

Preliminary Energy, Environment & Green Audit

for

SANJIVANI RURAL EDUCATION SOCIETY CAMPUS

At - Sahajanandnagar, post - Shinganapur,

Tal-Kopargaon - 423603, Dist. Ahemadnagar

Prepared by

Practical Vision Consultants, Aurangabad

Audit Date: 21-02-2025

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1. Introduction

1.1 Walk Through Energy Audit:

Organisation Name:	SANJIVANI RURAL EDUCATION SOCIETY CAMPUS
Site Name & Address:	At - Sahajanandnagar, Post - Shinganapur, Tal - Kopargaon-423603, Dist. - Ahmednagar
Buildings included:	Campus area of Sanjivani ACS college Pharmacy college College of Engineering campus area
Date of Audit:	Online Document Audit: 21 February 2025 On site Visit : 21 February 2025
Walk through energy auditors	Mr. Vivekanand Koranglekar Mr. Shirish Loya Practical Vision Consultants, Aurangabad
Visit Co-ordinated and Hosted by:	Prof: Dr. Jadhav and Prof. Hajare

1.2 Objective

This preliminary energy audit, also known as a "walk through audit," aims to evaluate the institute's efforts to raise student awareness of environmental issues and support environmental education on college campuses. It also evaluates the institute's performance in comparison to the previous year.

The following steps will be taken to accomplish this goal:

- Selecting an appropriate energy performance indicator to measure the potential for energy savings for both current and target energy use. This serves as a sense-check for computations and aids in evaluating how the energy-saving initiatives affect reaching this potential.
- Determining a set of actions, such as cost reductions and implementation budget, that when taken as a whole are large enough and have enough cumulative payback to make the project financially feasible and appropriate for execution as energy cost saving and conservation of natural resources and prevention of polluting it.
- Determining any additional requirements for metering and recording, as well as any environmental conditions that could be needed for a baseline in the event that measuring and verifying savings is required. The budget for the related installation will be estimated, allocated and utilised for implementation of necessary facilities.
- Determining the dates on the calendar each year for educating people about environmental consciousness and organizing events by coinciding those weeks with environmental conservation topics. / setting up professional talks and seminars on college campuses where students attend.

This preliminary energy audit was finished quickly by utilizing easily available site information, sector performance indicators, and common sense. It is not an investment grade audit. It is a succinct, walkthrough survey that was put together as quickly as possible using every conceivable level of skill, care, and diligence

1.3 Description of Site & Scope of Assessment

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
- Reusable energy resources
- Water Conservation
- Waste management

1.4 Brief account of site visit as follow.

Sr No	Site name	Excellent Initiatives for conservation natural resources and energy	PHOTO
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 	

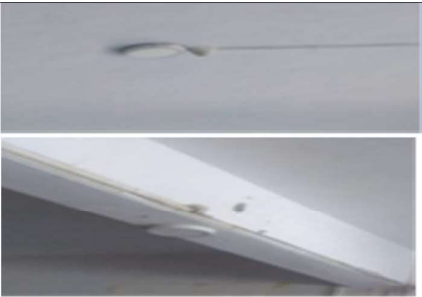
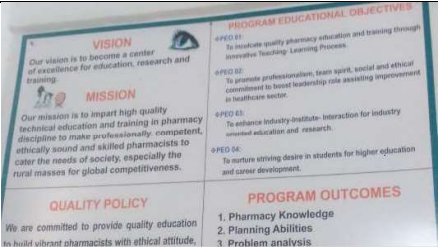
05	Building walls with drain water pipes	Water Harvesting to capture all water on the science building roof is excellent initiative. The proper sloping arrangements on roof at different locations ensures the rain water is carried through pipelines to soak pit.	
06	Soak Pit	Rain water soak pit is created 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 appliance 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.	

Table No 1: Site visit and Observation

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 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 January 2024 to Dec 2024) As per the MSEDL Monthly billing to the institute.

