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GREEN AUDIT REPORT

(2020-2021)

Barshi Shikshan Prasarak Mandal's
Shriman Bhausahab Zadbuke
Mahavidyalaya, Barshi
Zadbuke Marg Latur Road, Barshi Dist-Solapur Maharashtra, India.
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SHRIMAN BHAUSAHEB ZADBUKE MAHAVIDYALAYA, BARSHI

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Green audit 2020-21

Shriman Bhausaheb Zadbuke Mahavidyalaya (S.B.Z), Barshi





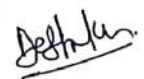

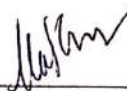
Green Audit Team

Name	College	Designation	Green Audit.
Dr. Gaisamudre K.N.	Botany Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi	Assit. Professor	Co-ordinator
Shri. Vhanhure K.T.	Political Science, Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi	Assit. Professor	Member
Shri. Karade B.A.	Geography, Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi	Assit Teacher	Member
Dr. Mohite R. M.	Physics, Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi	Assit. Professor	Member
Shri. Deshmukh D.P.	Botany, Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi	Assit Teacher	Member
Ms. Nimbalkar V.B.	Geography, Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi	Assit. Professor	Member
Shri. Mastud P.M.	Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi	Lab. Attendant	Member

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I/c Principal
Shriman Bhausaheb Zadbuke
Mahavidyalaya, Barshi



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GREEN AUDIT 2020-21



Shriman Bhausaheb Zadbuke Mahavidyalaya, Barshi Tal. Barshi, Dist-Solapur
Maharashtra (India)

GREEN AUDIT CERTIFICATE

This is to certify that the green audit report of Shriman Bhausaheb Zadbuke Mahavidyalaya is based on the original data collected during the period of study (2020-21). Further, it is certified that the baseline data was prepared by internal Green Audit team and submitted to us. The content of the baseline data of the study has been personally verified by the Green Audit Team for validity and reliability.

The data used in the study are original in nature and have not been presented or published elsewhere. Photographs used in the report are either taken directly by the audit team.


Dr. K. N. Gaisamudre
Co-Ordinator


Dr. G. R. Kashid
IQAC Co-Ordinator
Co-ordinator


Dr. M. B. Gadekar
I/C Principal
Principal

Internal Quality Assurance Cell
Shriman Bhausaheb Zadbuke

S.B.Z. Mahavidyalaya, Barshi
Dist. Solapur - 413 401 (Maharashtra)

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Green audit team 2020-2021



EXECUTIVE SUMMARY

The Shriman Bhausaheb Zadbuke Mahavidyalaya (S.B.Z), Barshi is affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur which was established in 1969.

Mahavidyalaya offers wide range of subject choices in Arts and Science faculty at undergraduate level. In its continuous commitment to provide an encouraging learning environment, S.B.Z. Mahavidyalaya, has its own campus and it is spread over an area of 11 acres. campus premises, includes spacious classrooms, workshop rooms, seminar hall and auditorium, equipped with audiovisual aids and play-ground.

Our institute was founded by 'Loknete' Late Shriman Bhausaheb Zadbuke in 1969. It is located in the heart of the city at educational and elite locality. The college is grantable and affiliated by P.A.H. University, Solapur.

During the initial phase in 1969, our college was started BA, B.Sc., and B.Com. degree courses. Later during 2006, self- funded courses like BBA and BCA were started and successfully implemented by the Mahavidyalaya. The Mahavidyalaya got NAAC accreditation done in 2013 and accredited with B+ grade. The Mahavidyalaya is located 6 Km away from the city railway station and 2 Km from bus station. We have completed 49 years of dedicated service in the field of education providing quality education.

The Mahavidyalaya conducts various extra-curricular activities, workshops, conferences, and participation in National and University level sports competition. Many student centric activities such as science fair, Rangoli competition, sports competition, etc has been conducted by Mahavidyalaya. UGC funds are completely utilized for the betterment of the college. We have many dedicated and expert staff members with doctoral degree training students every year for B.Sc., BA, MA, Ph.D, BBA and BCA courses. The Mahavidyalaya ensures our students to provide them quality education, skill development and better job opportunities. The audit was undertaken by Audit team of S.B.Z Mahavidyalaya, which had interdisciplinary composition of experts in various aspects of environment.

The audit team verified the documentation on green practices related to bio-diversity, Energy management, water resource management, waste management, carbon foot print etc. which had been prepared through participatory processes within the college.

Shriman Bhausaheb Zadbuke Mahavidyalaya, Barshi, is deeply concerned and unconditionally believes that there is an urgent need to address these fundamental problems and reverse the trends.

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution. The methodology included: preparation and filling up of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations.

It works on the several facets of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management, Paperless Work, Alternative Energy and Mapping of Biodiversity. With this in mind, the specific objectives of the audit was to evaluate the adequacy of the management control framework of environment sustainability as well as the degree to which the Departments are in compliance with the applicable regulations, policies and standards. It can make a tremendous impact on student health and learning college operational costs and the environment. The criteria, methods and recommendations used in the audit were based on the identified risks.

