

GREEN (ENVIRONMENT) AUDIT REPORT



A.B.M.S PARISHAD'S

**ANANTRAO PAWAR COLLEGE OF ENGINEERING AND
RESEARACH, PUNE**

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HAS CARRIED OUT

GREEN (ENVIRONMENT) AUDIT

AS PER GUIDANCE LAID DOWN IN THE
INDIAN STANDARDS AND CODES
IN 2020-21

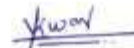
This certificate is valid for 3 years from 2020-21 to 2022-23



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ACKNOWLEDGEMENT AND CONCEPT

Enerfuture Technology thanks the management of Anantrao Pawar College of Engineering and Research, Pune for assigning this important work of Green Audit of Anantrao Pawar College of Engineering and Research, Pune

Green audit is defined as a formal examination of practices adopted and their effects on the environment, by an organization. It is also widely known as Environmental Audit.

The aim of the Green Audit is to review the overall environment management systems. Depending on the types of standards and the focus of the audit, there are different types of environmental audits.

Organizations now recognize the importance of environmental matters and accepts that their environment performance should be scrutinized to understand its impact and to take remedial measures to lessen it.

Environmental auditing is used to:

1. Investigate
2. Understand and
3. Identify

These are then used to help in improving existing human activities, with the aim of reducing the adverse effects of these activities on the environment.

An environment auditor studies an organization's environment effects in a systematic and documented manner and produces an environmental audit report.

Green audit for an educational institution mainly examines the following systems

1. Renewable/ green energy usage
2. Water management
3. Biodiversity
4. Health and safety management
5. Sanitation management
6. Adopted Green practices

Contribution of college's team is equally important in this venture. Team of technical experts from Enrfuture Technology Pvt Ltd is grateful to all the following personnel of Anantrao Pawar College of Engineering and Research, Pune for their kind cooperation, furnishing required data, analysis report and support offered during our visit.

Name	Designation
Prof. Dr. Sunil Thakare	Principal
Prof. Ganesh Kindhalkar	IQAC Coordinator
Prof Dr Soojey Deshpande	NAAC Coordinator

We are also thankful to the other staff members who were actively involved while taking measurements and conducting field study.

STUDY TEAM

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3	Mr Yogesh Kuwar	M.Tech (Energy Studies), IGBC IGBC Accredited Professional, Post Graduate Diploma in Environmental law and Policy (PGDELP), BEE Certified Energy Manager
4	Mr Prasad Kalal	B.E Electrical, BE (Electrical), Electrical Supervisor(51242), Electrical Contractor(37364)
5	Mr Prashant Shinde	B.E Mechanical, IGBC Accredited Professional, Certified Energy Auditor

LIST OF INSTRUMENTS USED

1. Lux meter (Meco)
2. TDS meter
3. CO2 meter
4. Air quality measure meter
5. Sound dB meter

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EXECUTIVE SUMMARY

Sr no	Location	Area	Objective/Purpose	Recommendation/Status
1	Boy's and Girl's hostel	Solar Water Heating System	To save conserve the energy and reduce the CO2 emission reduction by energy consumption	Implemented
2	College main building	Solar Photovoltaic System	To generate energy by renewable sources and reduce the CO2 emissions	Implemented
3	All college campus	Tree plantation/ Green belt cover	To increase the forest cover. Reduce the Air, Noise pollution, reduce CO2 emissions etc	Regularly implemented every year
4	All buildings	Tap water reducers	To save the water	Need to be implement
5	College Main building, Boy's and Girl's hostel	Window direction of the rooms	North-South direction. Reduces load of lighting, Fan during summer and winter season.	Good
6	College main building	Waste management- Solid waste	Reduce the CO2 emissions by recycling of solid waste	Regularly implemented and maintained every month.
7	College campus	Waste management- Organic waste	Reduces the landfill pollution and green-house gases.	Implemented
8	College main building	Waste management- E-waste	Reduce the CO2 emissions by recycling of solid waste. Also Save environment from hazardous materials.	Need to be implement



9	College campus	Rain water harvesting	Save water. Increases the groundwater recharge.	Implemented
10	College campus	Cleanliness drive and awareness campaign	Awareness and among the people or masses about importance cleanliness	Regularly conducting the activity by college
11	College campus	Plastic free campaign	Save environment from non recycling and hazardous materials.	Taken initiative for implementation
12	College campus	No vehicle day	Reduces the CO2 emissions	Need to be improved frequency.

