

# ENVIRONMENT AUDIT REPORT

2022-23

in compliance with the statutory requirements under the  
NAAC accreditation procedures



**Shri Dharmasthala Manjunatheshwara College of  
Engineering & Technology, Dharwad**

Principal Lead Auditor:

Mallikarjun A Kambalyal. CEA, ISO 50001, 14001 Lead Auditor.

Audited by:

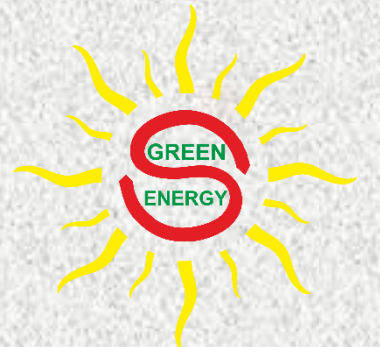
**SUNSHUBH TECHNOVATIONS PVT LTD.,**

120-2, LGF, 'A' wing, IT Park,

Hubli – 580029. Karnataka. India.

German off: Neuer Weg 166, 47803 Krefeld,

Dusseldorf. Germany Anbieter-Nr 1041388





## CONTENTS

CARBON FOOTPRINT - GREEN PLEDE (proposed) .....	1
EXECUTIVE SUMMARY. ....	2
CLOSING MEETING.....	5
CRITERION VII – INSTITUTIONAL VALUES AND BEST PRACTICES .....	6
CARBON FOOTPRINT - GREEN PLEDGE.....	14
ACKNOWLEDGEMENT.....	15
ONGOING STATUS .....	23
ENVIRONMENT AUDIT OBJECTIVES .....	25
THE GOALS OF GREEN AUDIT .....	26
SCOPE OF AUDIT .....	27
GREEN ENERGY PLEDGE (proposed) .....	29
ABOUT THE INSTITUTE.....	30
CONSIDERATIONS .....	32
GEOGRAPHICAL LAYOUT .....	34
DISCUSSIONS ON EXECUTIVE SUMMARY .....	36
WATER MANAGEMENT .....	36
PLACING OF WASTE COLLECTION BINS .....	39
BATTERY MANAGEMENT .....	41
GALVANIC CORROSION.....	42
LEAD .....	43
SULFURIC ACID.....	44
CADMIUM .....	45
VENTILATION.....	46
HACCP PRACTICES – GENDER EQUALITY .....	48
FIRE PREVENTION & SAFETY .....	48
RAINWATER MANAGEMENT.....	50
MEDICINAL PLANTATION.....	51
VERMICOMPOST.....	51

GREY WATER MANAGEMENT .....	53
LIMITATIONS:.....	54
ACTION PLAN SUMMARY: .....	55
MODE OF ACTION .....	55
Notes .....	56

ENVIRONMENT AUDIT REPORT

## **CARBON FOOTPRINT - GREEN PLEDE (PROPOSED)**

We the Principal, the staff and students, adopt responsible practices in our daily activities with due regard to the environment. We set and continually review objectives and targets for achieving our goal to protect our entire college premises in front, backyard and all other non-approachable areas of all primary and secondary pollutions.

We seek to compile with safety and environmental regulations to implement inhouse standards to improve our environmental performance. We commit ourselves to the safe operation of all our working habits, be it in classrooms, library, canteen, on road, off road, in-campus out-campus as well as at our place of stay. We adhere to reduce environmental load by efficiently using resources, saving energy, reducing waste, encouraging material recycle, with special emphasize to minimising emissions of greenhouse gases, ozone depleting substance and particle matter.

We endure to minimise environmental loads and adopt environmentally friendly technologies when ordering and purchasing necessary products and resources. We endure to attend educational programs and promulgate our close friends and colleagues to follow suite We endure to ensure that we recognize the essence of this Green policy by actively and aggressively conducting workshops and training to all in environmental concepts. We make wide ranging social contribution to close association with the students, teaching staff, administrative staff, housekeeping staff by disclosing environmental information and supporting environmental consumption.

-Sd-

Principal

*(Indicative templet for display at all prominent areas, waiting rooms, canteen, library, relaxing areas in the campus.)*

## EXECUTIVE SUMMARY.

For details, please follow the discussions in the report.

SI	Observations	Issues & Problems	Resulting losses	Remedial measures	Capital	Projected savings
1	Water management.	Flooding the lawns.	Excess water consumed.	Sprinkler.	@ Rs1000 /- per unit.	Energy & Water savings
2	Organic waste management.	System needs to be brought into order.	Handling costs	Composting at point of source	Nil.	Third party handling costs
3	Clear windows	Distraction of attention	Failed objective.	Filming	Few thousands	Better academic results.
4	Rainwater Harvesting Abuse and Use.	Water contamination	Loss of quality water source.	Proper filtration should be incorporated.	@ ₹8000/-	Third party supply.
4	Chemical waste disposal	Attracts pollution control boards authorities and capital costs	Loss of revenue	Good use practices.	Nil	Longer/extended life of Batteries



Sl	Observations	Issues & Problems	Resulting losses	Remedial measures	Capital	Projected savings
	LPG (Fuel) cylinders storage and management.	Fire hazards	Loss of life and loss of assets	Organise d way of handling of explosives	Nil or minimum	Safety in place.
5	HACCP practices.	Inconvenient and non-operation of assets and utilities provided.	Added manpower costs.	Provide Sanitary pad dispensers at easy & where required.	₹. 15000/- per unit.	Health safety compliance.
6	Utility Management.	Maintenance	Inefficient operation.	Periodical cleaning	NIL	Increased efficiency .
7	Food wastage and waste minimisation.	Random disposal	unaccountability	Segregate, weigh and deliver.	NIL	Minimised wastage.
8	Construction waste management.	Unaccountability	Call for or penalty for pollution	Land use change	Labelling & Transportation	Organise d and compliance.
9	Asset management.	Unaccountability	Loss of records	Move the unused assets to proper store area.	NIL	Increased accountability.

Sl	Observations	Issues & Problems	Resulting losses	Remedial measures	Capital	Projected savings
10	Indoor Air Quality	Inhaling of polluted air	Human inefficiency	Fresh air filters	₹.10k-100k	Complains OSHO Safety standards
11	Fire Safety	No training, awareness and non-suitable place.	Loss of assets	Training and awareness	NIL/Minimum	Emergency preparedness.