Green audit team

28-03-2021

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Green audit - 2020-2021



Chapter-1

Introduction

1.1 Green Audit

The Green audit process was began with the intention of identifying the activities carried out in a given institution or company. This was initiated against the background of growing concern over changing climate and related aspects. Green audit is a tool to identify the range of environmental impacts and assess the compliance of the operations on the development and regular activities within an organization. It may also assess the compatibility of the operations within an organization or a company with existing applicable laws and regulations and the expectations of their various stakeholders. It further assesses the possible implications and effect of pollution due to the operations within the organization. The audit also seeks to identify possible means and methods to save investments, enhance work quality, improve health and safety of their employees, reduce liabilities and reduce the rate of environmental pollution. A continuous process of such audit might result in maintaining the quality of these aspects within the premises of any organization.

Most companies, government and non-government bodies and other institutions conduct green audit aiming:

1. To ensure that the performance of the institution with respect to environmental activities they are involved in, is in compliance with existing laws and regulations.
2. Check the functionality and their operating success including water supply, energy related matters and other similar matters that are related to green operations in the campus
3. To formulate or update the institution's environmental policy, if warranted.
4. To measure the environmental impact of operational process related to green activities in the campus.
5. To measure the performance of each green related operations and actions in the campus. Generate a database of green activities for continuous monitoring to assess the success of each of them.
6. Identify future potential liabilities.
7. To align the institution's developmental and day to day activities with the stated vision, mission, strategies, etc.
8. To identify possible ways to reduce expenditure and running costs on equipment's,

appliances, etc. or try enhance revenue income.

9. To improve process and materials efficiency, and in response to stakeholder requests for increased disclosure.

The process of green audit based on operational activities within an institution happens not necessarily based on laws and regulations. It might be largely based on awareness and concerns on environmental performances within and outside the institute's premises. This further strengthens the fact regarding social responsibilities of the organization. Majority of the institutions that conducted green audits in the recent past has realized the importance of the same as they could easily manage their operational costs and provide good atmosphere to their stakeholders.

The green audit also provides opportunities to identify full range of operations within an organization, the impacts of maintaining and functioning of its operational goods and services, the actual source of raw materials for different activities within the organization, the costs of operations of its offices, functional units, and other facilities. It also provide chances to understand the relationship with employees, material suppliers, stakeholders, etc.

The recommendations, findings and suggestions that emerge during green audit would certainly help the management of the organization to set up future action plan that best suits to them.

1.2 General Steps involved in Green Audit

1. Systematic and exhaustive data collection.
2. Evidence based documentation of activities.
3. Regular monitoring.
4. Provide standards and methods for improvement by establishing cost effective green action plan.

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Chapter-2

About S.B.Z Mahavidyalaya

2.1 Brief History

Shriman Bhausahab Zadbuke Mahavidyalaya, Barshi is one among the leading higher education institutions in Maharashtra. It has completed 54 years of academic mission. The S.B.Z Mahavidyalaya, Barshi was established in the year 1969 under B.S.P.M. Barshi. The Mahavidyalaya, offers undergraduate and degrees in the Arts, Science, B. B. A. and B. C. A. streams. The campus is surrounded by heterogeneous vegetation with a fair amount of shady trees naturally found in the locality. The campus provides an academic ambience free from the hustle and bustle of the town.

2.2 Geography

The Mahavidyalaya, is situated at the Latur high-way road, Barshi Taluk in Solapur district. Its locational coordinates are **18°24'33.28"N 75°69'78.85"E**. The locality comes under the midland region of Solapur, which has the geographical features of undulated land. The raised part of the region provides conducive conditions for the growth of tropical and deciduous varieties of fruit yielding and other trees.

2.3 General Information

The Mahavidyalaya, offers 04 UG programs. Quality publications over a period in reputed national and international journals with high impact factor and h-index. The S.B.Z is adopting information technology as per the requirements. It also implement advance learning practices and system with utmost care. The Mahavidyalaya, apparently has a proven track record of its social commitment. Different department celebrations, inter-departmental and inter-collegiate competitions, and other celebrations helps the students to perform and sharpen their talents. All UGC, state government and university norms and directions are practiced without fail in the campus. This enables the students to develop their life with multifaceted and systematic activities.

The IQAC is well connected with the college management, administrative office, different departments, clubs and fora, etc. It also act as a mediator in organizing several activities in the campus. Systematic documentation of activities and academics is a characteristic feature of the college.



S.B.Z.-PLAY-GROUND



S.B.Z. -CANTEEN

Chapter- 3

Audit Preparations

3.1 Management

Shriman Bhausaheb Zadbuke Mahavidyalaya, management was very keen in taking up the recommendation of conducting a green audit.

The following were different criteria set forth for the present green audit.

- a) Green Practices
- b) Water Management
- c) Energy Management
- d) Carbon Footprint
- e) Waste Management

A detailed questionnaire for each aforementioned criteria was prepared based on the campus visit. The audit team in discussion with the college green cell has identified a team including teachers, non-teaching staff and students. The team has collected information that is addressed in the questionnaire.