Month & Year	Consumption (KVAH)	Solar Units Consumption	Billed Units	Bill Amount in (Rs.)	% of Solar Units credited
Jan-24	69959	24739	45220	₹ 11,53,810.00	35%
Feb-24	80448	24142	56306	₹ 12,97,470.00	30%
Mar-24	101455	30784	70671	₹ 15,89,480.00	30%
Apr-24	109631	29675	79956	₹ 17,43,090.00	27%
May-24	99056	29205	69851	₹ 16,84,540.00	29%
Jun-24	72857	12082	60775	₹ 13,11,450.00	17%
Jul-24	95971	14064	81907	₹ 16,48,610.00	15%
Aug-24	124856	16976	107880	₹ 20,89,830.00	14%
Sep-24	139404	15136	124268	₹ 23,63,000.00	11%
Oct-24	134099	19259	114840	₹ 22,81,950.00	14%
Nov-24	105225	19962	85263	₹ 17,78,090.00	19%
Dec-24	112016	12792	99224	₹ 18,70,660.00	11%
Total	1244977	248816	996161	2,08,11,980	

The Total electric units consumed during January 2024 to December 2024 are 1244977 with average of 103748 units per month and solar credit contribution per month is 20734 units @ 20 % of the total electric energy requirement.

Note: Average Solar credit Contribution in Summer Season is 29% and is dropped to 14 % in Winter and Rainy Season.

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.

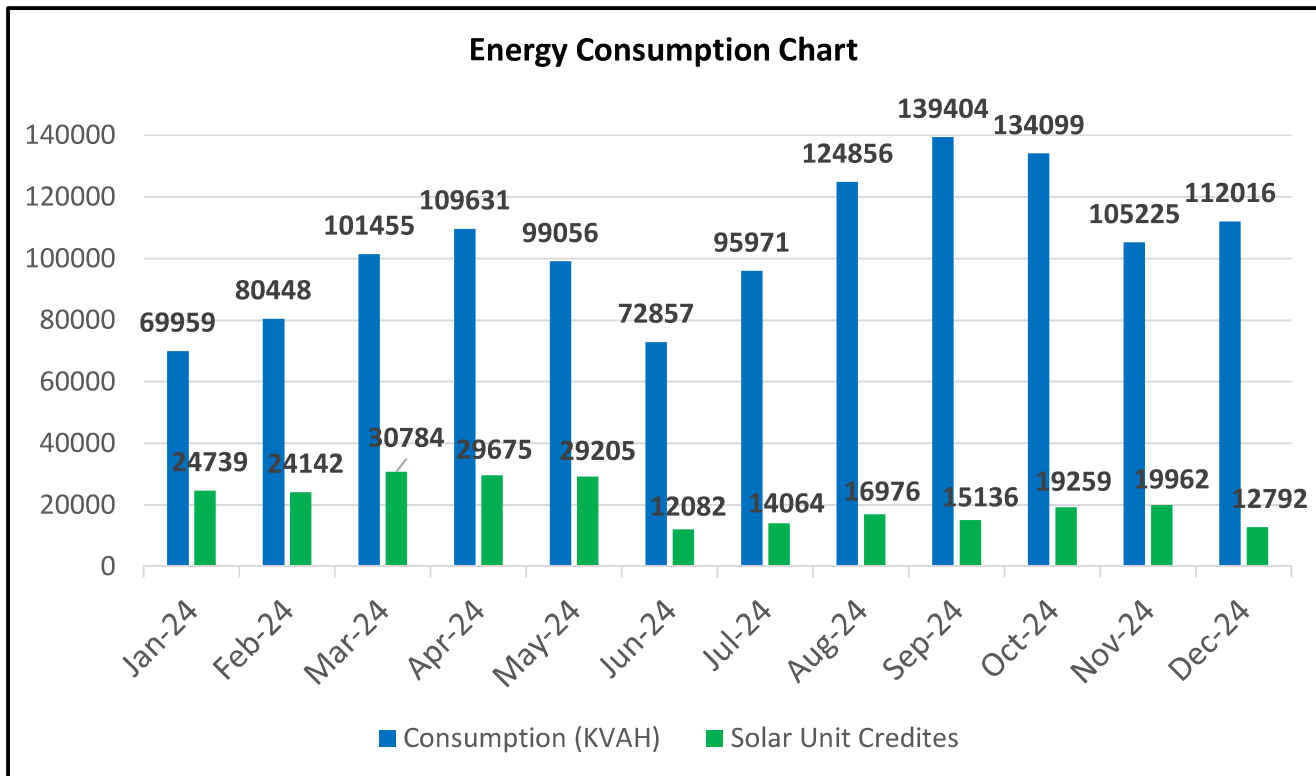
<i>Electric Instrument wise connecting load</i>			
<i>Electric appliances</i>	<i>Total Instruments</i>	<i>Energy consume/ unit</i>	<i>Total Connected load</i>
Led	94	18	1692
Tube light	2071	18	37278
Fans	1543	100	154300
Wall mount fans	1	80	80
Exhaust fans	62	80	4960
Wireless routers	13	600	7800
Computers	1100	233	256300
Projectors	57	600	34200
Printers	99	233.33	23099.67
AC	31	3517	109027
Freeze	13	1800	23400
Water Cooler	14	1800	25200
Total	5098		677336.7

