is having single energy meter for all institutes situated in campus. CO<sub>2</sub> emissions due to Electrical Energy is calculated for entire campus.

We herewith furnish the details of various forms of Energy consumption as under

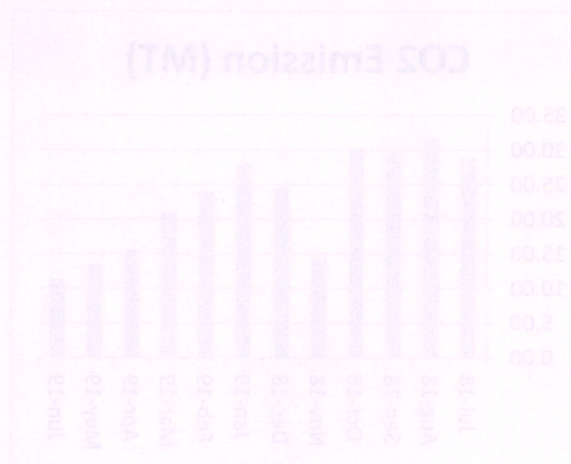


Figure 4.1: Month wise CO<sub>2</sub> Emission



## **5. Study of utilities**

### **5.1 Study of Lighting**

In the facility, the lighting system can be divided mainly in to parts, indoor lighting and outdoor lighting. There are 215 FTL fittings with Electronic/ magnetic chokes , 292 nos of LED tubes, 140 nos of LED bulbs. It is recommended to install the 20 W LED Tube light fittings in place of these old T-8 fittings. There are 30 No of LED street lights.

### **5.2 Ceiling Fans**

At building facility, there are about 181 Nos Old Ceiling Fans, which consumed about 65 W of Electrical Energy. It is recommended to replace these old Fans with BEE STAR Rated Ceiling Fans.

### **5.3 Water Pumps**

There are in total 1 Water pumps with 5HP.



## 7. Study of usage of LED lighting

In this chapter we study the lighting system of college and compute the percentage of total load catered by LED lighting.

**Table 7.1: Total lighting load**

No	Particulars	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	215	40	8.6
	<b>LED lighting load</b>			
1	LED tube	140	20	2.8
2	LED bulbs	292	12	3.5
3	LED street lights	20	35	0.7
	<b>Total LED lighting loadl</b>			<b>7.0</b>
	<b>Total Lighting load</b>			<b>15.6</b>

It can be seen that out of total lighting load 45% load is LED lighting load.



## 8.2 Replacement of old fans with STAR Rated fans

During the Audit, it was observed that there are 181 no of fans. It is recommended to replace these old fans with STAR Rated fans.

In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of Old Ceiling Fan fittings	181	Nos
2	Energy Demand of Old Ceiling Fan fitting	65	W/Unit
3	Energy Demand of STAR Rated Fan	52	W/Unit
4	Reduction in demad	13	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	9.412	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	2353	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	25883	Rs/Annum
11	Cost of STAR Rated Ceiling Fan	2174	Rs/unit
12	Investment required	393494	Rs lump sum
13	Simple Payback period	182	Months



#### 8.4 Summary of 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
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