COLLEGE INTRODUCTION

INTRODUCTION



Akhil Bharatiya Maratha Shikshan Parishad is an offshoot of the reformist thoughts initiated and spread by great revolutionaries like Mahatma Jyotiba Phule who established the 'Satyashodhak Samaj' and created awareness about the significance of education. Shrimant Sayajirao Gaikwad of Baroda too contributed greatly to the educational upliftment of the ordinary masses. A well-known advocate from Pune Mr. Gangaram Bhau Mhaske duly felt the need for the spread of English education amongst people. However at the same time he felt the economic backwardness of people and the expensive nature of English education and in order to resolve this impasse, in 1885 he founded 'Deccan Association' and raised funds for mass education. Shrimant Sayajirao Gaikwad started an annual grant for the Association and supported it greatly. Great King of Kolhapur, Rajarshi Shahu Maharaj too sanctioned grants to the institute.

Rajarshi Shahu had undertaken the task of the upliftment of the socially and economically backward sections of society. In 1901 he set up a Students' Hostel where children from all walks of life and all castes were admitted. It was indeed a great revolutionary step ahead in the path of social progress. And such revolutionary acts gave way to a public discussion in the newspapers on the need for an Association/Federation of the backward classes. Shri Narayan Lokhande in his paper 'Deenbandhu' initiated such discussion which was positively responded to by Shrimant Sayajirao Gaikwad with an assurance of financial support. In one of his editorials in 1906 Shri Lokhande mentioned that there was a need for a social and educational institute which would not delimit its efforts to just one or the other community but would adopt an all inclusive, comprehensive approach which would

understand and incorporate all the backward sections of the nation equally. This revolutionary thought led to the organisation of the very first educational conference in 1907 at Dharwad.

Thus the A.B.M.S. Parishad is the oldest educational institute founded in the first decade of the 20th Century. It is undoubtedly the “mother institute” of many other educational institutes in Maharashtra. The Parishad with the able efforts by various social reformists, revolutionaries and intellectuals including journalists like Mr. Lokhande and Mr. Bhagvanrao Patekar of ‘Jagriti’ initiated a great social, educational movement in the 20th century. Remarkably enough it was a joint venture which included the ordinary, common masses as well as the rulers. Accordingly on account of such joint and honest efforts academic programmes began all over; boardings, schools and colleges were established and obviously society started adopting a progressive look.

Today all over Maharashtra there is a great network of educational institutions viz. Shri Shivaji Maratha Society, Pune; Maratha Shikshan Prasarak Mandali, Solapur; Maratha Vidya Prasarak Samaj, Jalgaon; Maratha Unnati Samaj, Nagpur; Shri Shivaji Maratha Society, Amaravati; Shri Shahu Maratha Boarding, Baramati; Many more institutes have been functional at Mumbai, Nashik, Dhule, Dharwad, Jabalpur, Zait, Akkalkot, Ichalkaranji, Bhusawal etc. All these institutions have their roots in the A.B.M.S. Parishad, Pune.

It was indeed remarkable that this mass movement of education and social progress was promoted and encouraged by the rulers who did not want their subject to remain ignorant and blind. Contrary to ordinary rulers who sought their own well-being at the cost of their people these rulers like Rajarshi Shahu Maharaj of Kolhapur, Shrimant Sayajirao Maharaj Gaikwad of Baroda and Shrimant Alijabahadur Madhavrao Maharaj Shinde of Gwalior, themselves had a great desire for social welfare and change. Besides their attitude towards education was devoid any vested political or commercial interests. This pure concern on the part of the kings along with the mass inclination towards betterment brought about a great social change and helped the Parishad attain its goals.

There was, however, a phase when the Parishad fell short of financial support which is the backbone of any social institution. It is then that Karmaveer Bhausaheb Hirey came forward and in 1948, in the capacity of the General Secretary of the Parishad he rejuvenated the slack spirit of work and once again the Parishad was on its glorious path. It is Karmaveer Hirey’s efforts which won 67 acres of land from the Government of Maharashtra for an educational complex in Pune – the city known for its education and culture. During the 7 years from 1960 to 1967 Shri Shahu Mandir Mahavidyalaya, Karmaveer Bhausaheb Hirey High-school and Jedhe-More Boys’ Hostel were established in Pune. Since then the Parishad has never ceased to progress.

The once dry and desert-like area of 67 acres at the foot of the Parvati hill has been meticulously developed and preserved over a period of a hundred years. More than 2 lakh trees have been planted. Strenuous efforts have been made to retain the natural beauty of this area and to beautify it even more. As a result of this great contribution to environment the Govt. of Maharashtra awarded the Parishad with the ‘Vanashree Puraskar’ in 1996 and the Pune Municipal Corporation honoured it with the ‘Harit Pune Puraskar’ in the year 2000.