Table 3: Equipment wise Summary of Primary Electrical Energy Consumers

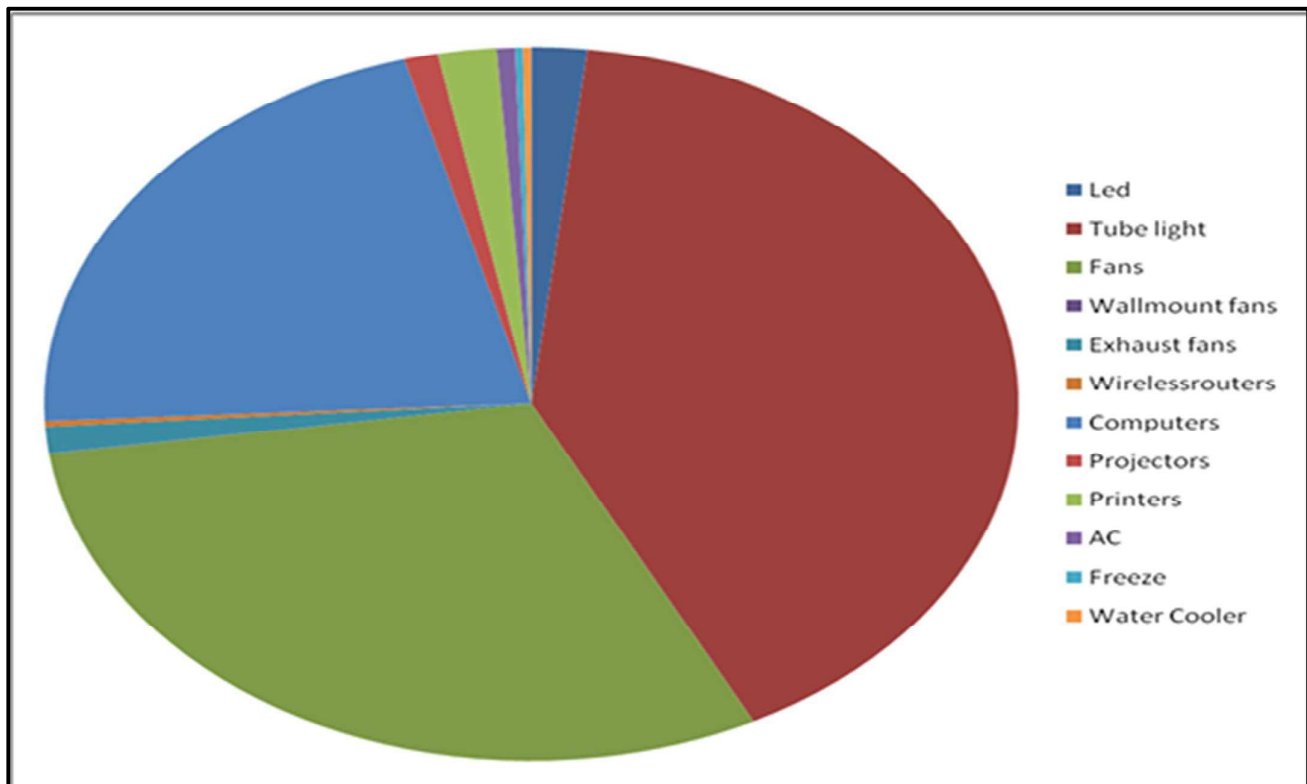
College wise Distribution of Electric Appliances					
College ->	B. Pharmacy	D. Pharmacy	Jr. college	Engg. college	Total
Led	15	2	7	70	94
Tube light	139	40	114	1778	2071
Fans	110	40	82	1311	1543
Wall mount fans	1	0	0	0	1
Exhaust fans	27	18	1	16	62
Wireless routers	1	0	0	12	13
Computers	52	7	9	1032	1100
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