ENVIRONMENT AUDIT REPORT



## CLOSING MEETING



Shri Dhannasihala Manjunatheshwara Educational Society (Regd.) Ujire, D.K.  
**S.D.M. COLLEGE OF ENGINEERING & TECHNOLOGY**

An Autonomous Institution & Affiliated to VTU, Belagavi  
 Recognized by UGC and AICTE, New Delhi & UG programs accredited by NBA under Tier-I  
 Dhavalagiri, DHARWAD - 580 002, Karnataka, India

Tel. (0836) 2447465 & 2448327 | Fax: 0836-2464638 | email: principal@sdmcol.ac.in | website: www.sdmcol.ac.in

Ref.: SDM CET / / /

Date

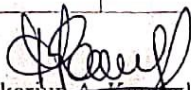
Dr. K.Gopinath Ph.D  
 PRINCIPAL

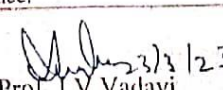
### Minutes of the Meeting

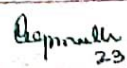
Environmental Audit:

Table of contents discussed with the Criteria 7 compliance auditor and institutions level of acceptance.

Parameter	Issues	Auditors observation	Institutes Response.	
<b>ENVIRONMENT AUDIT.</b>				
1	Water management.	Excess water consumed.	Use Sprinkler in lieu of Flooding the lawns.	Due to space constraints, sprinklers are not in use. For larger areas sprinklers are being used.
2	Organic waste management.	Waste segregation at source is required.	Place two small waste bins at prominent places	Will comply.
3	Battery placement	Battery shell in conductor loop	closely packed placement results in low performance & self-discharge. Will call for early discard, thus causing environment impact.	Will rework on placing the batteries properly.
4	Clear windows in some places	Distraction of attention	Leads to distraction of attention.	Will take it up for filming
5	Rainwater Harvesting	Flooding	Due to terrain, rainwater flooding should be avoided by providing multi level percolation pits.	Where ever possible will implement.
6	Food wastage and waste minimisation.	Accounting of wasted cooked food	Needs inmates to be made aware of how much food is wasted in the previous day. Conduct internal competition to bring in sense of accountability.	Will implement.
7	Construction waste management.		Label all construction waste when work is in progress	Construction waste is used in land filling wherever is necessary
8	Indoor Air Quality	Closed ventilation in very few Rooms	Increased CO2 concentration. Need to open ventilators	Will propose before the management for approval of modification of ventilators and budgetary approval.
9	Fire Safety	Awareness	Appropriate fire extinguishers should be used at appropriate place.	Adequate Fire extinguishers already in Place

  
 Mallikarjun A. Kambalyal  
 Auditor

  
 Prof. J.V. Vadavi  
 Dean - IPD

  
 Dr. K.Gopinath  
 Principal

## CRITERION VII – INSTITUTIONAL VALUES AND BEST PRACTICES

### Key Indicator - 7.1 Institutional Values and Social Responsibilities

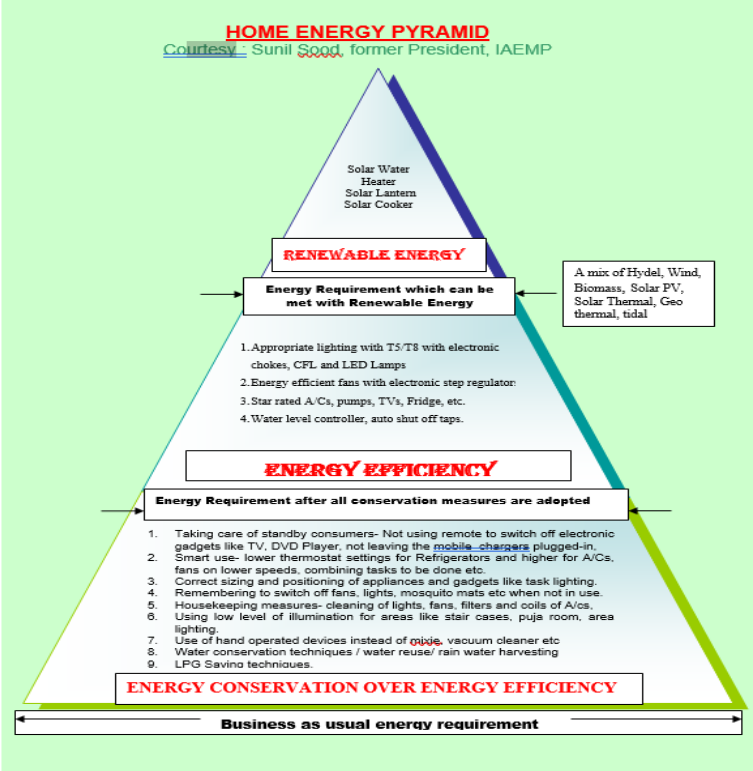
Metric No.	Description	Compliance	Initiatives required
7.1.1 QIM	<p>Measures initiated by the Institution for the promotion of gender equity during the last five years.</p> <p>Annual gender sensitization action plan</p> <p>Specific facilities provided for women in terms of:</p> <p>Safety and security - Energy</p>	Partly Complied	<p>Our The concept of home energy management in relation to the environmental impact may be initiated for the women. Detailed discussion on <b>CARBON HANDPRINT</b> should be discussed at length. The typical illustration is reproduced.</p>
 <p><b>HOME ENERGY PYRAMID</b> Courtesy - Sunil Sood, former President, IAEMP</p> <p><b>RENEWABLE ENERGY</b> Solar Water Heater, Solar Lantern, Solar Cooker</p> <p><b>Energy Requirement which can be met with Renewable Energy</b> A mix of Hydel, Wind, Biomass, Solar PV, Solar Thermal, Geothermal, tidal</p> <p><b>ENERGY EFFICIENCY</b> Energy Requirement after all conservation measures are adopted</p> <ol style="list-style-type: none"> <li>1. Appropriate lighting with T5/T8 with electronic chokes, CFL and LED Lamps</li> <li>2. Energy efficient fans with electronic step regulator</li> <li>3. Star rated A/Cs, pumps, TVs, Fridge, etc.</li> <li>4. Water level controller, auto shut off taps.</li> </ol> <ol style="list-style-type: none"> <li>1. Taking care of standby consumers- Not using remote to switch off electronic gadgets like TV, DVD Player. not leaving the mobile chargers plugged-in.</li> <li>2. Smart use- lower thermostat settings for Refrigerators and higher for A/Cs, fans on lower speeds, combining tasks to be done etc.</li> <li>3. Correct sizing and positioning of appliances and gadgets like task lighting.</li> <li>4. Remembering to switch off fans, lights, mosquito mats etc when not in use.</li> <li>5. Housekeeping measures- cleaning of lights, fans, filters and coils of A/cs.</li> <li>6. Using low level of illumination for areas like stair cases, puja room, area lighting.</li> <li>7. Use of hand operated devices instead of mixie, vacuum cleaner etc</li> <li>8. Water conservation techniques / water reuse/ rain water harvesting</li> <li>9. LPG Saving techniques.</li> </ol> <p><b>ENERGY CONSERVATION OVER ENERGY EFFICIENCY</b> Business as usual energy requirement</p>			
	Environmental Consciousness and Sustainability		Discuss on why the recent calamities keep occurring more often than before.