3.2. Green Audit Process:

1. Selection of area/activities/parts of the campus.
2. Planning of visit to campus to discuss about the audit process.
3. Scope of audit process was identified in consultation with the auditee.
4. A meticulous plan of action was designed.
5. A team consisting of teachers, non-teaching staff and students was constituted with specific tasks and a proper time schedule.
6. Data pertaining to identified parameters for green auditing of the campus were collected directly through an on-site visit.
7. Available background information on the identified activities and other parameters were collected.
8. The role of each stakeholder in green related activities has been collected.

9. Historical aspects of green activities in the campus including flora fauna, water usage and waste generation, etc. were collected.
10. A questionnaire based on the preliminary visits and other evaluations was communicated to the authorities who are involved in the in house data collection.
11. Data collection based on questionnaire.
12. Visit to the campus by audit team.
13. Data analysis and evaluation.
14. Discussion on the findings.
15. Report preparation.

3.3. Onsite audit activities

1. The preliminary visit and meeting with the campus authorities was the first step between the audit team and auditee.
2. Site inspection for determining parameters for audit.
3. Site visit and evaluation of collected information of the audit team.
4. Meeting with the Principal, IQAC coordinator, teachers, non-teaching staff and students.
5. Meeting with the in house audit team for evaluation and clarifications.

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Chapter-4

Green Audit

4.1. Inspection

The preliminary visit to the campus had identified criteria for audit, parameters to be evaluated and time schedule of green audit of Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi. It included meeting with the Principal, IQAC coordinator, teachers in charge of different green activities of the campus and students representing different departments, clubs and fora. This enabled the auditing to gather all necessary preliminary information that is useful in preparing pre auditing questionnaire and data sheets. The on-site audit team collected information based on questionnaire and data sheet.

4.2. Questionnaire

The detailed questionnaire was handled by three different audit teams and information was gathered. Information pertaining to green activities, water management, energy management and carbon foot print was analyzed under different titles and sub-titles. This was based on the parameters identified. The questionnaire was comprehensive covering qualitative and quantitative dimensions.

4.3. Evaluation of documents and reports

The audit visit to the campus evaluated documents and reports that are necessary for the audit process. This further strengthened the claims made by the campus authority on green operations in the campus. To generate future action plan, the audit team had a detailed discussion with different in house team in the institute and a concluding discussion session with IQAC coordinator and he was done to finalize the plans.

Findings and Analysis

4.4.1 Analysis of Green Practices

4.3.1.1. Gardens

SBZ College is situated in a peri-urban area. The campus biodiversity is an example of how they have imbibed the local practices and culture in preserving local biodiversity within the campus. The college management and authorities who are responsible for greening the campus is aptly adopting methods to preserve local flora and fauna. The botanical garden are ideal for academic practices and learning while practicing.

Students of related subjects are actively involved in gardening, maintenance, etc. of gardens within the campus. Further, they find the garden an apt place for discussions, combined studies, practical, aesthetic purposes, spending leisure time, etc.

Students are learning garden techniques by working in the garden with the help of teachers concerned. Garden makes ample space and scope for them to conduct practical including budding, grafting, lawn making, and individual population of natural plants in the college. etc. for students of Botany studies. They also find this as a good opportunity to observe and learn about birds and butterflies. Students from department of Zoology learn about insects and their role in pollination by observing the same in the botanical garden. So far, 63 plants are identified and maintained in the garden. Students of Botany are doing bee keeping and are learning the bee preference towards plants from the garden. There are enough resources available in gardens and these resources are being utilized by the Botany and Zoology students for project works.

It would be nearly impossible to learn taxonomy and morphology for Botany students if plants are not available nearby. Different species of plants in the garden make this possible. Students are keen in maintaining species that are dealt with in their syllabus for practical's and further observation.

4.4.1.2 Arboretum

Shriman Bhausahab Zadbuke Mahavidyalaya is maintaining an arboretum where natural species of plants are maintained. The college authority is keen to enrich the arboretum by adding plants of different values.

4.4.1.3. Medicinal Plants

The diversity of medicinal plants in any place, especially in an academic campus is indicative the emphasis that the institute given towards traditional knowledge. This would be a platform for awareness, learning, and source for local usage. The present status of flora that have medicinal importance is representative of regional and local floristic diversity.

4.4.1.4. Awareness Programs

Several significant and fruitful awareness programs both students and staff of the campus are arranged every year in the campus.

Environment Related

1. Observances of Environment Day. Tree plantation and Swachhata Din

Best Practices

2. Participation of teachers in different orientation program
3. Initiation of vermi-compost.

Campaigns

4. Plastic free campaign

Some of these activities are year round programs and others are regular year wise or semester wise or any other stipulated time bound programs. This indicates that students and teachers concerned are actively involved in green activities in the campus.

