

Preliminary Energy Audit

Date: 24 Nov 2020

Place: Sanjivani Rural Education Society Campus, Kopergaon

We are happy to certify that the institute has implemented necessary framework in following areas: -

- > Energy Conservation,
- > Energy Management,
- ➤ Use of Renewal Energy.

Based on the documentation submitted and our site visit, we appreciate the commitment demonstrated by the institute in implementing initiatives for energy conservation and use of natural resource like solar energy.

This has resulted in achieving substantial savings and sustenance of Green March.

Vivekanand Koranglekar

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Preliminary Green Initiatives Assessment

Date: 24th Nov 2020

Place: Sanjivani Rural Education Society Campus, Kopergaon

We are happy to certify that the institute has implemented necessary framework in following areas: -

- > Water Conservation,
- Use of Renewal Energy,
- **Waste management.**

Based on the documentation submitted and our site visit, we appreciate the initiatives being implemented and substantial results achieved by 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

Shirish Loya

Practical Vision Consultants

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Preliminary Energy Audit

for

SANJIVANI RURAL EDUCATION SOCIETY CAMPUS

At - Sahajanandnagar, post - Shinganapur,

Tal-Kopargaon - 423603, Dist. Ahemadnagar

Prepared by

Practical Vision Consultants, Auranagabad

Audit Date: 24Nov2020

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Introduction

<u>1.0 Walk through energy audit :</u>

Organisation Name:	SANJIVANI RURAL EDUCATION SOCIETY CAMPUS		
Site Name & Address:	At - Sahajanandnagar,		
	Post - Shinganapur,		
	Tal - Kopargaon-423603,		
	Dist - Ahemadnagar		
Buildings included: Campus area of Sanjivani ACS college			
	Pharmacy college		
	College of Engineering campus area		
Date of Visit:	24Nov2020		
Walk through	Mr. Vivekanand Koranglekar		
energy auditors	Mr. Shirish Loya		
	Practical Vision Consultants,		
	Aurangabad		
Visit Hosted by:	Mr. Hajare		

1.1 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 along with assessing the progress with respect to previous year's performance.

This objective will be achieved by:

- Identifying, monitoring & reviewing 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, monitoring & reviewing 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, monitoring & reviewing 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, monitoring & reviewing 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

<u>1.2 Description of Site & Scope of Assessment</u>

The Site within the campus of Sanjivani Rural education society forms the scope of Assessment.

This assessment includes the following aspects:

- Electricity / Thermal Energy / Fossil fuel
- Renewable energy
- Water Conservation
- Waste management

- **1.3 Brief account of site visit as follow.**
 - **01. Solar Panel installation**



Use of Solar Energy for generating electricity will help to reduce grid supplied electricity. This is now fully functional and reduction in electric bills will be reflected in next month onwards.

02. Solar panel supporting shed



The specially created shed to support solar panel serves dual purpose:

- 1) Firm support to panels at optimum level from ground; i.e. direct access to sunlight and ease of maintenance.
- 2) Creation of covered assembly area for various college functions

03. Laboratory



Abundant natural light coming through broad and wide windows across laboratory and lecture hall will significantly reduce the need to use flurocent tubes, lights.

04. Lecture hall



Excellent natural air ventilation ensures fresh air circulation in lecture hall and reduces the use of electricity for fans

05. Building walls with drain water pipes



Water Harves ting to

capture all water on the science building roof is excellent initiative. The proper sloping arrangements on roof at different locations ensures the rain water is carried through pipelines to soak pit.

06. Soak Pit



Rain water soak pit is created for charging ground by rain water. The soak pit can further be developed as water storage pond.

07. Passages





Progressive replacement of fluorescent tubes by LED bulbs is resulting in reduced electricity consumption for illumination. The institute had made a resolve to replace every fluorescent tube by LED bulb whenever it stops working.

08. Laboratory



Enthusiastic members are planning to use the exhaust fan working on natural air current to generate electricity.....may be enough to charge cell phone batteries.

09. Exit point

All the lecture halls, labs and offices are having one central switch at exit point to switch off all appliances in the hall.

10. Display Boards



The quality policy, environmental policy boards are displayed at prominent locations to make every member and especially new entrants, aware of institute's commitment to conserve natural resources.