Figure 1 - Home energy pyramid

7.1.2 Q <sub>n</sub> M	<p><i>The Institution has facilities for alternate sources of energy and energy conservation measures</i></p> <ul style="list-style-type: none"> <li>• Solar energy</li> <li>• Biogas plant</li> <li>• Wheeling to the Grid</li> <li>• Sensor-based energy conservation</li> <li>• Use of LED bulbs/ power efficient equipment</li> </ul>	Complied through parent society.	<p>Irrespective of the financial impact, the institute should consider the renewable energy projects as they impart the sense of green energy alternatives. Such as Solar Power, Wind energy, Biogas plant in Hostel mess.</p> <p>If renewable energy projects are installed the excess power can be exported to grid on non-working hours.</p> <p>Sensor based control is a must for energy use optimization.</p> <p>Complete the ongoing work at faster pace.</p>
7.1.3 Q <sub>i</sub> M	<p><i>Describe the facilities in the Institution for the management of the following types of degradable and non-degradable waste (within 500 words)</i></p> <p>Solid waste management Liquid waste management Biomedical waste management E-waste management Waste recycling system Hazardous chemicals and radioactive waste management</p>	Complied partially w.r.t minimising .	Energy consumption details need to be monitored and the benefits of avoided accumulated energy use and power demand should be established.
7.1.4 Q <sub>n</sub> M	<p><i>Water conservation facilities available in the Institution:</i></p>	Complied .	The institution should consider in measuring the energy and power demand at various

	<p>Rain water harvesting Borewell /Open well recharge Construction of tanks and bunds Waste water recycling Maintenance of water bodies and distribution system in the campus</p>	<p>Open ground percolation, Open well restoration. Percolation pond near to open well</p>	<p>ground water table to demonstrate the impact of increased water table by rainwater harvesting methods. Kindly refer to the article listed at the end of the table.</p>
7.1.5 QnM	<p><i>Green campus initiatives include (4)</i> 7.1.5.1. The institutional initiatives for greening the campus are as follows: Restricted entry of automobiles Use of Bicycles/ Battery powered vehicles Pedestrian Friendly pathways Ban on use of Plastic landscaping with trees and plants.</p>	<p>Partially complied.</p>	<p>With disciplined vehicle parking the reduction in fuel consumption can be demonstrated in the college campus. The students can be given a task of conducting such practical on field and a competition in house should educate the society.</p>
7.1.6 QnM	<p><i>Quality audits on environment and energy are regularly undertaken by the institution (5)</i> 7.1.6.1. The institutional environment and energy initiatives are confirmed through the following 1.Green audit 2. Energy audit 3.Environment audit</p>	<p>Complied .</p>	<p>The audit findings should be predominantly projected by action from all stake holders of the institution.</p>

	<p>4.Clean and green campus recognitions/awards</p> <p>5. Beyond the campus environmental promotional activities</p>		
7.1.7 Q <sub>n</sub> M	<p><i>The Institution has disabled-friendly, barrier free environment</i></p> <p>Built environment with ramps/lifts for easy access to classrooms.</p> <p>Disabled-friendly washrooms</p> <p>Signage including tactile path, lights, display boards and signposts</p> <p>Assistive technology and facilities for persons with disabilities (<i>Divyangjan</i>)</p> <p>accessible website, screen-reading software, mechanized equipment</p> <p>Provision for enquiry and information: Human assistance, reader, scribe, soft copies of reading material, screen reading</p>	<p>The initiatives have been considered.</p>	<p>The demand for muscle power to climb the ramp may be considered as one such case and ideally establish the gradient of the ramp.</p>
7.1.9 Q <sub>i</sub> M	<p><i>Sensitization of students and employees of the Institution to the constitutional obligations: values, rights, duties and responsibilities of citizens</i></p> <p>Describe the various activities in the Institution for inculcating values for being responsible citizens as reflected in the</p>	<p>Need to explore.</p>	<p>The sensitization of switching off the non-required electrical appliances and devices should be encouraged. Like organizing the inhouse competition.</p> <p>Every student to table their energy bills in the previous year. The savings in the forthcoming year should be recorded and</p>

	Constitution of India within 500 words.		an energy ambassador award be shouldered on the top students. This activity brings in the sense of responsibility, accountability and importantly knowing their energy use and abuse.
7.1.10 Q <sub>n</sub> M	<p><i>The Institution has a prescribed code of conduct for students, teachers, administrators and other staff and conducts periodic programs in this regard.</i></p> <p>The Code of Conduct is displayed on the website There is a committee to monitor adherence to the Code of Conduct Institution organizes professional ethics programs for students, teachers, administrators and other staff Annual awareness programs on Code of Conduct are organized</p>	Complied .	A range of activities can be brought in just as discussed in 7.1.9 above.
7.1.11 Q <sub>i</sub> M	<p><i>Institution celebrates / organizes national and international commemorative days, events and festivals</i></p> <p>Describe the efforts of the Institution in celebrating /organizing national and international commemorative</p>	Complied	In today's practices, the celebration has been formal. The actual celebration has to be yearlong. The theme for the year has to be laid and the activities should be conducted and on the day of celebration the selective activities be carried out. Just to illustrate,



	days, events and festivals during the last five years within 500 words		<p>Consider the Republic Day. We celebrate the flag hoisting and with cultural activities. Consider the week-long program where in, students can discuss what is the Republic Day. How the final draft got to be written and who all are the members of the draft committee.</p> <p><a href="https://en.wikipedia.org/wiki/Constitution_of_India">https://en.wikipedia.org/wiki/Constitution_of_India</a></p>
7.2.1 Q/M	Describe two best practices successfully implemented by the Institution as per NAAC format provided in the Manual.	Complied .	<p>When the listed activities from 7.1.1 to 7.1.11 are complied, the institute can have many creative best practices and the achievements can really bring in the name, fame and the recognition and appreciation not just on records but on monetary contributions as well.</p>



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Content Copyedit Layout & Design

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इन लेखों में प्रकट विचार मूलतः लेखकों के हैं तथा यह आवश्यक नहीं है कि इरेडा या विनरॉक भी इन विचारों से सहमत हो ।

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Core-4A, East Court, 1<sup>st</sup> Floor  
India Habitat Centre, Lodhi Road, New Delhi-110003  
Tel: 91-11-2468 2214-21 Fax: 91-11-2468 2204  
E-mail: [efficiency@rediffmail.com](mailto:efficiency@rediffmail.com)  
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FROM THE EDITOR-IN-CHIEF

## The simple economics of water and energy security



It is estimated that the global annual use of commercial energy is about 400 Quads (quadrillion BTUs). The sun pours an additional 6 million Quads of radiant energy into the Earth's atmosphere each year. Thus in absolute terms, energy available is several orders of magnitude higher than demand. Yet, the world continues to struggle against an acute energy crisis. This leads one to believe that the problem is not merely of energy availability but rather a problem of affordability. Energy is a matter of pure economics, of demand and supply – at a cost.

