

# PRACTICAL VISION CONSULTANTS

*We have carried out the preliminary Energy Audit and Assessment for Green Initiatives on 3 July 2017 at*

*Sanjivani Rural Education Society Campus, Kopergaon.*

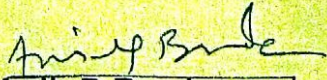
*Based on the documentation submitted and our site visit, we certify that this institute has accomplished the necessary framework to implement the green initiatives in following areas*

- *Energy Conservation,*
- *Water Conservation,*
- *Use of Renewal Energy,*
- *Reduction of Green House Gases and*
- *Waste management.*

*We appreciate the intent of the institute for Environment protection and commitment for conservation of natural resources.*

*This shall definitely result into nourishment of student education for Green Environment and sustenance of Green March.*

  
Vivekanand Koranglekar

  
Anil P Borde

Practical Vision Consultants

PRACTICAL VISION CONSULTANTS  
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# **Preliminary Energy Audit**

**for**

**SANJIVANI COLLEGE OF ENGINEERING**

**At - Sahajanandnagar, post - Shinganapur,**

**Tal-Kopargaon - 423603, Dist. A'nagar**

**Prepared by**

**Practical Vision Consultants, Auranagabad**

Audit Date: 3-7-2017

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## 1 Introduction

### 1.1 Site Visit

**Organisation Name:** SANJIVANI COLLEGE OF ENGINEERING

**Site Name & Address:** At-Sahajanandnagar, post-Shinganapur,  
Tal-Kopargaon-423603,dist.A'nagar

**Buildings included:** Campus area of College of Engineering only.

**Dates of Visits:** 03-07-2017

**Energy Advisor:** Practical Vision Consultants , Aurangabad

**Visit Hosted by:** Mr. R.N. Hajare

Brief account of site visit as follow.

**Table No 1 : Site visit and Observation**

Sr No	Site name	Focus of discussion
01	Gymkhana , Students Hostel	Water Harvesting
02	Student Hostels	Use of Solar Energy alternate to Thermal energy for Hot Water
03	STP	Recycling of Water
04	Solar Tower	Use of Re-enable energy alternate to Electrical energy (work in Progress, Project material received at site )
05	Automation Research Lab	Use of Re-enable Energy (Solar)/Battery operated vehicles
06	Site maintenance office for Electric maintenance, DG set, water supply	Electric Line Diagrams, Distribution of water lines for RO, Usage, Waste & Reject
07	Library, Class Room, Drawing Hall, Corridor	Adequate Day light availability, Natural air circulation.
08	Vehicle Parking Area	Arresting entry of Motor cycles in college campus to avoid air / Noise pollution.
09	IT Lab	Use of e services /awareness of Environment consciousness.

## **1.2 Objective**

The objective of this Preliminary Energy Audit, (Walk Through Audit), is primarily to assess the institutes initiatives for the awareness of Environment consciousness among the students and nourish the environmental education among the students studying in college campus.

This objective will be achieved by:

- Identifying a suitable energy performance indicator for existing and target energy use to quantify the potential for energy savings. This also helps to assess the impact of the energy conservation measures in achieving this potential and provide a sense-check of calculations.
- Identifying a suite of measures, including savings and implementation budget, which together are of sufficient scale and combined payback to create a financially viable project suitable for implementation as a single package of works? Where appropriate, non-energy savings, such as water or maintenance, will also be quantified.
- Identifying additional metering and recording requirements, including any environmental conditions that are likely to be required for a baseline should the measurement and verification of savings be necessary. The associated installation budget will be included.
- Identifying the yearly calendar dates for environment awareness generation and education by celebrating the respective weeks with environment conservation themes./ arranging expert lectures /seminars in college campus with participation of students.

This Preliminary Energy Audit is not an Investment Grade Audit and has been completed in a relatively short period of time with using readily available site information, sector performance indicators, and rules of thumb. It is a concise, or walkthrough survey that has been prepared with all reasonable skill, care and diligence possible within a short period of time

## **1.3 Description of Site & Scope of Assessment**

The Site map of SANJIVANI Rural education society with marked area of SANJIVANI College Of Engineering which forms the scope of Assessment.