11. Biodigester



Biogas is Eco-Friendly. Biogas Generation Reduces Soil and Water Pollution. Biogas Generation Produces Organic Fertilizer. It's A Simple and Low-Cost Technology That Encourages A Circular Economy.

Healthy Cooking Alternative For Developing Areas

<u>2 Energy Consumption</u>

2.1 Annual Energy Consumption

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

Table 2 : Annual Electrical Energy Consumption & Electrical Energy Costs (from Apr 2019 to Sep. 2020) As per the MSEDL Monthly billing to the institute.

Month	Solar Units	Total Electricity Units	Total Amount in Rs.
Sep-20	-10373	4692	198400
Aug-20	-10416	4811	200002
Jul-20	-11706	4959	201713
Jun-20	-12239	4547	203609
May-20	-9453	4633	197199
Apr-20		3867	186433
Mar-20	-21519	11059	287861
Feb-20	-10208	31472	580149
Jan-20	-12186	30589	561210
Dec-19		38898	665560
Nov-19		42110	713459
Oct-19		42140	688213
Sep-19		62910	1086641
Aug-19		51352	768654
Jul-19		51213	649218
Jun-19		21273	394215
May-19		28670	495678
Apr-19		36924	594644

During the pandemic period from Apr 2020 to Sep 2020 the consumption is very low



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.

Electric Instrument wise connecting load						
Electric appliances	Total Instruments	Energy consume/ unit	Total Connected load			
Led	94	18	1692			
Tube light	2071	18	37278			
Fans	1543	100	154300			
Wallmo-unt fans	1	80	80			
Exhaust fans	62	80	4960			
Wireless routers	13	600	7800			
Computers	1100	233	256300			
Projectors	57	600	34200			
Printers	99	233.33	24000			
AC	31	3517	109027			
Freeze	13	1800	23400			
Water Coolar	14	1800	25200			
Totals	5098		677335			

Table 3: Equipment wise Summary of Primary Electrical Energy Consumers

College wise Distribution of Electric Appliance					
College -→	B. Pharmacy	D. Pharmac y	Jr. college	Engg. college	Total
Led	15	2	7	70	94
Tube light	139	40	114	1778	2071
Fans	110	40	82	1311	1543
Wallmount fans	1	0	0	0	1
Exhaust fans	27	18	1	16	62
Wirelessrouters	1	0	0	12	13
Computers	52	7	9	1032	1100
Projectors	4	2	1	50	57
Printers	8	4	2	85	99
AC	8	0	0	23	31
Freeze	6	3		4	13
Water Cooler	1	0	1	12	14
Totals	372	116	217	4393	5098



2.3 Energy Performance

The objective of this subsection is to establish how the facility is performing. The monitoring of energy performance indicator by institute will reflect the effectiveness of energy saving initiatives.

2.3.1 Energy Performance Indicators

As suggested in previous audit the following "Energy Performance Indicator" at the site is being monitored and shows good improvement as summarised in Tables 4 below :

Table 4: Energy Performance Indicators : SRES CAMPUS

As suggested in previous audit the following "Energy Performance Indicator" at the site is being monitored and shows good improvement as summarised in Tables 4 below :

Sr No	SRES CAMPUS	Average monthlyPopulatiElec. EnergyonConsumption in(Student)		i Performance t Indicators Units/	
	Year	Units	+ Staff)	Student	
1	2016-2017	69536	6306	11.02	
2	2017-2018	68047	7043	9.66	
3	2018-2019	47246	7400	6.38	
4	Apr 2019-Mar 20	37384	7500	4.09	
5	Apr 2020-Sep 20	4563.4	7500	0.60	

During the pandemic period from Apr 2020 to Aug 2020 the consumption is very low and such period is excluded from review

2.3.2 <u>Benchmarks</u>

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. This Benchmarks gives 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

Monthly Running Average Usage	Electricity KWH	Renewable Energy (Solar) KWH	Remark
2016-17	69536	0	Solar nanel installation of
2017-18	68047	10000 Expected	480 KWH is implemented
2018-19	47246	10013	
Apr 2019-Sep 2020	27731	10900	@10900 solar units credited