ABOUT APCOER

Anantrao Pawar College of Engineering and Research is situated in nation's education hub, Pune and recognized for its quality education and research. It is the institute of Akhil Bhartiya Maratha Shikshan Parishad, Parvati Pune 09, an educational trust was founded by a team of renowned educationists and social reformers. The institute is situated in the area of 10 acres of land surrounded by beautiful landscape of Sahyadri Hills of Western Ghat nearing to famous Parvati Hills. The institute is established in 2012 having 5 UG and 2 PG courses affiliated to SPPU, Pune. Institute is on creating versatile engineers who can apply their knowledge and skills in any field across the globe. Highly qualified faculty members, well equipped laboratories, extensive industry - academia interactions all serve to make engineering education at APCOER campus a unique and enriching experience.

OUR VISION

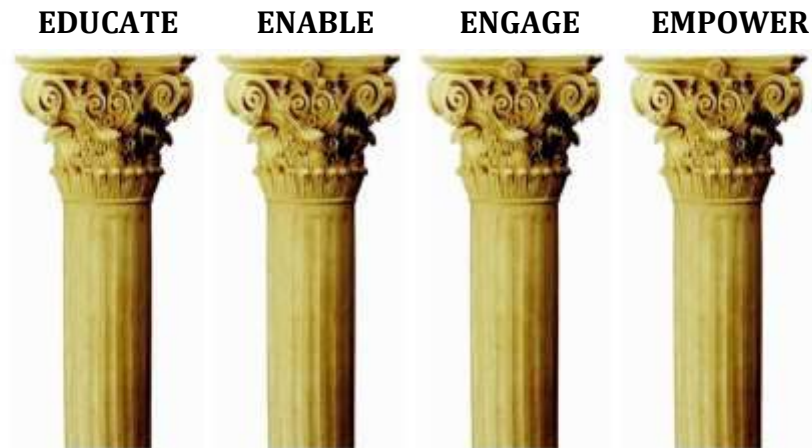
Committed to comprehensive development of students through quality technical education

OUR MISSION

1. To provide state of art infrastructure that shall create ambience to encourage novel ideas, research activities and consultancy services.
2. To inspire students in creation & entrepreneurship.
3. To create future technocrats with intelligence, technical skills & good ethical moral values so as to serve needs of society & industries.
4. To provide healthy Teaching-Learning environment that will cultivate contemporary research activities, innovations & inventions.
5. To develop centre of excellence in technical education.

GOAL OF INSTITUTE

- Imparting quality engineering education.
- Provide healthy environment for physical, intellectual, emotional and spiritual growth of students and staff.
- Create aesthetically sensitive, socially committed and technologically competent engineers.



LOCATION



SOLAR WATER HEATING SYSTEM

OBSERVATION

1. In Boy's hostel and Girl's hostel, there are Solar Water Heating systems are installed for the purpose of water heating instead of electric heaters.
2. Total capacity of Solar Water Heating system is 1000 litres/day each.
3. No any auxiliary heaters are used in solar water heating system in the morning.



CO₂ EMISSION REDUCTION

Particulars		
Hot water temperature	60	deg C
Cold water temperature	25	deg C
Temperature difference(delta T)	35	deg C
Volume of water	2000	lit
Volumetric flow	2000	lit/day
Hot water temperature	60	deg C
Enthalpy of cold water	25.04	kcal/kg
Enthalpy of Hot water	60	kcal/kg
Enthalpy difference	34.96	kcal/kg
Amount of heat used	69920	kcal
Power used for heating	81.30	kW
Monthly kWh	2479.72	kWh/month
Saving kWh	2479.72	kWh/month
Saving kWh	29756.65	kWh/year
Saving Rs	37493.38	Rs/month
CO₂ emission reduction/ year	25.29	tonnes of CO₂e

SOLAR PHOTOVOLTAIC SYSTEM

OBSERVATION

1. In main college building, there is Solar Photovoltaic System is installed for the purpose of kWh units generation
2. Total capacity of Solar Photovoltaic System is 10kWp

*Solar PV system is only six month old so Performance Guarantee Test is not required.



Particulars		
Total capacity of Solar PV system	10	kWp
Units generation per month	1125	kWh/month
Units generation per year	13500	kWh/year
CO2 emission reduction/year	11.48	tonnes of CO2e

TAP WATER REDUCER

1. TAP WATER REDUCER

Conventional Tap water system	Tap water system with Reducer
	
Existing tap water system uses more water while during purpose of washing of utensils, hands etc in college.	Used reducer to tap water for purpose of washing of utensils, hands etc which reduces flow of water and ultimately saves the water.
	