Table 4: College wise distribution of Electric Appliances

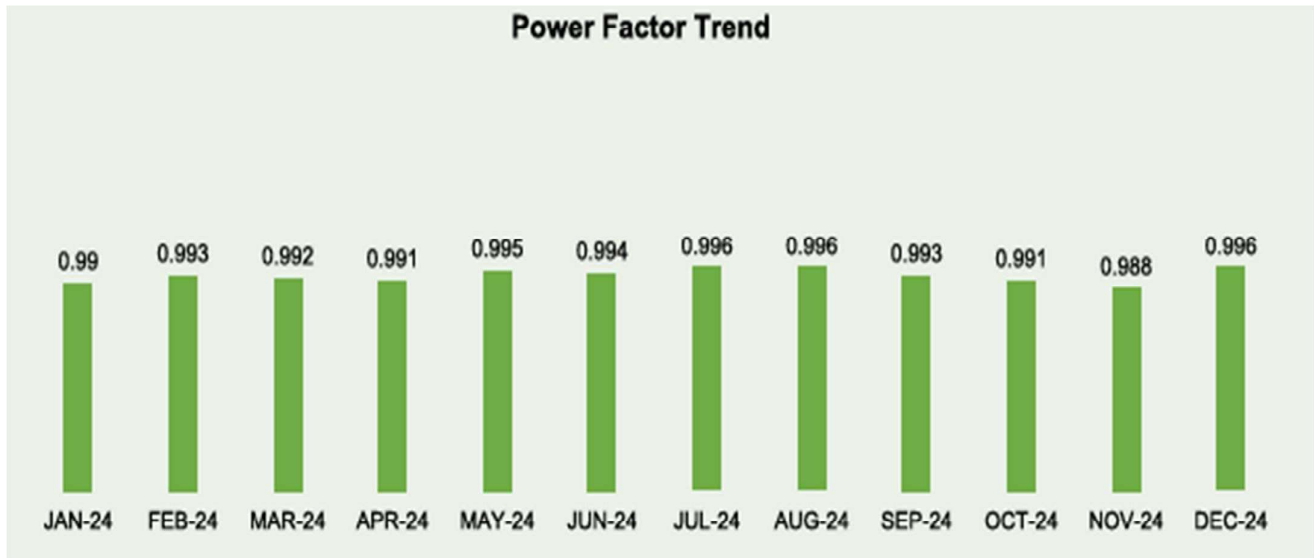
Month Wise Electrical Energy Consumption Trend



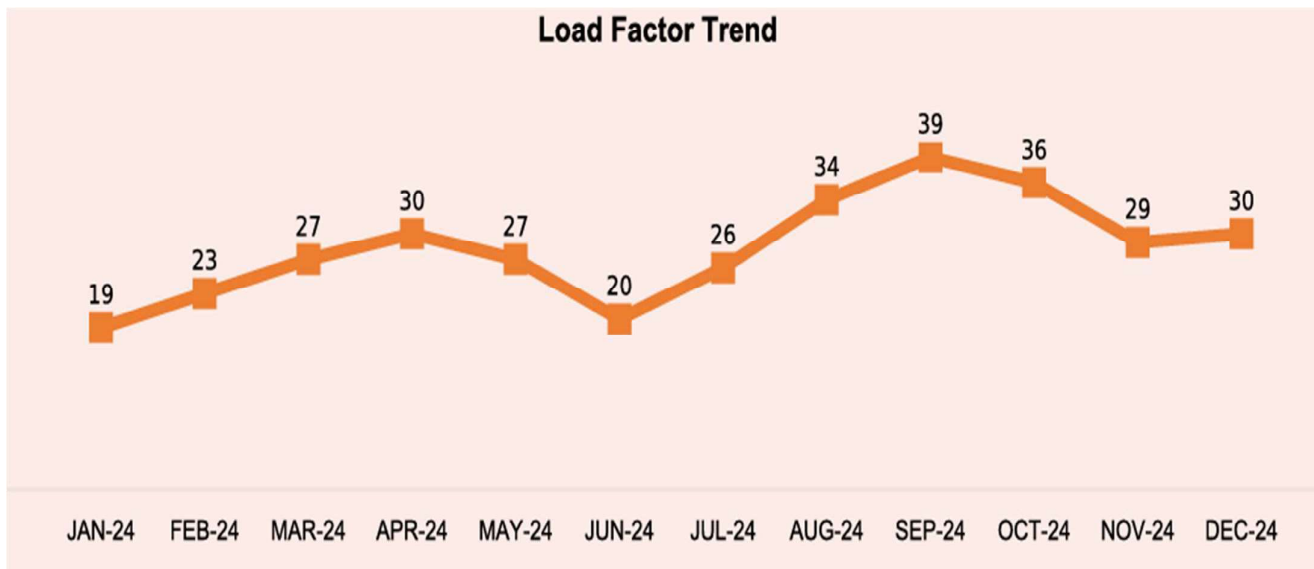
Pie Chart of Energy Equipment Share as Per Connected Load