**This assessment includes the following aspects:**

- Electricity / Thermal Energy / Fossil fuel
- Re-enable energy
- Water Conservation
- Green House gas generation
- Waste management

## 2 Energy Consumption

### 2.1 Annual Energy Consumption

The data regarding electricity consumption was available for the entire campus of Sanjivani Rural Education Society. On similar lines data to be captured for SANJIVANI college of Engineering 's annual energy consumption by installing sub meters for all the institutes in the campus .

**Table 2 : Annual Electrical Energy Consumption &Electrical Energy Costs (from Jan 2016 to June 2017 ) As per the MSEDL Monthly billing to the institute.**

Month	Industrial Electricity	Residential Electricity	Total Electricity Units	Total Amount in Rs.
May-17	68610	1740	70350	769680
Apr-17	85867	1075	86942	803454
Mar-17	80680	1975	82655	803754
Feb-17	62061	1308	63369	626044
Jan-17	54670	1333	56003	568104
Dec-16	47965	1450	49415	494725
Nov-16	50009	950	50959	518663
Oct-16	69043	1742	70785	646870
Sep-16	82513	1287	83800	756122
Aug-16	79799	1288	81087	763627
Jul-16	71125	1855	72980	678511
Jun-16	52704	1684	54388	547320
May-16	72661	1234	73895	725603
Apr-16	77009	1249	78258	745180
Mar-16	82272	1800	84072	737861
Feb-16	66585	1401	67986	614982
Jan-16	53696	1472	55168	511010

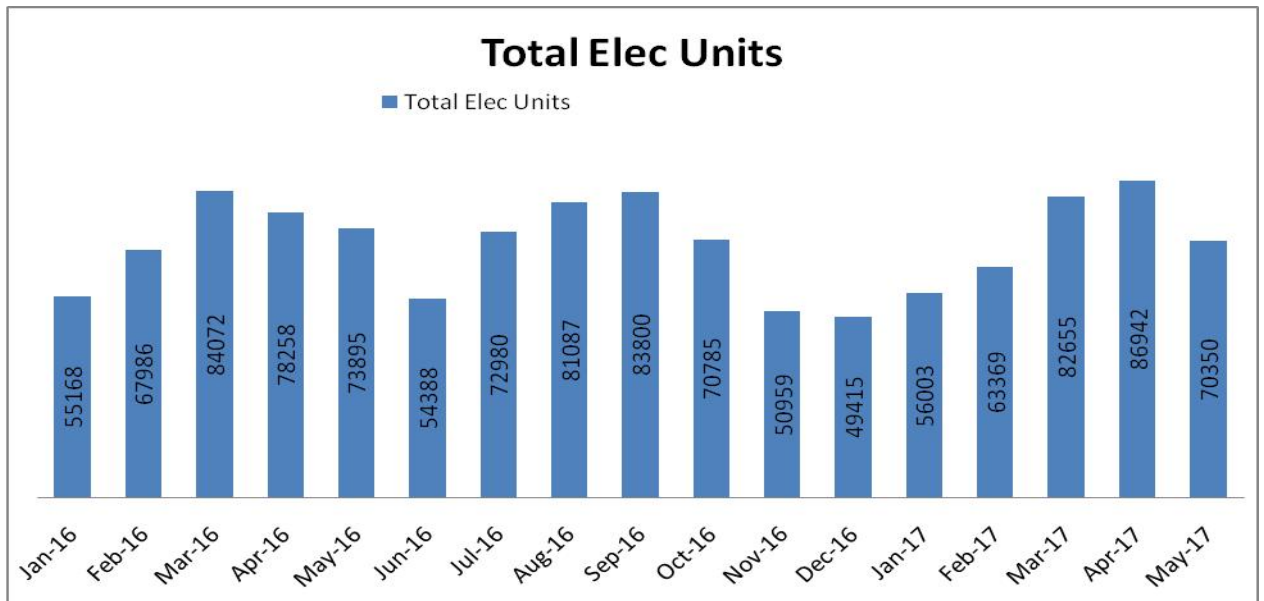
### 2.2 Main Energy Consumers

The main energy consumers at the site that have been quantified for this assessment are summarised in Tables 3 below.