RECOMMENDATION

It is recommended that to use water reducer for water taping for save the water.

WASTE MANAGEMENT SYSTEMS

1. BIO-GAS GENERATION

OBSERVATION

1. In the college canteen approximately 10kg kitchen waste is generated daily.
2. Currently there is no any bio gas plant for generation of bio gas in the college.

RECOMMENDATION

1. It is recommended that installed the small capacity of bio gas plant at college canteen for production of bio gas from kitchen waste generated daily.
2. Produced bio gas can be used for small purposes in the canteen instead of LPG which saves monthly approximate one cylinder of INR1,000/-

Bio-Gas Generation Plant - 10g/day- At canteen



SAVINGS MEASURES

SAVINGS DUE TO BIO GAS PLANT

Saving due to Bio gas plant		
Capacity of bio gas plant	10	kg/day
Waste generated	10	kg/day
Approximate bio gas generation	1	m3/day
Approximate bio gas generation	30	m3/month
Equivalent LPG gas saved	12	kg/month
Approximate LPG cylinder saved	1.0	nos
Cost saved	1000.00	INR/month

TREE PLANTATION AND TREE OR FOREST COVER IN THE COLLEGE PREMISES

Tree-planting is the process of transplanting tree seedlings, generally for forestry, land reclamation, or landscaping purpose. It differs from the transplantation of larger trees in arboriculture, and from the lower cost but slower and less reliable distribution of tree seeds.

In silviculture the activity is known as reforestation, or afforestation, depending on whether the area being planted has or has not recently been forested. It involves planting seedlings over an area of land where the forest has been harvested or damaged by fire, disease or human activity. Tree planting is carried out in many different parts of the world, and strategies may differ widely across nations and regions and among individual reforestation companies.

Tree planting is grounded in forest science, and if performed properly can result in the successful regeneration of a deforested area. Reforestation is the commercial logging industry's answer to the large-scale destruction of old growth forests, but a planted forest rarely replicates the biodiversity and complexity of a natural forest. Because trees remove carbon dioxide from the air as they grow, tree planting can be used as agro engineering technique to remove CO₂ from the atmosphere. Desert greening projects are also motivated by improved biodiversity and reclamation of natural water systems, but also improved economy and social welfare due to increased number of jobs in farming and forestry.

College has planted the trees campus area to make it more environments friendly.

Tree or Forest Cover in College Campus



ACTIVITY ORGANIZED REPORT**TREE PLANTATION- 2019-20****(Academic Year: 2019-20)**

Name of activity organized	Tree Plantation
Title of the activity	Tree Plantation
Date of activity organized	22/07/2019
Place of the activity	College campus
No of participants (Students+ Staff)	Approximate 500
Name of the sponsored organization	Shri Shahu Mahavidyalaya, Pune
Objective of the activity	To save environment, reduce CO2 emission and global warming
Outcome of the activity	Improve Air quality, reduces soil erosion, noise pollution
Trees are planted	Banyan, (Ficus benghalensis), Neem, (Azadirachta indica), Peepal Ficus religiosa, Almond (Prunus dulcis etc
Trees planted who maintained	College gardener and college students

WASTE MANAGEMENT- E-WASTE

Electronic waste or e-waste describes discarded electrical or electronic devices. Used electronics which are destined for reuse, resale, salvage, recycling, or disposal are also considered e-waste. Informal processing of e-waste in developing countries can lead to adverse human health effects and environmental pollution.

Electronic scrap components, such as CPUs, contain potentially harmful components such as lead, cadmium, beryllium, or brominated flame retardants. Recycling and disposal of e-waste may involve significant risk to health of workers and communities in developed countries and great care must be taken to avoid unsafe exposure in recycling operations and leaking of materials such as heavy metals from landfills and incinerator ashes.

RECOMMENDATION

College need to have E-waste management policy and all the E-waste disposals generated in the college campus should be disposed/ reuse as per standard procedures/norms

The environmental impact of the processing of different electronic waste components

E-Waste Component	Process Used	Potential Environmental Hazard
Cathode ray tubes (used in TVs, computer monitors, ATM, video cameras, and more)	Breaking and removal of yoke, then dumping	Lead, barium and other heavy metals leaching into the ground water and release of toxic phosphor
Printed circuit board (image behind table – a thin plate on which chips and other electronic components are placed)	De-soldering and removal of computer chips; open burning and acid baths to remove metals after chips are removed.	Air emissions and discharge into rivers of glass dust, tin, lead, brominated dioxin, beryllium cadmium, and mercury
Chips and other gold plated components	Chemical stripping using nitric and hydrochloric acid and burning of chips	PAHs, heavy metals, brominated flame retardants discharged directly into rivers acidifying fish and flora. Tin and lead contamination of surface and groundwater. Air emissions of brominated dioxins, heavy metals, and PAHs
Plastics from printers, keyboards, monitors, etc.	Shredding and low temp melting to be reused	Emissions of brominated dioxins, heavy metals, and hydrocarbons
Computer wires	Open burning and stripping to remove copper	PAHs released into air, water, and soil.