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Table - 1. Campus Flora		
Sl. No.	Name of plants	No. of plants
1	<i>Acacia arebica</i>	5
2	<i>Acalypha indica</i>	10
3	<i>Azardirecta indica</i>	15
4	<i>Ailanthus excelsa</i>	2
5	<i>Albizia lebbeck</i>	5
6	<i>Aloe vera</i>	2
7	<i>Alstonia scholaris</i>	10
8	<i>Antigonon leptopus</i>	2
9	<i>Aristolochia indica</i>	2
10	<i>Bambusa sp.</i>	5
11	<i>Bauhinia variegata</i>	5
12	<i>Begonia sp.</i>	2

13	<i>Bougainvillea sp.</i>	10
14	<i>Cactus sp.</i>	2
15	<i>Cassia tora</i>	30
16	<i>Caesalpinia pulcherrima</i>	5
17	<i>Canna indica</i>	5
18	<i>Cassia fistula</i>	5
19	<i>Clitoria ternatea</i>	3
20	<i>Cuscuta repens</i>	5
21	<i>Dalbergia sissoo</i>	2

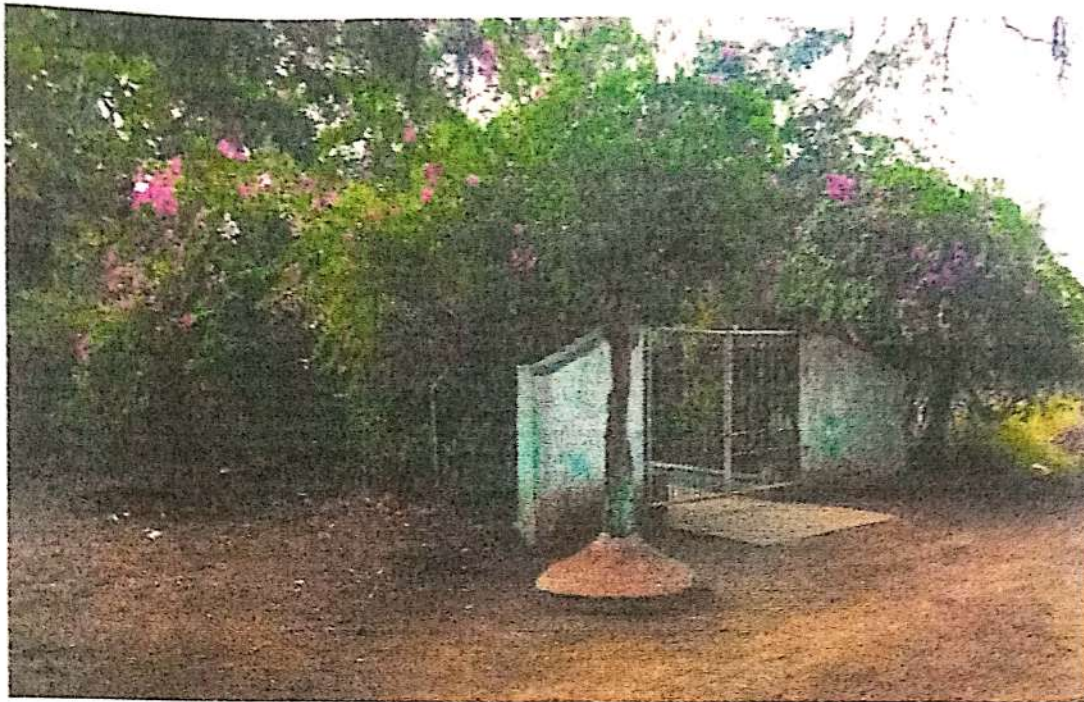
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22	<i>Datura sp.</i>	10
23	<i>Delonix regia</i>	5
24	<i>Duranta plumieri</i>	20
25	<i>Duranta repens</i>	1
26	<i>Erythrina indica</i>	2
27	<i>Ficus bengalesis</i>	2
28	<i>Ficus religiosa</i>	12
29	<i>Euphorbia hirta</i>	50
30	<i>Euphorbia rothieri</i>	5
31	<i>Euphorbia sp.</i>	5
32	<i>Gliricidia maculata</i>	5
33	<i>Heptis sp.</i>	20
34	<i>Hibiscus rosa-sinensis</i>	15
35	<i>Impatiens balsamina</i>	10
36	<i>Indigofera sp.</i>	10
37	<i>Jasminum grandiflorum</i>	5
38	<i>Murraya paniculata</i>	5
39	<i>Nerium indicum</i>	10
40	<i>Ocimum basilicum</i>	10
41	<i>Ocimum sanctum</i>	10
42	<i>Oxalis purpurea</i>	50
43	<i>Palm sp.</i>	2