A similar principle applies to water. Though roughly 80 percent of the Earth's surface is water, cheap potable and clean water is simply beyond the reach of millions across the world. Potable water sourcing, treatment, and distribution require considerable amounts of energy. Access to water is therefore closely linked to energy availability and affordability.

This close interdependence between energy and water needs to be clearly recognized and the nexus addressed suitably at the policy level. The first and foremost priority of any energy policy should be the wise, efficient use of whatever energy supplies are available. Similarly, priority should be given to the efficient use of whatever water supplies exist. Once the issue of efficient use has been tackled, focus can then be shifted on creating new energy and water supplies that meet sustainability and environmental requirements. And this may not be as difficult to achieve as it appears.

As in the case of energy use, the difficult part is reducing the quantum of water use while maintaining the level of benefits both for the customer and the utility. If this can be addressed, water utilities can save money as the reduced demand effectively creates more system capacity. With decreasing demand, the water utility effectively avoids additional investments in new facilities and equipment. Reduced volume of water flowing through the system has the attendant advantage of reduced frictional energy losses, thereby reducing the cost of pumping. This leads to a win-win situation for both the consumer and the utility, with the consumer benefiting through the reduced cost of delivery, diminished chances of water shortfalls, and the utility benefiting from decreased likelihood of major investment expenditures.

Needless to say that all this also saves energy. In rural areas, a large number of irrigation pump sets are either operated at highly subsidized electricity tariff from the power utilities or at no cost at all, encouraging the use of poorly designed inefficient pump sets which are over-rated and over-used. Replacing these pump sets with energy-efficient ones is one option, but who bears the cost? Another option is rainwater harvesting. For every one foot increase of the water table one achieves an approximate savings of 1 percent power.

Which means one gets more for the same energy use. That's simple economics.

*Debashish Majumdar*  
Debashish Majumdar  
Managing Director, IREDA

## Water–Energy: two faces of a coin

*There is a direct relationship between water and power. A reduced water table is directly proportional to the square of the increased electrical power consumption, says the author*

**W**e all presume that if the dams and reservoirs are full then electrical power could be available in plenty. However, we tend to ignore that the demand for electrical power has been growing at a much faster rate than what we can produce and, hence, any amount of rain and or electrical power generated is insufficient to meet our demand. Most thermal power plants are running low owing to a short supply of coal. So where are we?

The recent changes in temperature and erratic rainfall has a direct relationship with urbanization. With increased urbanization and industrialization, we have only created a greater need for energy. This energy is sourced primarily from fossil fuels such as coal and nuclear power plants. In the absence of rains, the only means of generating electrical power is by burning fossil fuels. The burning releases emissions into the atmosphere, resulting in increased CO<sub>2</sub> concentration in the troposphere, and subsequently the greenhouse effect. The disturbed rainfall pattern is a result of this global warming.

The demand for power can be classified into four areas: agricultural need-based; industrial need-based; commercial need-based; and domestic need-based.

Today, a number of agencies such as the Bureau of Energy Efficiency (BEE), Petroleum Conservation Research Association (PCRA), the National Productivity Council (NPC) and a host of voluntary organizations, are working at ensuring energy efficiency in industries. But while the commercial and domestic need-based sectors have the potential, little is being done in this area. These sectors need a lot of education, motivation and awareness.

The agricultural industry needs the greatest attention, mainly in irrigation pump-sets (IPs). Most IPs are being operated free or on highly subsidized electricity supply. But eventually they consume a lot of power.

For instance, there are 16,000 irrigation pumps reportedly being operated under the HESCOM (Hubli Electric Supply Company), a division in North Karnataka. If, on an average each 5 HP pump consumes 3.73 kW of power per hour (there are actually a greater number of 10 HP pumps), the total consumption is as below:

For 10 hours per day = 37.30 kWh  
 For 200 days of watering = 7,460 kWh (7.46 MWh/pumpset)  
 For 16,000 sets, it is 119,360 MWh which means, 358,080 MWh of power generation at the power plant.

To reduce this consumption, should the IP users be asked to change over to energy-efficient sets? The question is:

- can the users afford the change?
- are they willing to accept the new brands of sets imposed on them?
- can the sale of inefficient IP sets be controlled?

Or should measures be adopted where the users may not use the IPs at all? Or can power consumption be reduced?

One good method is to reduce power consumed by IP sets by increasing the water table. If the water table can be increased by, say, 13 ft, then for the same 150 LPM delivery we will need a 4 HP (2.984 kW), and the savings for 16,000 IP sets would be 23,872 MWh, which is 20 percent – approximately 1.5 percent power saving for every feet of increase in the water table. This increase in water table can be achieved by adopting rainwater harvesting – through either bunds or by natural

filtration tanks or by preventing pumping of water by making use of rainwater.

Now who meets the cost of these programs is one big question. Let us see how the electrical supply company benefits: If the organization spends around Rs 5,000 per IP set, we have Rs 800 crore as the capital investment on rainwater harvesting. For an annual savings of 23,872 MWh of electrical power, a savings of Rs 9.55 crore at the rate of Rs 4 per kWh for every feet increase in the water table.

It is always better not to use energy than try and save energy.

When a process industry utilizes water for its operations, then this water has to be demineralized or softened. To do this, it will need electrical power. Also due to dissolved solids and increased concentration, repeated breakdowns may happen, demanding periodic maintenance and scraping of industrial components, which means more energy consumption.

Now, greater the amount of rainwater harvested, lesser will be the dissolved solids, which means less breakdowns and increased fuel savings. Once the fuel consumption comes down, the release of CO<sub>2</sub> into the atmosphere is also reduced. Reduced CO<sub>2</sub> means lesser effect on global warming. This will then lead to stable weather conditions and predictable monsoons. Once the ecological cycle is renewed, achieving a balance between industrial, agricultural and environmental growth is easy.

Water is a renewable source of energy and must be conserved.

*Courtesy: Mallikarjun A. Kambalyal, President, Sunshubh Renewable Energy Foundation  
 E-mail: mallu\_solar@yahoo.co.uk*

## **CARBON FOOTPRINT - GREEN PLEDGE**

(PROPOSED)

We the Principal, the staff and students, adopt responsible practices in our daily activities with due regard to the environment. We set and continually review objectives and targets for achieving our goal to protect our entire college premises in front, backyard and all other non-approachable areas of all primary and secondary pollutions.

We seek to compile with safety and environmental regulations to implement inhouse standards to improve our environmental performance. We commit ourselves to the safe operation of all our working habits, be it in classrooms, library, canteen, on road, off road, in-campus out-campus as well as at our place of stay. We adhere to reduce environmental load by efficiently using resources, saving energy, reducing waste, encouraging material recycle, with special emphasize to minimising emissions of greenhouse gases, ozone depleting substance and particle matter.