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</u> <u>No</u>	Project	Category	Status	Impact
1	Solar Water Heater	Renewable Energy	Implemented	Fuel and Electricity billing ↓
2	Solar panel 480 KWH for electricity	Renewable Energy	Implemented	Electricity billing ↓
3	Rain Water Harvesting	Water	Implemented	Water consumption ↓
4	RO reject water circulation	Water	Implemented	Water consumption \downarrow
5	Strom water, Waste water collection and recycling	Water	Implemented	Water consumption \downarrow
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 \downarrow
10	Curriculum projects undertaken by Final Year students for Energy savings	Electricity, Renewable energy usage, Fossil fuels, Water conservation, GHG reduction, Waste management	Implemented	As academic initiative for environment consciousness among budding engineers.
11	Bio digester	Waste Managements	Implemented	Dirt volume ↓
12	Sewage Treatment plant capacity 100 KLD	Waste water management	Implemented	Water pollution ↓
13	Composting pit 15*15*8 mtrs	Garden waste	Implemented	Soil erosion ↓
14	E waste management through repair, reuse, recycle	E waste	Implemented	Soil erosion ↓

GREEN FIELD SURVEY

GREEN FIELD Survey					
Sr. NO.	FRUIT TREE	Tall	Medium	Small	
1.	COCONUT	65	55	32	
2.	MONGO	5	11	20	
3.	LEMON	6	-	-	
4.	BOR(JIJUPAS)	8	2	10	
5.	DRUM STIK	20	-	-	
6.	ALMOND	20	5	5	
7.	VILAYTI CHINCH	8	-	-	
8.	Chinch	15	07		
9.	Karanj	30	40	50	
10.	Bottle Brush	12	10	4	
11.	Bottle Palm	130	90	30	
12.	Suru Shrubs/ Bush	825	-	-	
13.	Chafa	06	06	05	
14.	Rubber Tree	01	-	-	
15.	Crotton	05	03	03	
16.	Gava (Peru Tree)	25	-	-	
17.	Sappota Chikku	15	60	5	
18.	Jamun	5	12	-	
19.	Custared Apple (Sitaphal)	-	22	-	
20.	Phyrus Tree	80	50	50	
21.	SapttaPanni	5	60	30	
22.	Rain Tree	130	100	100	
23.	Kashid	800	200	258	
24.	Pelto Form	600	100	40	
25.	Nilgiri	852	-	-	
26.	Kanchan	-	80	-	
27.	Sandal Wood (Chandan)	22	35	30	
28.	Bogan Wel	-	225	-	
29.	Morpankhi	-	-	27	
30.	Rudraksha	-	2	-	
31.	Bhadraksha	-	2	-	
32.	Subabul	15	35	100	
33.	Other Flower Bushes	-	510	900	
34.	Bamboo	-	50	-	

Sr No	Project Title	Category	Impact
1	CORONA WARRIOR ROBOT	Environment	Study Complete
2	SOLAR POWER STATION	Renewable energy	Study Complete
3	Higway Speed Sensing Conveyor Belt Control & Other Application	Safety	Study Complete
4	Hybrid energy powered battery charge controller	Electricity	Study Complete
5	Smart Management of Street Light for Energy Conservation	Energy Conservation	Study Complete
6	Automatic Efficiency and Power Factor Calculator	Electricity	Study Complete
7	Solar Based Charging Station	Renewable energy	Study Complete
8	"ENERGY AUDIT OF S.R.E.S COLLEGE OF ENGINEERING CAMPUS"	Awareness of Energy Conservation	Study Complete
9	Performance Evaluation of smart EV with Electrified Roads	Environment	Study Complete
10	Electric scooter	Environment	Study Complete
11	Thermo Electrical generation using waste heat by deep and solar for rural electrification	Energy Conservation	Study Complete
12	Conditional Monitoring of motor with smart sensors	Energy Conservation	Study Complete
13	Performance analysis of grid connected pv, wind hybrid power system	Electricity	Study Complete
14	Lot based home automation system	Energy Conservation	Study Complete

3.2 List of energy saving & environment project taken by final year students

3.3 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.

<u>Sr No</u>	Project	Category	Status	Impact
1	Replacement of Fluorescent tubes by LED bulbs	Electricity	In progress	Increase in Bulb life \uparrow and Electricity units \downarrow
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	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 Manageme nt	To plan	To use segregate the wastes as hazardous /Non hazardous Use of campus waste as fuel
6	Additional Building expansion	Green Building	In progress.	To benchmark project as a model of Eco-friendly environment for budding engineers awareness /study

Table no 7 : Projects identified for Opportunities for Energy saving Implemented

<u>3.4 Activity Metrics</u>

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:

List of activities to be captured in the activity metric may include Electric meter and submeter for each building as well as utility, Water meter at intake and usage points, Pollution checks, and category wise waste generation in the campus.