Green Audit 2020-21

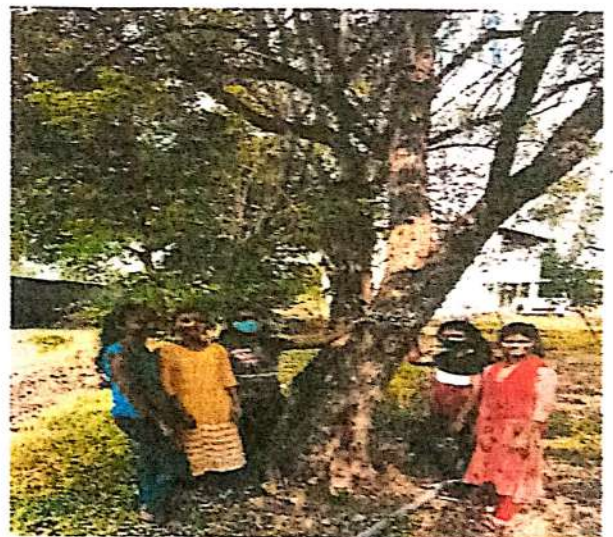
	Name of the plants	No. of Plants
44	<i>Polyalthia longifolia</i>	5
45	<i>Pongamia glabra</i>	5
46	<i>Ricinus communis</i>	5
47	<i>Santalum alubum</i>	1
48	<i>Tamarindus indica</i>	7
49	<i>Tectona grandis</i>	1
50	<i>Terminalia catappa</i>	2
51	<i>Tenospora cardifolia</i>	10
52	<i>Thevetia peruviana</i>	2
53	<i>Thea sp.</i>	3
54	<i>Thuja sp.</i>	2
55	<i>Thunbergia erecta</i>	5
56	<i>Tephrosia pupurea</i>	30
57	<i>Tradax indica</i>	10
58	<i>Tecno stanz</i>	12
59	<i>Trichosanthes sp</i>	2
60	<i>Vinca rosea</i>	5
61	<i>Woodfordia fruticosa</i>	2
62	<i>Zizipus jujube</i>	6



Botanical Garden- S.B.Z.Mahavidyalaya, Barsh



**Green Practice Parameter by
Shri. Deshmukh D.P.**



**Campus Plant Identification by
(B.Sc. II Year Botany Students)**

4.4.2. Water Management

4.4.2.1 Major Findings.

- Water and tanks resources in the college are well maintained.
- Separate tanks were installed for different blocks and for different purposes. This enables to use water with maximum potential control.
- The college has rain water harvesting mechanism which is to be appreciated. This will help generate awareness about the importance of water conservation and shall act as a model system to be followed by other institutions as well.
- The drip irrigation systems present in the campus were found to be effective in reducing the amount of water used in different purposes.
- The college organizes awareness programs on water conservation frequently to spread the message of significance of conserving water.
- 2073 L of water is used per day by the college for its different uses.
- There is no any leakage of pipes.
- The water consumption in the summer season is significantly high compared to other months. (Due to pandemic condition there are no student in campus except Jan. & Feb.)

Details of water analysis of S.B.Z College

Activity	Average use per activity in liters	Number of activity/day	Water use/person/day (L)	Number of persons using water	Total water consumption /day(L)
Washing hands and face	1L	Twice	1L/head	2073	2073L
Washing clothes	nil	nil	nil	nil	Nil
Toilet flush	5L	at least 1	5L/head	100	500L
Leaking/dripping(1 drop/second /day)	nil	nil	nil	nil	Nil
Garden use	1000L	Once	2000	nil	2000L
Cooking (average)	Nil	nil	nil	nil	Nil
Cleaning Floor	200L	Once in a week	nil	nil	30L
Lab uses	1L	Once	2L	950	425L
Construction work	Nil	nil	nil	nil	Nil
Any other activity	500L	nil	nil	nil	100L
Total water use					5128L

Water Management- Water Harvesting System



Data collection by Shri. Karade B.A. (Geography)



Water-Dripping System in college Campus

4.4.3 Energy Management

An assessment of energy consumption, energy sources used, energy management, lighting devices used and other appliances used by the campus community is an important aspect of sustainability of the community. Hence this is a relevant aspect of the assessment. The audit team assessed the number of electrical appliances and their respective uses in terms of consumption of energy per month in KWh. This indicates the energy management of the campus. Based on the assessment we made suggestions and recommendations.

Study of Connected Load

In this chapter, we present the details of various Electrical loads as under

Details of various Electrical Equipment

No	Location	40 W Tube	18 W CFL	20 W LED Tube	7 W LED	Fan 80 W	PC	Printer/Scanner / Xerox	Inverter	Projector with Sound System
1	Principal's office	01	02		01	01	01	01		
2	Vice Principal's Office	01				01				
3	Office	01		05	01	05	05	01/01/01	01	
4	Seminar Hall	02								
5	Multimedia Hall	06				06	01			01
6	Admission Room			01		01				
7	NSS			01		01				
8	IQAC Office	01	01			02	02	01		
9	Library	05		06		07	01			
10	Security Room					01				
11	Staff Room	03				02				
12	Physics Dept.	04		01		04				
13	Chemistry Dept.	08		04		04				
14	Biology Dept.	06		02		04				
15	Math/Stats Dept	04				02	04			
16	Micro. Dept.	08	01			02	02	01		
17	Geo. Dept			01		01	01	01		
18	Hindi Dept.	01			01	01				

19	Marathi Dept.	01				01				
20	MCVC Dept.	08				02				
21	BBA/BCA Dept.	03	01	21		10	42	01		
22	Mandal's Office	04	01		01	03				
23	Security Office	02		03		01				
24	Nutan School	03				03				
25	English Dept	01				01				
26	Gymkhana	02				01	01			
27	Table Tennis Hall	02								
Total		77	06	45	04	67	60	08	01	01