We endure to minimise environmental loads and adopt environmentally friendly technologies when ordering and purchasing necessary products and resources. We endure to attend educational programs and promulgate our close friends and colleagues to follow suite We endure to ensure that we recognize the essence of this Green policy by actively and aggressively conducting workshops and training to all in environmental concepts. We make wide ranging social contribution to close association with the students, teaching staff, administrative staff, housekeeping staff by disclosing environmental information and supporting environmental consumption.

-Sd-

Principal

*(Indicative templet for display at all prominent areas, waiting rooms, canteen, library, relaxing areas in the campus.)*

## ACKNOWLEDGEMENT

SUNSHUBH TECHNOVATIONS PVT LTD. is pleased to express its sincere gratitude to the management of Shri Dharmasthala Manjunatheshwara College of Engineering & Technology, Dharwad, for entrusting SUNSHUBH TECHNOVATIONS PVT LTD. with the assignment on Green Earth practices based on Educate, Practice, Advocate & Manage the resources in their educational organization.

We also wish to thank the officials and the maintenance staff for the help rendered during the energy flow study.

We would fail if we neglect to appreciate the sincere efforts put in by the faculty Dr. K Gopinath Principal.

Dr. S M Joshi. NAAC Project Co-Ordinator

and the students who against all odds have kept the college premises clean to the possible limits. Without the crucial and significant support from the fellow teaching team the energy savings and carbon footprint reduction would not be a reality.

With the motivational support of the management, ground realistic support from teaching team and sincere efforts of the students in incorporating the change (habits) and instructions, the college could effectively declare the reduction in Carbon footprint and optimize the waste reductions.

We are not in a position to compute the carbon foot print at this point of time as the basic information from each of the students is yet to be collected; however, we will discuss the Carbon Foot print in the follow up compliance report.

Wishing the team, a great success we deeply express our gratitude and heartfelt "THANKYOU" for allowing us to assess the energy flow scenario there by the GREEN STATUS.

We acknowledge the involvement of

List of HoDs & IQAC Coordinator

Dr. S M Joshi NAAC Coordinator

Supported by all the department team head.

Department  
Chemical Engineering

Coordinator  
Prof. Rashmi

Civil Engineering  
Computer Science and Engineering  
Electronics and Communication Engg  
Electrical and Electronics Engineering  
Information Science and Engineering  
Master of Business Administration  
Mechanical Engineering  
Physics  
Chemistry  
Mathematics

Dr. Fernandez  
Prof. Nita G K  
Prof. Vijay Kumar  
Dr. Shelavadi  
Dr. Rajashekharappa)  
Dr. Mahesh  
Dr. K N Patil  
Dr. Bahubali  
Dr. Shashidhar  
Dr. Varsha Joshi


Mallikarjun A. Kambalyal. B.E.(E&C).  
Certified Energy Auditors (EA-3485)  
SUNSHUBH TECHNOVATIONS PVT LTD.

**Criteria 7.1. 6**



## SUNSHUBH TECHNOVATIONS PVT LTD

#402, Hill view apartment, Adarshnagar 2<sup>nd</sup> Cr, HUBLI-580 029. Karnataka, INDIA  
Germany off: NeuerWeg 166, 47803 Krefeld, Dusseldorf.

WATER	ENERGY	POLLUTION	ORGANIC	
Harvesting	Efficiency	Minimize	Farming	
Conservation	Conservation	Eliminate	Worm compost	
Management	Generation	Manage	Benefits	
Regd: Certified Energy Auditors. GOI (EA 3485), Germany: Anbieter-Nr 1041388				
<a href="http://www.sunshubhrenewables.com">www.sunshubhrenewables.com</a> , Email: <a href="mailto:ceo@sunshubhrenewables.com">ceo@sunshubhrenewables.com</a> , Ph: 94492 83505, 94490 33505 CIN : U74999KA2020PTC136321, PAN:ABECS0250Q, TAN:BLRS77362F GST No: 29ABECS0250Q1ZX				

### ENVIRONMENT AUDIT COMPLETION CERTIFICATE

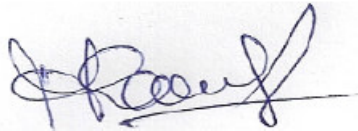
I, Mallikarjun A Kambalyal, endorse and confirm that the Environment Audit has been carried out on 13<sup>th</sup> March 2023 under the instructions of Dr. K Gopinath Principal for Shri Dharmasthala Manjunatheshwara College of Engineering & Technology, Dharwad, Karnataka.

This report is generated based on the site visits and evidence collected from the site and this completion certificate is issued in compliance with *Criteria* 7.1.6.

All attempts have been made to evaluate the scope for development and inculcate green practices in the campus and extended throughout the campus. The focus is also laid to make positive impact on the society for a better living. This report is tabled in two parts. The first forms the core discussions which are subject specific under the statutory requirements of the NAAC accreditation norms. The second section is general in nature.

Any modifications, changes, omissions after the site visit shall be exclusive.

Authorised Auditor.




Mallikarjun A. Kambalyal B.E (E&C)

Certified Energy Auditors EA-3485.


ISO 50001:2011 & ISO14001:2015 Lead Auditor.

Date: 13<sup>TH</sup> March 2023





## BUREAU OF ENERGY EFFICIENCY



Examination Registration No. : **EA-3485** Serial Number **2838**

Certificate Registration No. : **2838**

### Certificate For Certified Energy Manager


This is to certify that Mr./Mrs./Ms. **Mallikarjun A Kambalyal** Son/Daughter of Mr./Mrs. **Andanappa V Kambalyal** who has passed the National Examination for certification of energy manager held in the month of **April 2006** is qualified as certified energy manager subject to the provisions of Bureau of Energy Efficiency (Certification Procedures for Energy Managers) Regulations, 2010.

This certificate shall be valid for five years with effect from the date of award of this certificate and shall be renewable subject to attending the prescribed refresher training course once in every five years.

His /Her name has been entered in the Register of certified energy manager at Serial Number **2838** being maintained by the Bureau of Energy Efficiency under the aforesaid regulations.

Mr./Mrs./Ms. **Mallikarjun A Kambalyal** is deemed to have qualified for appointment or designation as energy manager under clause (1) of Section 14 of the Energy Conservation Act, 2001 (Act No.52 of 2001).

Given under the seal of the Bureau of Energy Efficiency, this **7<sup>th</sup>** day of **February, 2013**

  
**Secretary**  
**Bureau of Energy Efficiency**  
**New Delhi**


Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
<b>28.01.2020</b>			

Figure 2 - Bureau of energy Efficiency Regd No: EA3485





Figure 3 - ISO Certified Lead Auditor. Certificate No: 47730



# BSI Training Academy

This is to certify that

**Mallikarjun A. Kambalyal**

has attended and passed

**Energy Management Systems (ENMS) Auditor/Lead Auditor Training Course  
(ISO 50001:2011)**

Premanand Ramakrishnan, Director of Training

Date: 14/04/2016 - 18/04/2016

Certificate Number: ENR-00253448

This certificate is valid for 3 years from the date above for the purpose of registering as an auditor with IRCA.