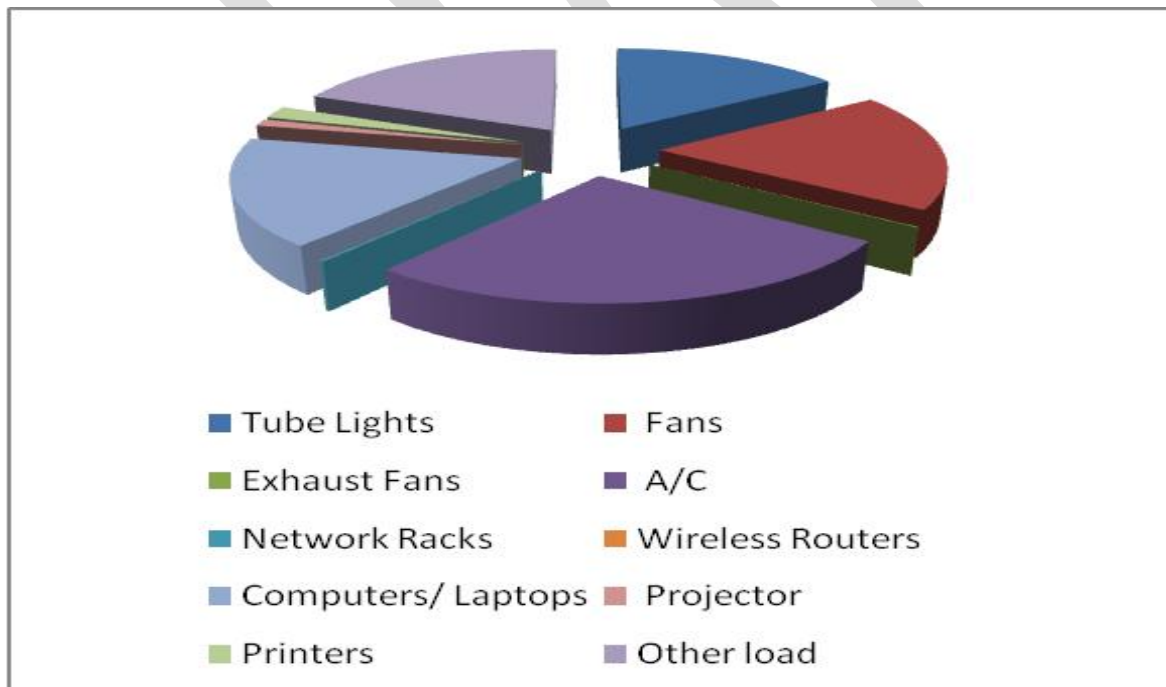
**Table 3: Equipment wise Summary of Primary Electrical Energy Consumers ( Inventory )**

Tube Lights	Fans	Exhaust Fans	A/C	Network Racks	Wireless Routers	Computers/ Laptops	Projector	Printers	Pumps & Other load	Total
71	85	1	121	1	1	77	5	9	85	456

### Month Wise Electrical Energy Consumption Trend



### Energy Equipment Share As Per Connected Load



## 2.3 Energy Performance

The objective of this subsection is to establish how the facility is performing. At present monitoring of energy performance indicator by institute is not evident.

### 2.3.1 Energy Performance Indicators

The term “Energy Performance Indicator” is used here to reflect trends in energy use in that facility over a period of time.

We suggest following EnPIs at the site that need to be quantified for future assessment as summarised in Tables 4 below :

**Table 4: Energy Performance Indicators**

Sr No	Building Name	Total Energy Consumption in KWH	Area in Sq Mtrs	Population (Student + Staff)	Performance Indicators	
					KWH / Sq Mtr	KWH/ person
1						
2						
3						
4						
5						

### 2.3.2 Benchmarks

The term “Benchmark” is used here to reflect a comparison of this facilities existing and projected energy use (i.e. when energy saving measures proposed herein are implemented) with industry norms.