Details of various Laboratory Electrical Equipment:

Sr. No.	Department	Name of the equipment	No's	Wattage	Average use per Month (hrs)
1	Physics	Filament Bulbs/Na-He-lamp	07	60×4 35×3	2
2		CRO	03	40×3	1
3		Function generator	02	85×2	1
4		Other equipments	-	40	1
5	Microbiology	Fridge	02	780×2	720
6		Incubator	01	450	3
7		Hot air oven	01	1750	1/2
8		Laminar air flow, Illuminator	01	280	1/2
9		Centrifuge	01	300	1/2
10		Water bath, Hot plate	02	1000	1/2
11		Distillation Unit	01	600	1
12		Autoclave	01	750	1/2
13		Rotary shaker	01	250	1/2
14		Microscope, colony counter	02	100	1
15	Biology	Fridge	01	100	---
16	Chemistry	Oven	01	900	1/2
17		Fridge	01	1000	720
18		Centrifugal, Digital Balance	01	300	1/2
19		Distillation Unit	01	600	1
20		Heater	06	750×6	1
21		MCVC	Motor 1 Phase	4	745
22	Motor 3 Phase		2	5hp 3728 3hp-2237	1/2

Now we present the Connected Load- Electrical Equipment wise as under:

Connected Load

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W Tube	77	40	3.080
2	18 W CFL	06	18	0.108
3	20 W LED Tube	45	20	0.9
4	Xerox machine	01	1373	1.373
5	7 W LED	04	7	0.028
6	Fan	67	80	5.360
7	PC	60	110	6.600
8	AC	02	1375	2.750
9	Printer	07	150	1.050
10	Pump	01	2238	2.238
11	Laboratory Equipments	42	21731	24.731
12	Total	279	27142	48.209

Study of Electrical Energy Consumption

In this chapter, we present the analysis of last year Electricity Bills

Electricity Bill Details:

Month	Electricity Meter Units					
	*****333	*****723	*****731	*****715	*****837	*****979
April 20	09	307	445	266	07	74
May 20	03	307	445	266	02	22
June 20	32	631	2018	518	01	271
July 20	00	283	617	134	01	93
August 20	00	196	654	146	00	141
September 20	00	283	654	139	00	188
October 20	10	254	654	140	09	141
November 20	00	362	654	297	00	289
December 20	00	148	654	165	00	104
January 21	00	181	654	151	01	122
February 21	00	183	654	191	05	138
March 21	00	177	654	182	02	121
Total	54	3312	8757	2595	28	1704
Total						16450

Findings

- Electricity charges – Rs.9.10×1370.8=12474 /month.
- Number of gas cylinders used -00
- Cost of Gas cylinders used – Rs-00 (Due to pandemic)
- Average monthly amount paid for electricity during the last year - Rs. 12474

The water distribution system of the campus is a well-designed one. The water tanks kept in optimum locations, resulting in minimum energy wastage.

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4.4.4 Carbon Footprint Audit

The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere.

Each human being is contributing towards adding green-house gases to the atmosphere depending upon his day to day activities and usage of instruments and machineries for different purpose. Release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon footprint.

An understanding about the same of any institute where large number of anthropogenic activities are happening is important to assess the contribution of emission of gases that are responsible for Green House Effect.

Auditing for carbon footprint of S.B.Z College Campus was done using a detailed questionnaire, so that the impact of the community on global environment can be assessed.

Major Findings

Total number of Students – 2073

Total number of Teachers – 61

Number of non-teaching staff – 12

Number of persons using cars - 04 (10L fuel per day)

Number of persons using two wheelers - 20 (50L fuel per day)

Number of persons using public transport – 1 km per day, average (1 L of fossil fuel per day)

Number of cycles used in the campus– 02

LPG usage - no Cylinders in month

Total fossil fuel usage per day - L, apart from LPG and fuel for generators

Basis for computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to the Electrical Energy are as under

1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO₂** into atmosphere.

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations.

Month wise CO₂ Emissions

Sr. No	Month	Energy Consumed, kWh	CO ₂ emissions, MT
1	April 20	1108	0.8864
2	May 20	1045	0.836
3	June 20	3471	2.776
4	July 20	1128	0.902
5	August 20	1137	0.9096
6	Sept. 20	1264	1.011
7	Oct. 20	1208	0.966
8	Nov. 20	1602	1.281
9	Dec. 20	1071	0.857
10	Jan. 21	1109	0.887
11	Feb. 21	1171	0.937
12	March 21	1136	0.909
13	Maximum	3471	2.776
14	Minimum	1045	0.836
15	Average	1370.8	1.096

Key observations:

No	Value	CO ₂ emissions, MT
1	Maximum	2.776
2	Minimum	0.836
3	Average	1.096

Conclusion:

Annual **13.16 MT** CO₂ released into atmosphere due to the use of electricity in the college.