Course number A17583 certified by IRCA

The British Standards Institution is incorporated by Royal Charter.  
BSI India, The Mira Corporate Suites (A-2), Plot 1 & 2, Jawahar Nagar, Mathura Road, New Delhi 110065, India Tel: +91 11 2652 9000



By Royal Charter



...making excellence a habit.™

RT

Figure 4 - ISO Certified Lead Auditor. Certificate No: ENR-00253448



Figure 5 - Manager training program, Germany



Figure 6 - Fit for partnership with Germany



## ONGOING STATUS

It's an optimistic & highly dedicated team effort lead by the Principal, & the senior staff who have dedicated all their wits & free time to initiate Green Carpet the entire college premises. It is also a fact that there do exist few short comings which however is unintentional & on being trained & educated the campus should look for continued minimized waste generation. With all due appreciation to the management, staff involved & cooperation by the students, we have made few suggestions which on implementation, will reduce, demand for water & electrical power. It will also reduce the existing level of pollution to bear minimum.

**NO WASTE – NO POLLUTION – NO HEALTH HAZARD.**

### **Why is this audit being carried out?**

Whether you own or manage a small business, a large commercial facility, or a manufacturing operation, it's important to take advantage of any tips, programs and incentives that will help you save money on your energy bills. There are measures that will generate savings to positively impact your bottom line immediately, as well as longer-term strategic initiatives to assess your needs and stabilize your energy spend in the longer term – which is great news for your budget!

One such initiative is an energy audit. Energy audits reveal your usage patterns, identify waste, over-expenditure and, generally, make you fully cognizant of where your energy dollars are going. This knowledge will enable you to be more efficient with your energy use and be able to track and accelerate savings. Energy Audits may sound expensive or complicated, but they can be free and are easier than you think.

### **What is an energy audit?**

An energy audit is an analysis of a facility, indicating how and where that facility can reduce energy consumption and save energy costs. Its insight to energy efficiency and conservation can lead to significant savings on the company's utility bill.

### **Why should you get an energy audit?**

Energy costs are soaring and your business can be at considerable risk if you do not take the guesswork out of your energy usage and the budget you need to cover it. Energy audits identify where your business is wasting energy. Residential and commercial properties account for around 10% of carbon emissions in the US,

according to the EPA, which means they are very inefficient and waste huge amounts of energy and... revenue. An energy audit helps by revealing just how and where energy is being wasted. With thousands of commercial energy customers nationwide, we are well-qualified to advise you on which methods are best used for reducing energy waste and overall energy consumption. Let's start with a simple free evaluation of your bills and show you how we have been found to save between 5% and 35% for many of our customers.

In the case of energy, less is more. Lower energy consumption equals lower energy costs. And, of course, less energy consumption is obviously good for the environment.

As you can see, to be truly effective, energy management requires a strategy just like the other aspect of your operation and measures to curb costs can be simple and in some cases free. Gaining more control over your energy costs will improve the general health of your budget. Not only that but reducing your CARBON FOOTPRINT is great for the environment too!

ENVIRONMENT AUDIT REPORT

## ENVIRONMENT AUDIT OBJECTIVES

Energy Audit was initiated in the beginning of 1970's, with the motive of inspecting the work executed within an organization, whose exercises could cause risk to the health of inhabitants and the environment. It exposes the genuineness of the proclamation made by the organisation with the concern on health issues. As a consequence of their operations with respect to environmental pollution it is the duty of the organisation to carry out the Energy Audit of the ongoing processes for various reasons, such as,

- To make sure whether one is performing in accordance with the relevant rules and regulations,
- To improve the procedures and aptness of material in use,
- To analyse the potential duties and to determine a way which can lower the cost and to the revenue.

Through Energy Audit one gets adoration as to how to improve the condition of the environment. There are various factors that were forced upon and determine the growth of/or conduct of Energy Audit. Incidents like,

- Decades old Bhopal gas tragedy, that has left its residual effect which still haunts us.
- Our buildings catching fire due to various reasons,
- Industries blowing off taking valuable human lives etc
- People going sick, feeling tired, after long hours of operations in the organization,
- Increased demand of generators due to inconsistent power supply, which has resulted or lead into recent floods and droughts,

are some of the situations to ponder about!

To address various issues in context with human health, Energy Audit is assigned to "Criteria 7" of NAAC (National assessment and accreditation council) accreditation. NAAC is a self-governing organization in India that declares the institutions as Grade "A++", "A+", "A", Grade "B", .... according to the scores assigned at the time of accreditation.

The other intention of organising Energy Audit is to update the environment conditions in and around the institutions i.e., within the compound and outside the compound. It is carried out with the aid of performing certain tasks like waste



management, energy consumed, diesel burnt it performing the objective of the organization. Lastly to self-assess the net carbon footprint of the conduct of process in the organization.

## **THE GOALS OF GREEN AUDIT**

- The purpose of carrying out Green Audit is securing the environment and cut down the threat posed to human health.
- To Make sure that rules and regulations are complied with.
- To avoid the environmental interruptions that are more difficult to handle and their corrections call for high cost.
- To suggest the best protocol for adding to sustainable development.
- To execute the process of the organisation utilising minimum natural resources and efficient use of those resources contributing to minimum waste generation.

How is the green audit conducted?

- Pre-audit
- Planning
- Selecting the team of auditors both internal and external
- Schedule the audit facility
- Acquire the background information
- Visit areas under audit

## SCOPE OF AUDIT

- Analyse the strengths and weaknesses of the internal controls
- Conduct audit with end user comfort focused and making it easy to perform.
- Collect necessary evidence so that the stakeholders stand to understand how and where they are going wrong in the process of their conduct.
- Post audit draw the report based on the data collected.
- On confirmation of the preliminary report, draw a final report of the observations and inference with accuracy more near to implementable way.
- Discuss various remedial measures for alternatives if required.
- Prepare an action plan to overcome the shortcomings with continual observation on the action plan initiated.

### Steps under green audit

- Water is one of the cheapest commodities next to the Air we breathe. Although we Indians, use less water in comparison to western countries. However, the extent of pollutants that we leave behind has polluted all the resources including the deep well.
- Rainwater harvesting is one of the best techniques that can be adopted by harvesting the rainwater and using it at the time of scarcity. the audit team to observe and investigate the relevant methods that can be adopted and implemented and draw the balance of use of water.
- The point of generation of waste, the type of waste generated, i.e., hazardous, recyclable and organically compostable wastes and segregating method at the point of generation for easy and best way to handle the same. Evaluating such methods to minimise the use of resources in the process of their management.
- It deals with use of energy in the conduct of the process. The priority is topmost for conservation over efficiency; hence, energy auditor should always consider not to use the energy if necessary. At best it can be used judiciously.
- It analyses air quality, noise level and the programs undertaken by the institution for plantation creating awareness of trees around us and how nature provides us with remedial measures within its framework.