Institute is not monitoring the benchmark at present, The suggested Benchmarks give an indication of existing performance, the potential for further savings and a sense check for the overall savings that this audit has identified.



**Table 5: Energy Benchmarks**

<b>[Benchmark Name &amp;source] kWh/m2/p.a.</b>	<b>Electricity</b>	<b>Fossil Fuel</b>	<b>Re-enable Energy (Solar)</b>	<b>Water</b>	<b>Green House Gas Generation</b>	<b>Disposal of Waste in ton</b>
Existing						
Projected						

Institute to work out the existing figures on monthly basis to have reference for further improvement

### **3 Scope of Natural Resources Conservation**

#### **3.1 Recent / Existing Energy-Saving & Environment protection Initiatives**

**Table 6 : List Of Energy Saving & Environment Projects**

<u>Sr No</u>	<u>Project</u>	<u>Category</u>	<u>Status</u>	<u>Impact</u>
1	Solar Water Heater	Renewable Energy	Implemented	Fuel and Electricity billing ↓
2	Solar panel for electricity	Renewable Energy	E&C-in progress	Electricity billing ↓
3	Rain Water Harvesting	Water	Implemented	Water consumption ↓
4	RO reject water circulation	Water	Implemented	Water consumption ↓
5	Strom water, Waste water collection and recycling	Water	Implemented	Water consumption ↓
6	Water Sprinklers	Water	Implemented	Water consumption ↓
7	Street light timers	Electricity	Implemented	Electricity billing ↓
8	No vehicle movement in campus	Fossil Fuel	Implemented	Air & Noise pollution ↓
9	Provision of bus for commuting to reduce individual vehicle usage	Fossil Fuel	Implemented	Air Pollution ↓
10	Curriculum projects undertaken by Final Year students for Energy savings	Electricity ( ), Fossil fuels ( ), Water consr. ( ), GHG reduction ( ), Waste management ( )	Implemented	As academic initiative for environment consciousness among budding engineers.

#### **3.2 Suggested Opportunities for Energy Savings**

We identified a number of opportunities for further energy savings at the site; these are summarised as below.

Above measures for energy saving mentioned in 3.1; to be extended to other locations in campus for horizontal deployment.

Further to this, following initiatives to be taken by institute for further saving in all types of energy conservation, preservation of natural resources and protection of environment.

**Table no 7 : Project identified for Opportunities for Energy saving**

<b><u>Sr No</u></b>	<b>Project</b>	<b>Category</b>	<b>Status</b>	<b>Impact</b>
1	Replacement of Fluorescent tubes by LED bulbs	Electricity	In progress	Increase in Bulb life ↑ and Electricity units ↓
2	Replacement of Window Air conditioner to Split Air Conditioners	Electricity	To Plan	Electricity consumption reduction upto 25% .
3	Remote sensing lighting in isolated area / non traffic zones ( Corridors / lawns , Play grounds, Halls)	Electricity	To Plan	Electricity consumption↓
4	AMCs schedules & activities of Equipment such as Pumps / Motors / DG set and Transport vehicles to be reviewed from the point of equipment performance	Electricity, Fossil Fuel	To Plan	To ensure better performance of equipment resulting in reduction of Energy consumption and Air pollution.
5	Bio- gas plant for Canteen Waste	Fossil fuel	To plan	To utilize wastage of food left out.
6	To review the AMC with Housekeeping agency @ the disposal of wastes from campus is done as per Eco guideline and explore the possibility for re use in sugar factory	Waste Management	To plan	To use segregate the wastes as hazardous /Non hazardous  Use of campus waste as fuel
7	Additional Building expansion	Green Building	Green Building	To benchmark project as a model of Eco-friendly environment for bodying engineers awareness /study

### **3.3 Activity Metrics**

If energy use is driven by other activities (e.g. Hostel occupancy, College Student Population, Running in day/ shift), this will have to be identified.