It is evident that majority of the campus community are relying on public transport system for commutation leading to the expense of 50 L of fuel per day.

This shall be considered as a very conservative approach. Assuming that 04 persons travel together combined with number of motorcycles and cars lead to the usage of 20L of fuel per day. This causes the emission of about 100kg of CO₂ per day.

This measurement is excluding the natural emission of CO₂ by human by breathing (ie. 840g/day). Consumption of one litre LPG releases about 1.5kg of CO₂. Since there is no data from similar institution available a comparison of carbon footprint is not attempted.

4.4.5. Waste Generation

This indicator addresses waste production and disposal of different wastes like paper, food, plastic, biodegradable, construction, glass, dust etc. and recycling. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone. The survey focused on volume, type and current management practice of solid waste generated in the campus.

4.4.5.1 Observations

Waste generation from tree droppings and lawn management is a major solid waste generated in the campus. The waste is segregated at source by providing separate dustbins for Bio-degradable and Plastic waste.

Single sided used papers reused for writing and printing in all departments and recently both side printing is carried out as per requirements. The waste generated by newspapers, magazine and of cartons etc. Very less plastic waste is generated by the department, office, garden etc. but it is neither categorized at point source nor sent for recycling. Metal waste and wooden waste is stored and solid waste is collected and disposed by their methods.

4.4.5.2 E-Waste Generation

E-waste can be described as consumer and business electronic equipment that is near or at the end of its useful life. This makes up about 5% of all municipal solid waste worldwide but is much more hazardous than other waste because electronic components contain cadmium, lead, mercury, and Polychlorinated biphenyls (PCBs) that can damage human health and the environment.

Observations

E-waste generated in the campus is more in quantity. The E-waste and defective item from computer laboratory is being stored properly. In BBA and BCA department some easy waste material is used as reuse and recycling for exam etc. External and internal parts of computer is used for demonstration purposes only.

4.4.5.3 Chemical waste Management

Proper chemical management is necessary to protect the health and safety of the college campus and surrounding communities and the environment.

All laboratories should, based on the hazards they pose, inspect all of their reagent chemicals. Look for chemicals that are no longer needed, old and out of date or unusable.

Try to redistribute unneeded chemicals around the department or building. If no one else needs the chemical or if they are out of date or unusable, then package

them.

Use sufficient packing material to prevent container damage route. Place a completed chemical waste label and packing slip on the outside of the box.

After determined what waste you are going to generate and have obtained the appropriate dustbin, you must properly fill out a chemical waste label and attach it to the dustbin.

There are directions on the back side of the label and labels must be applied on all chemical waste dustbins as soon as waste is added. These labels are designed to meet the regulatory requirements; therefore, every piece of information on the label is critical and must be completed.

Use only common chemical names or IUPAC nomenclature when listing the chemical constituents on the label. Solid waste includes any laboratory material that has come in contact with a chemical. All containers must have lids.

Apply a completed chemical waste label on the outside of the container. It is important not to overload dustbin. Do not use overly large dustbin. Only fill dustbin two-thirds full if they contain broken glass.

4.4.5.4 Clean, Uncontaminated Broken Glassware-

In an effort to minimize the amount of chemical waste generated on college campus, clean, uncontaminated glassware and plastic ware should not be managed as waste.

Unwanted clean non-broken glassware and plastic ware can be packaged up by the laboratory personnel and taken to the dumpster.

Broken glassware, plastic needles, syringes, razor blades, slides, scalpels, pipettes, broken plastic or glassware, micropipettes and pipette tips ware creates a potential hazard. Triple rinse with copious amounts of water. Collect the first rinse as chemical waste.

Rinse two and three can go down the sanitary sewer. Place empty/triple rinsed containers in a glass only box, recycling container or directly into the dumpster.

4.4.5.5 Adding Waste to Dustbin

Waste can be added only after you choose the proper dustbin and it is labelled. All personal working with chemical waste must wear, Safety glasses, Lab coat.

4.4.5.6 Procedure for liquid chemical waste management

Perform liquid chemical waste management in open space. Mixing of liquid waste may generate toxic or corrosive aerosols.

Check the container label to assure that waste is being added to the correct container. Uncap the container.

Use a funnel sufficient for the size of the container and volume of waste being added. Slowly add the waste, watching for any unintended reactions. If you observe a reaction, immediately stop adding the waste. After the waste has been added, remove the funnel and seal the container with the cap.



Waste Management Team visited to Botany Dept.



Library



E-Waste management and their Re-Use



Chemical Waste Management



Solid Waste- Dumping and Re-use

Chapter – 5

Recommendations

5.1 General recommendations

1. Review periodically the list of trees planted in the garden, allot numbers to the trees and keep records. Assign scientific names to the trees.
2. Promote environmental awareness as a part of course work in various curricular areas, independent research projects, and community service.
3. Create awareness of environmental sustainability and take actions to ensure environmental sustainability.
4. Establish a College Environmental Committee that will hold responsibility for the enactment, enforcement and review of the Environmental Policy. The Environmental Committee shall be the source of advice and guidance to staff and students on how to implement this Policy.
5. Ensure that an audit is conducted annually and action is taken on the basis of audit report, recommendation and findings.
6. Celebrate every year 5th June as 'Environment Day' and plant trees on this day to make the campus more Green.
7. Green library should be established.