- In the process of use of resources and conduct of the activities, they can develop impact on human health, that might be off minutely harmful, cause permanent disorder or may even cause death. Occupational health hazards are discussed in detail and the stakeholders are informed of the same and required necessary remedial measures indicated.
- To make in organisation net zero net zero carbon emission use of renewable resources including energy such as solar wind biogas geothermal energies are put into ooh utilisation.
- The net impact All the above energy audits should be to make an organisation contribute zero emissions which are called by bhai use of water generation of waste use of energy e environmental damage health damage and finally to explore if the campus or direction can go in in contributing to third-party emissions minimising
- To draw home the benefits, the system has been separated out into various audits as listed above. In doing so, and if audit findings are effectively implemented there are many advantages that can be practised in the process
- Recognise the cost saving methods through waste minimising and managing technologies.
- Point out the prevailing and forth coming complications.
- Authenticate conformity with the legal requirements.
- Empower the organisation to frame a better environmental performance.
- Portray a good image of the institution which helps build better relationships with the group's organisations, stakeholders in and around its operations
- Enhance the alertness for environmental guidelines duties and conduct of preparedness for any eventualities due to environmental disasters proposed)
- Indicative templet for display at all prominent areas, classrooms, waiting rooms, canteen, library, relaxing areas in the campus.

## **GREEN ENERGY PLEDGE (PROPOSED)**

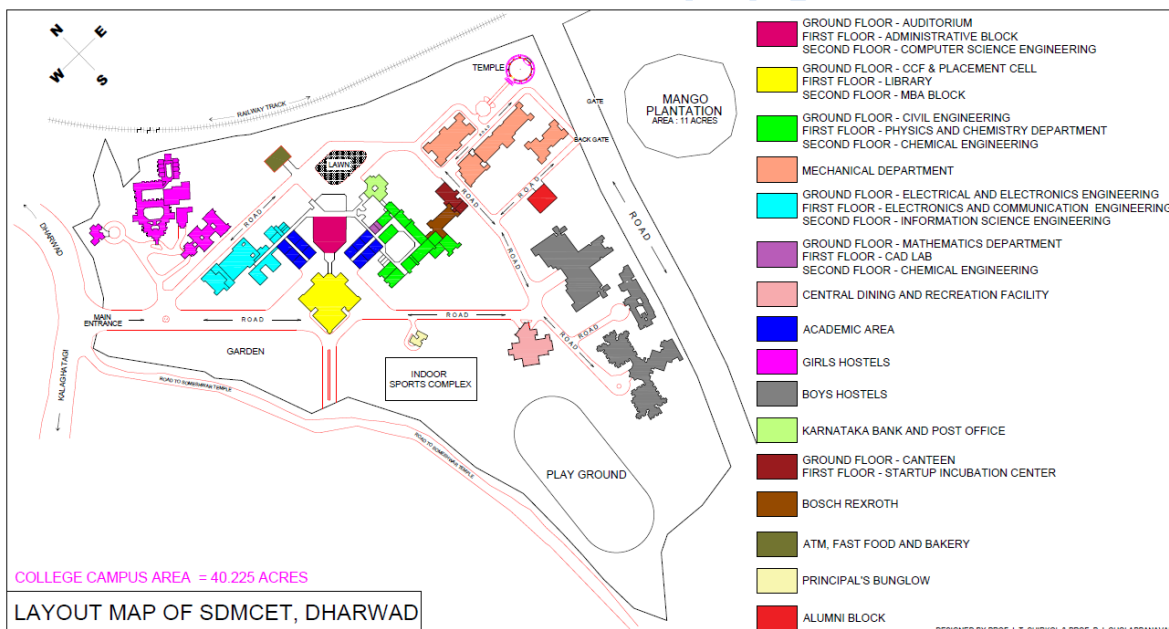
We the Principal, the staff and students, adopt responsible practices in our daily activities with due regard to the environment. We set and continually review objectives and targets for achieving our goal to protect our entire college premises from all pollutions primarily. We seek to compile with safety and environmental regulations to implement inhouse standards to improve our environmental performance. We commit ourselves to the safe operation of all our working habits, be it in classrooms, library, canteen, on road, off road, in-campus out-campus as well as at our place of stay. We adhere to reduce environmental load by efficiently using resources, saving energy, reducing waste, encouraging material recycle, with special emphasize to minimising emissions of greenhouse gases, ozone depleting substance and particle matter. we endure to minimise environmental loads and adopt environmentally friendly technologies when ordering and purchasing necessary products and resources. We endure to attend educational programs and promulgate our close friends and colleagues to follow suite We endure to ensure that we recognize the essence of this Energy policy by actively and aggressively conducting workshops and training to all in environmental concepts. We make wide ranging social contribution to close association with the students, teaching staff, administrative staff, housekeeping staff by disclosing environmental information and supporting environmental consumption.

-Sd-

Principal

*(Indicative templet for display at all prominent areas, waiting rooms, canteen, library, relaxing areas in the campus.)*

## ABOUT THE INSTITUTE



Shri Dharmasthala Manjunatheshwara College of Engineering & Technology, Dharwad.

We understand from the institutes web site that the management has laid a well-defined VISION, MISSION and laid the VALUES. As seen from the website...



#### Vision:

To develop competent professionals with human values.



#### Mission

- To have contextually relevant Curricula.
- To promote effective Teaching Learning Practices supported by Modern Educational Tools and Techniques.
- To enhance Research Culture.
- To involve the Industrial Expertise for connecting Classroom contents to real-life situations.
- To inculcate Ethics and soft-skills leading to overall personality development.



#### Core Values

- Competency
- Commitment
- Equity
- Team work
- Trust



## CONSIDERATIONS

Before we present our report, the factors that are considered for positive impact recommendations are,

Climatic conditions under which the institute is located.

The core of activities carried out in the campus.

The energy consumption pattern.

Sources of electrical power to address the needs of the campus.

Dharwad climate (India)

Data and graphs for weather & climate in Dharwad.