We suggest following activity metric to be monitored by the institute. Identify here any activity metrics that should be recorded, the frequency/recording interval, and the mechanism by which they will be recorded.

**Table No – 8 : Activity Metric Record**

Ref	Activity Metric	Location	Recording Interval	Responsibility	Method of Measurement
1	Electric Meter				
2	Water Meter				
3	Pollution Check				
4	Water Balance				
5	Category wise Waste Measurement				

**Activity Metrics For Energy Profile :**

We propose institute to capture the energy usage as per energy type in following format to monitor the energy usage as well as explore the feasibility of using alternative low cost fuel

**Table No – 9 Energy Profile Yearly consumption category wise**

Sr no	Type of Energy	Usage quantity in Equivalent KWH	Annual usage Percentage	Annual spend in Rs. with percentage	Remark
01	ELECTRICITY				
02	DIESEL				
03	PETROL				
04	GAS				
05	SOLAR				
06	WIND				
07	WOOD				

## **4 Conclusions & Next Steps**

### **4.1 SANJIVANI College management commitment**

As a part of commitment to Environment consciousness, Institute has made the necessary provision of infrastructure such as Green Policy, Green Committee looking after implementation of Policy by monthly review meetings and recommending the Budgetary provisions for necessary Green initiatives.

The committee has also prepared the yearly calendar for Environmental days identified for the celebration to create the awareness for green Environment among the budding Engineers.

### **4.2 Mechanism for project proposal review**

Environment project review should be based on following simple formula to verify the viability and ROI and Payback period .

- Total investment budget [Rs. ----- ]
- Expected savings [Rs.-----]
- Simple payback [----- years]
- Note non-quantified benefits.

Note- if the payback period of any project is less than one year those should be taken on priority basis.

### **4.3 Checklist for Environment Consciousness in campus**

**As a part of Environment Consciousness in the College campus on continual basis, institute has to follow the checklist as mentioned in the Annexure no 1.**

Vivekananda Koranglekar  
PVC Aurangabad

Anil P Borde  
PVC Aurangabad

**Appendix 1:****Campus Sustainability Best Practices**

primarily focuses on energy and climate change, but also includes topics such as campus waste, food, and water usage which can impact climate change.

Based on above College can formulate strategies and ensure the success of campus sustainability programs.

Following List of initiatives may be undertaken by SANJIVANI College of Engineering as a part of Campus sustainability to check for adopting the best practices followed.

**A. Small-Scale Energy Efficiency Initiatives**

Energy Competitions  
 Computer Energy Savings  
 Energy Efficiency in equipment  
 Light Bulb Replacement  
 University Heating/Cooling Policy

**B. Large-Scale Efficiency Initiatives**

Metering of Buildings  
 Cogeneration

**C. Renewable Energy Initiatives**

Wind Energy  
 Biomass  
 Solar/ Photovoltaic Energy  
 Solar Hot Water  
 Biomass mixed with Fossil Fuels  
 Geothermal  
 Renewable Energy Certificates  
 Carbon Offsets

**D. Transportation**

Bicycle Initiatives  
 Commuter Programs  
 Public Transit  
 Bio-fuels / Efficiency

**E. Food**

Organic and Local Food  
 Gardens and Farming  
 Waste Associated with Food  
 Food Procurement and Production

**F. Environmental Procurement**

Recycled Paper, Water Bottles  
 Computer Policies and  
 Electrical items with higher star rating by BEE

**G. Waste**

E waste Generation, Recycling and Disposal Management  
 Conservation Incentives  
 Recycling Awareness Programs  
 Reducing Consumption

**H. Green Building Design**

White Roofs    Natural ventilation    Day lighting

**I. Water and Ecological Design**

Green Roofs  
 Using Native Plants  
 Parking Improvements  
 Reducing Water Consumption  
 Rainwater Harvesting

**J. Education and Outreach**

Eco-Representatives  
 Expanding the Curriculum  
 Green Laboratories  
 Incorporate Sustainability Awareness Early

**K Innovative Financing**

Revolving Load Fund  
 Alumni Sustainability Fund  
 Project Contracting/Performance Contracts