Power Factor Trend



Load Factor Trend



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:

Sr No	SRES CAMPUS Year	Average monthly Elec. Energy Consumption in Units	Population (Student + Staff)	Performance Indicators Units/ Student
1	2016-2017	69536	6306	11.02
2	2017-2018	68047	7043	9.66
3	2018-2019	47246	7400	6.38
4	2020-2021	22836	3618	6.31
5	2022-2023	76275	7600	10.04
6	2023-2024	103748	12200	8.5

Table 5: Energy Performance Indicators- SRES Campus

2.3.2 Benchmarks

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.

Monthly Running Average Usage	Electricity KWH	Average Solar Energy (KWH/ Mon)	Remark
2017-18	68047	10000 Expected	Solar panel of 480 KW Installed
2018-19	47246	10013	@10013 solar units credited
2020 -21	22836	11674	@11674 solar units/ month credited
2022 -23	76275	24701	@24701 solar units/ month credited
2023-24	103748	20734	@20734 solar units/ month credited

Table No 6: Energy Benchmarks

3. Scope of Natural Resources conservation

3.1 Recent / Existing Energy-Saving & Environment protection Initiatives

<u>Sr 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 ↓
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, Renewable energy usage, Fossil fuels, Water conservation, GHG reduction, Waste management	Implemented	As academic initiative for environment consciousness among budding engineers.
11	Biodigester	Waste Managements	Implemented	Dirt volume ↓
12	Sewage Treatment plant capacity 100 KLD	Waste water management	Implemented	Water pollution ↓
13	Composting pit 15*15*8 meters	Garden waste	Implemented	Soil erosion ↓
14	E waste management through repair, reuse, recycle	E waste	Implemented	Soil erosion ↓
15	Formation of Clean Technology impact club	Preservation & Conservation of Natural Resources	Implemented (2024-2025)	Environmental Sustainability ↑

Table No 7: List of Energy Saving & Environment Projects

Green Field Survey

GREEN FIELD Survey					
Sr. NO.	FRUIT TREE	Tall	Medium	Small	
1.	COCONUT	65	55	32	
2.	MANGO	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.	Cotton	05	03	03	
16.	Guava (Peru Tree)	25	-	-	
17.	Sapota Chikku	15	60	5	
18.	Jamun	5	12	-	
19.	Custard Apple (Sitaphal)	-	22	-	
20.	Pyrus 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	-	

Table No 8: Green Field Survey

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.

<u>Sr No</u>	Project	Category	Status	Impact
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 up to 25%.
3	Remote sensing lighting in isolated area / non-traffic zones (Corridors / lawns, Play grounds, Halls)	Electricity	To Plan	Electricity consumption↓
4	Review and implement the Power Factor improvement initiatives to gain @ 0.5% savings in Energy charges.	Electricity	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 Management	To plan	To use segregate the wastes as hazardous /Non-hazardous Use of campus waste as fuel
6	Review the load Factor	Electricity	In progress.	To match the demand and sanction load

Table No. 9: Projects identified for opportunities of Energy saving

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:

List of activities to be captured in the activity metric may include Electric meter and sub-meter 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.

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.

4. Conclusion and 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 making the Budgetary provisions for necessary Green initiatives and implementing the same.

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 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.

Vivekananda Koranglekar

Practical Vision Consultants

ANNEXURE 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.

<u>Initiatives</u>	
A. <u>Small-Scale Energy Efficiency Initiatives</u>	
○ 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	AC temp to lock on 27 deg. Cel.
B. <u>Large-Scale Efficiency Initiatives</u>	
○ Metering of Buildings	Separate meters for each building are must for monitoring the impact of various energy conservation initiatives & participation
○ Cogeneration	Progress
C. <u>Renewable Energy Initiatives</u>	
○ Wind Energy	
○ Biomass	implemented
○ Solar/ Photovoltaic Energy	Project is now fully operational
○ Solar Hot Water	Implemented in hostel
○ Biomass mixed with Fossil Fuels	Experimentation is under progress
○ Geothermal	
○ Renewable Energy Certificates	
○ Carbon Offsets	
D. <u>Transportation</u>	
○ Bicycle Initiatives	No personal vehicles within campus is boosting bicycle usage
○ Commuter Programs	Common buses for staff and students are already in place
○ Public Transit	
○ Bio-fuels / Efficiency	
E. <u>Food</u>	
○ Organic and Local Food	
○ Gardens and Farming	
○ Waste Associated with Food	Bio digester plant is implemented
○ Food Procurement and Production	
A. <u>Environmental Procurement</u>	
○ Recycled Paper, Water Bottles	Waste item are segregated at the point of collection