WASTE MANAGEMENT- SOLID WASTE

College have good policy and maintained the record for solid waste generated in the college like old newspapers, books, scrap boxes, etc.

Record of the Solid Waste Management

- College have taken good initiative for solid waste management in the college.
- College given the solid waste generated in the college to the authorised third party viz. Aditya Enterprises periodically.
- So Solid waste in the college is managed properly through authorised channel for recycling it.

WASTE MANAGEMENT- ORGNAIC WASTE

In the college there college Canteen, Boy's and Girl's hostel and Trees which are mainly generated wet and dry solid waste.

Record of the Solid Waste Management



- College have main centralised facility in the premises where wet and dry waste generated is collected.
- Collected waste is further processed internally and makes the organic waste instead of landfill. Generated organic compost is used for garden trees.
- College has already implemented the self processed internally organic waste management system.

RAIN WATER HARVESTING

There is a good potential for rain water harvesting in a college. This water can be used for purposes like gardening, bores, wells, etc.

Rain Water Harvesting Well in the College



- College have taken good initiative at campus level for rain water harvesting.
- College have centralised rain water harvesting well where all rain water is collected.
- Rain water is by gravity is comes to the well by piping made at various location in college premises.

CLEANLINESS DRIVE AND AWARENESS CAMPAIGN

ACTIVITY ORGANIZED REPORT

CLEANLINESS DRIVE AND AWARENESS CAMPAIGN- 2019-20

(Academic Year: 2019-20)

Name of activity organized	Cleanliness Drive and Awareness Campaign
Title of the activity	Cleanliness Drive and Awareness campaign
Date of activity organized	19/09/2019 25/09/2019
Place of the activity	College campus, Aryaneshwar Area in Pune
No of participants (Students+ Staff)	140
Participants	NSS students and Other college students and Staff etc
Name of the sponsored organization	Shri Shau Mahavidyalaya, Pune
Objective of the activity	- Removal of plastic debris. - The plastic debris is responsible for the environmental harm. - As the plastic does not decompose or dissolve and poses serious harm to health - Clean the area in Aryaneshwar which is hampered due to heavy rain fall and flood in the month of September-2019 - To aware the people about the diseases created due to unclean area like Malaria, Dengue etc
Outcome of the activity	- To aware the people about importance of cleanliness. - To save the environment from hazardous materials like plastic debris this is not easily decomposed.

Cleanliness Drive and Awareness Campaign



Cleanliness Drive and Awareness Campaign





PLASTIC FREE CAMPUS CAMPAIGN

College have taken initiative for single used plastic free in the campus. As single used plastic is hazardous to the environment as it is once used cannot be recycled. So it is good initiative taken by college in 2019-20 year under the guidance of college principal.

ACTIVITY ORGANIZED REPORT

SINGLE USED PLASTIC FREE - 2019-20

(Academic Year: 2019-20)

Name of activity organized	Single used plastic Campaign
Title of the activity	Single used plastic Campaign
Date of activity organized	01/11/2019
Place of the activity	College campus
No of participants (Students+ Staff)	All students and staff
Name of the sponsored organization	Shri Shahu Mahavidyalaya, Pune
Objective of the activity	- Single used plastic is hazardous to the environment as it is once used cannot be recycled

NO VEHICLE DAY

Many of the college students and staff use the private or own vehicle to come college. It contributes the CO₂ emission due to burning of petrol or diesel in the vehicles.

RECOMMENDATION

It is recommended to follow 1 day per month no vehicle day in the college campus. Instead of that use the public transport to reduce the CO₂ emission.

No Vehicle Day Initiative- Every Saturday



It is recommended that college take initiative of No Vehicle Day on every Saturday of the week

Particulars		
Number of vehicles in college premises	250	nos
Average running of vehicle	5	km/vehicle
Average fuel required	625	litres/day
Average cost of fuel	28125	INR/day
Number of Saturday per month	4	nos
Average fuel save	2500	litres/month
Average cost save	112500	INR/month
Average CO ₂ emission reduction per month	1.68	tonnes of CO ₂ e
Average CO ₂ emission reduction per year	20.1	tonnes of CO ₂ e

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