Identify here any activity metrics that should be recorded, Location of measurement unit, the frequency of recording interval, Responsibility of recording and monitoring and the mechanism by which they will be recorded.

3.5 Activity Metrics For Energy Profile :

We propose institute to capture the energy usage as per energy type, to monitor the energy usage in KWH and energy cost in Rupees as well as explore the feasibility of using alternative low cost fuel. The energy types are Electricity, Diesel, Petrol, LNG, Solar, Wind, Wood, Coal etc.

CHAPTER 2 Conclusions & Next Steps

2.1 SANJIVANI College management commitment

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

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

2.2 Mechanism for project proposal review

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

Simple Payback = ------Expected savings per year

- Note- if the payback period of any project is less than one year those should be taken on priority basis.
- Record all non-quantified benefits and legal compliances

2.3 Checklist for Environment Consciousness in campus

As a part of Environment Consciousness in the College campus on continual basis, institute is following the checklist as mentioned in the Annexure no 1.

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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.

List of initiatives being undertaken by SANJIVANI RURAL EDUCATION SOCIETY CAMPUS

as a part of Campus sustainability to check for adopting the best practices followed.

UPDATE STATUS FROM GREEN AUDIT FILE AND OTHER DETAILS

Initiatives suggested last year	Status on 12 Oct 2019		
A. Small-Scale Energy Efficiency Initiatives			
Energy Competitions		Preliminary work	
		done	
Computer Energy Savings		Replaced by energy	
		efficient screens	
Energy Efficiency in equipment		Done	
Light Bulb Replacement		Done	
University Heating/Cooling Policy		Done. AC temp	
		locked at 27 deg.cel	
B. Large-Scale Efficiency Initiatives			
☐ Metering of Buildings Separate r		eters for each building	
	is must for	monitoring the impact	
	of various of	energy conservation	
	initiatives a	& participation	
	Progress		
C. <u>Renewable Energy Initiatives</u>			
□ Wind Energy			
	Implemented		
□ Solar/ Photovoltaic Energy	Project is now fully operational		
□ Solar Hot Water	Implemented in hostel		
□ Biomass mixed with Fossil Fuels	Experimentation is under progress		
Renewable Energy Certificates			
Carbon Offsets			
D. Transportation			
□ Bicycle Initiatives	No persona	al vehicles within	
	campus is l	boosting bicycle usage	
Commuter Programs	Common b	uses for staff and	
Public Transit	students are already in place		
□ Bio-fuels / Efficiency			
E. Food			
□ Organic and Local Food			

□ Gardens and Farming		
□ Waste Associated with Food	Bio digester plant is implemented	
□ Food Procurement and Production		
F. Environmental Procurement		
Recycled Paper, Water Bottles	Waste item are segregated at the point of collection	
□ Computer Policies .	Preference is accorded to procure	
Electrical items with higher star rating by BEE	equipment with higher BEE ratings	
G. Waste		
E waste Generation, Recycling and Disposal Management	Being followed, with comprehensive policy for	
	monitoring effectiveness for	
Recycling Awareness Programs	incentives, promoting awareness	
□ Reducing Consumption	programs for conservation and	
II. Course Basilding Design	reduction. Implemented.	
H. Green Building Design	Implanantad	
White Roots	Exactlent implemented	
	Excellent implementation	
	Excellent implementation	
1. water and Ecological Design	Ture of the second state	
U Green Koors	Implemented	
	Neem tree plantation observed	
Parking Improvements	Implemented	
Reducing Water Consumption	Awareness is observed	
□ Rainwater Harvesting	Excellent implementation	
J. <u>Education and Outreach</u>		
	Will be monitored	
□ Expanding the Curriculum	Projects to help environment	
Green Laboratories	conservation, using labs for	
□ Incorporate Sustainability Awareness Early	extensive analysis are observed	
K Innovative Financing		
Revolving Load Fund	Management is working on it.	
Alumni Sustainability Fund		
Project Contracting / Performance Contracts		