5.2 Water Management

1. There is no particular mechanism to find the water wastage. This has to be dealt with utmost care without delay and has to be included in the future action plan.
2. There is no water consumption monitoring system in the college.
3. The college does not have waste water treatment for waste water generated from laboratories, canteen, hostel kitchen, toilets, bathrooms and office rooms.
4. The waste water from canteen and kitchens is not suitably controlled and is not used for gardening. This has to be addressed and suitable action plans have to be evolved..
5. No adequate facilities available in the college to treat the waste water from chemical laboratories.
6. Water fountain in the college was found to be dysfunctional. This need to be activated.

7. Strengthening awareness on water conservation among student and teacher communities.
8. Observe 'world water day' on March 22nd with different programmers (cycle rally, street play, flash-mob, poster, elocution etc. can be conducted).
9. 'Save Water' posters to be affixed in the classrooms, hand washing areas.
10. Repair water leaks and leaky toilets immediately.

5.3 Energy Management

1. The on grid solar power plant can bring down electricity costs and might prove to bring in financial benefits in the long run. Being at a relatively high lying area of the town, there would be no issues with sunshine, particularly in summer.
2. Gradual replacement of existing non LED based lights to LEDs can further bring down costs for lighting.
3. Replacement of existing electric fans with BLDC fans can significantly reduce power consumption and help in a good reduction in electricity charges.
4. Instead of using desktop workstations, we could consider desktop virtualization, wherever possible which could lead to reduced power consumption and reduced power costs.

5.4 Carbon Footprint

1. Encourage the use of bicycles and public transport system by the community, particularly the student community.
2. Planting of trees to negate the effect of burning of fossil fuels.
3. Carpooling, wherever possible, particularly by those who are using cars should be encouraged.
4. Plants absorb greenhouse gases, which helps mitigate climate change. Plant as many trees as possible in the college campus. Create Climate-friendly garden and Botanical garden.

5.5 Waste Generation

Reduce the absolute amount of waste that is produced from college staff offices. Make full use of all recycling facilities provided by City Municipality and private suppliers, including glass, cans, white, coloured and brown paper, plastic bottles, batteries, print cartridges, cardboard and furniture.

Provide sufficient, accessible and well-publicized collection points for recyclable waste, with responsibility for recycling clearly allocated.

Important and confidential papers after their validity to be sent for pulping.

Vermicomposting should be adopted on at least 300 sq. ft. of land.

E-Waste

Recycle or safely dispose of white goods, computers and electrical

Use reusable resources and containers and avoid unnecessary packaging where possible.

Always purchase recycled resources where these are both suitable and available.



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Chapter – 6

Future Action Plans

1. Year wise internal audit on green, water and energy to be conducted by respected teachers.
2. Proper management and month wise mapping of water and energy usage to be conducted by monitoring the same in the records.
3. Department wise awareness programs to be organized by department staff representative to each committee.
4. Proper waste water management.
5. Proper monitoring and disposal of waste discharge from chemical laboratories.
6. Implementation of sign boards and indications of water and energy usage.
7. Energy maintenance by proper usage of electrical appliances.
8. A timber garden and museum to be implemented.
9. Vegetable and agriculture crop planting has to be increased using advanced technologies.
10. Promotion of visit to agriculture farm lands and processing centers.
11. Marketing of vegetables and crops cultivated in the campus.

The students and staff who are active in green related activities have a clear vision about how and what should be planned for a greener campus.

They think that planting of more saplings during the world environment day would cater more awareness and enthusiasm in students who join afresh each year.

The college is also planning to initiate plant a tree/adopt a tree program where each student will be planting a sapling and taking care of it during his or her stay in the college.

Although the college follow a university curriculum by implementing several such awareness program in their academic and non-academic activities promote more students turn to green activities.

Conclusions

1. The management and other authorities are keen to make the campus a green campus
2. S.B.Z College is making learning process by practical approach. This is fulfilled by setting different types of gardens, arboretum concept based garden and conservation of water and energy.
3. Staff and students are aware about the commitment of the institute towards the society.
4. Green audit at times makes the campus authority to understand the effect of implications towards greenness and conservation of water and energy.
5. The evaluation process proved that the authorities have applied implications suggested in the audit.
6. The campus community functions are oriented with an eco-friendly approach that enables the student community to develop a genuine approach on conservation of nature, and natural resources.
7. The results presented in the present report would be helpful for the authorities to make future action plans to develop more sophisticated ideas in bringing more values in future efforts towards conservation of biodiversity, water and energy.
8. Green Audit team, submitting the comprehensive audit report to the authorities of S.B.Z College Campus. We hope the audit finding would help them implement better management plan to achieve a complete green campus, save maximum water and energy for a better future.

We suggest the college management to conduct the next audit after three years. This would help them understand whether they are heading forward by achieving the set forth plans and goals.

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