o Computer Policies.	Preference is accorded to procure equipment with higher BEE ratings
o Electrical items with higher star rating by BEE	
B. Waste	
o E waste Generation, Recycling and Disposal Management	Being followed, with comprehensive policy for monitoring effectiveness for incentives, promoting awareness programs for conservation and reduction. Implemented.
o Conservation Incentives	
o Recycling Awareness Programs	
o Reducing Consumption	
C. Green Building Design	
o White Roofs	Implemented
o Natural ventilation	Excellent implementation
o Day lighting	Excellent implementation
D. Water and Ecological Design	
o Green Roofs	Implemented
o Using Native Plants	Neem tree plantation observed
o Parking Improvements	Implemented
o Reducing Water Consumption	Awareness is observed
o Rainwater Harvesting	Excellent implementation
E. Education and Outreach	
o Eco-Representatives	Will be monitored
o Expanding the Curriculum	Projects to help environment conservation, using labs for extensive analysis are observed
o Green Laboratories	
o Incorporate Sustainability Awareness Early	
K Innovative Financing	Management is working on it
o Revolving Load Fund	
o Alumni Sustainability Fund	
o Project Contracting / Performance Contracts	
L Clean Technology Impact Club	Management is working on it
o No Poverty	
o No Hunger	
o Good Health	
o Quality Education	
o Gender Equality	
o Clean water and Sanitation	
o Renewable Energy	
o Good jobs and Economic growth	
o Innovation and Infrastructure	
o Reduced Inequalities	
o Sustainable cities and Communities	
o Responsible consumption	
o Climate action	
o Life below water	
o Life on Land	
o Peace and Justice	
o Partnership for the Goals	

ANNEXURE 2: Final Year Projects by Students for Environment Protection (2024-25)

Sr. No.	Project Title	Category	Impact
1	Bluetooth Controlled Solar grass Cutter and water sprinkler machine	Agriculture Development	Provide human comfort and better control
2	Fabrication of windmill, Solar charging system for laptop and mobile	Renewable Energy	Increase in saving of electricity
3	Smart Breeze connect: Cost effective wi-fi and remote speed-controlled fan for seamless comfort	Technological Development	Provide comfort to human being
4	Design and implementation of PV integrated Single level DC-AC Converter (Inverter)	Electricity	Maximize the energy usage using PV solar panels
5	Smart coastal waste Collection system	Environmental	Reduction in waste, improvement in waste management
6	Design and development of Alfa Seed sowing machine	Agricultural Development	Provide human comfort
7	Optimizing Ventilation and renewable energy with a wind driven power generation system	Renewable Energy	Reduction in consumption of fossil fuels
8	Load flow Analysis of SCOEK using ETAP Software	Electricity	Increase in stability and performance of equipment
9	Detection of false reading attacks in Small net metering system	Technological Development	Avoid financial losses and fair billing to customers
10	ANSYS-based design and development of axial flux permanent magnet motor	Electricity	Efficient, compact and high-performance motor design
11	Gas leak shield protection	Human Safety	Human safety increase
12	Electric weed controller	Agricultural Development	Reduction in labor
13	Smart patient healthcare system using IoT	Medical Science	Remote monitoring of patient is possible
14	Firefighting robotic arm system	Human Safety	Human safety increase
15	Development of intelligent Trolley system for shopping malls	Technological Development	Better control of process and customer satisfaction
16	Design and execution of bridgeless isolated Zeta-Luo converter solution for EV Charger	Electricity	High power factor and better efficiency
17	A Novel stepper motor precision closing for chemical industries	Electricity	High force and high torque
18	Automatic seed fertilizer harvesting for smart farming	Agricultural Development	Reduction in human efforts and comfort
19	Load forecasting using Machine learning	Electricity	Improved accuracy in predicting electricity demands

ANNEXURE 3: PHOTOGRAPHS

1) STUDENT PARTICIPATION IN THE ENVIROMENTAL AWARENESS



2) STUDENT PARTICIPATION IN THE ENVIROMENT PRESERVATION, PROTECTION