>>[weather by month // weather averages Dharwad](#)

>>[climate graph // weather by month Dharwad](#)

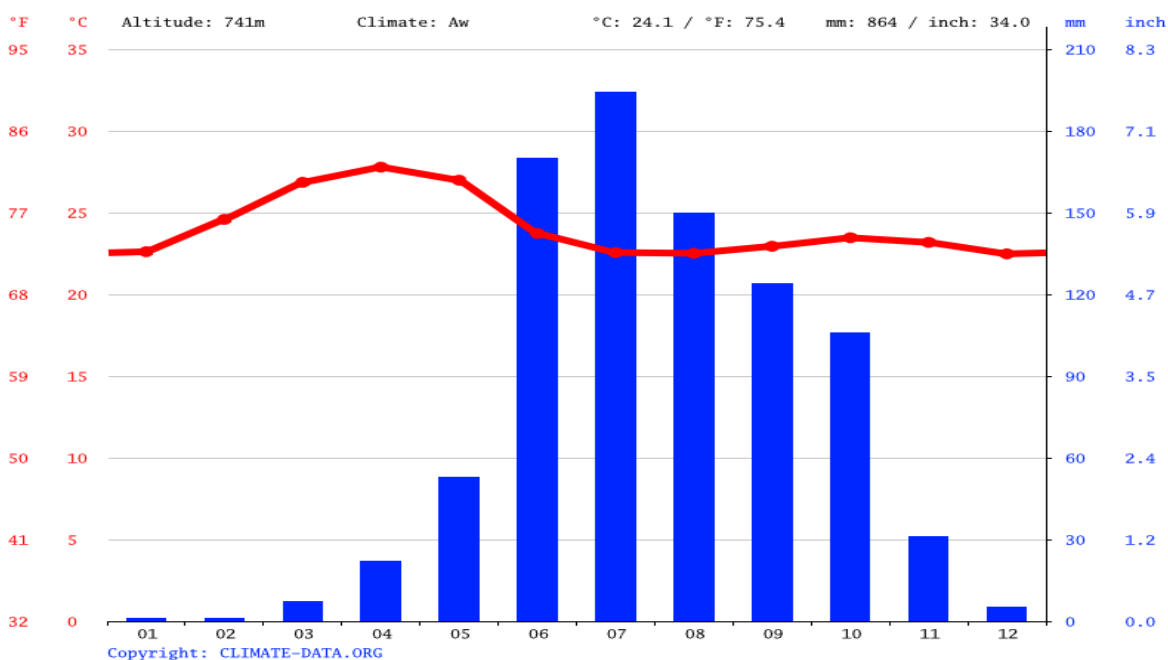
>>[average temperature Dharwad](#)

>>[weather Dharwad](#)

This city has a tropical climate. In winter, there is much less rainfall than in summer. The köppen-geiger climate classification is aw. The temperature here averages 24.1 °c | 75.4 °f. In a year, the rainfall is 864 mm | 34.0 inches.

This region, situated near the equator line, is characterized by difficult-to-define summer seasons. The best time to visit is January, February, March, May, June, July, August, September, October, November, December.

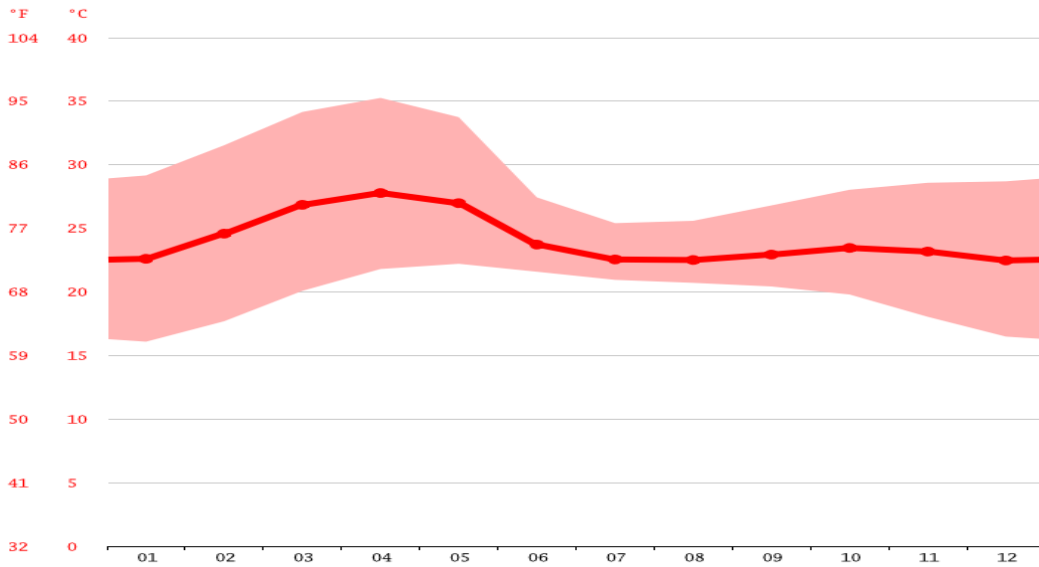
Climate graph // weather by month Dharwad





The least amount of rainfall occurs in January. The average in this month is 1 mm | 0.0 inch. Most precipitation falls in July, with an average of 194 mm | 7.6 inch.

Average temperature Dharwad



The temperatures are highest on average in April, at around 27.8 °c | 82.0 °f. In December, the average temperature is 22.5 °c | 72.5 °f. It is the lowest average temperature of the whole year.

Weather by month // weather averages Dharwad

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C	22.6 °C	24.6 °C	26.9 °C	27.8 °C	27 °C	23.7 °C	22.6 °C	22.5 °C	22.9 °C	23.5 °C	23.2 °C	22.5 °C
Min. Temperature °C	16.1 °C	17.7 °C	20.1 °C	21.8 °C	22.2 °C	21.6 °C	20.9 °C	20.7 °C	20.4 °C	19.8 °C	18 °C	16.5 °C
Max. Temperature °C	29.2 °C	31.5 °C	34.2 °C	35.3 °C	33.7 °C	27.4 °C	25.4 °C	25.6 °C	26.8 °C	28 °C	28.6 °C	28.7 °C
Precipitation / Rainfall mm	1	1	7	22	53	170	194	150	124	106	31	5
Humidity (%)	44%	40%	41%	53%	63%	83%	87%	86%	83%	74%	58%	48%
Rainy days (d)	0	0	1	4	8	18	20	19	14	10	3	1
avg. Sun hours (hours)	9.8	10.2	10.4	10.4	9.6	6	5.4	5.4	6.1	7.8	8.8	9.3

Data: 1991 - 2021 Min. Temperature °C, Max. Temperature °C, Precipitation / Rainfall mm (in), Humidity, Rainy days. Data: 1999 - 2019: avg. Sun hours

The variation in the precipitation between the driest and wettest months is 193 mm | 8 inches. The average temperatures vary during the year by 5.3 °C | 9.6 °F. The month with the highest relative humidity is July (86.75 %). The month with the lowest relative humidity is February (39.91 %). The month with the highest number of rainy days is July (26.90 days). The month with the lowest number of rainy days is February (0.23 days).

## GEOGRAPHICAL LAYOUT



Figure 7= Satellite view of the College campus (2017 image).

Water availability and the quality of water decides the environment in the campus.

Considering the geographical parameters and weather conditions, water management methodology has evolved and the barren land is now fully covered with grass, shrubs and plants. The site images show the metamorphous change in the land use.

These images demonstrate the significance of the grass in enhancing the self-survival over the non-rainy days. The continued retention of the grass will see higher growth and thicker bushes and shrubs.

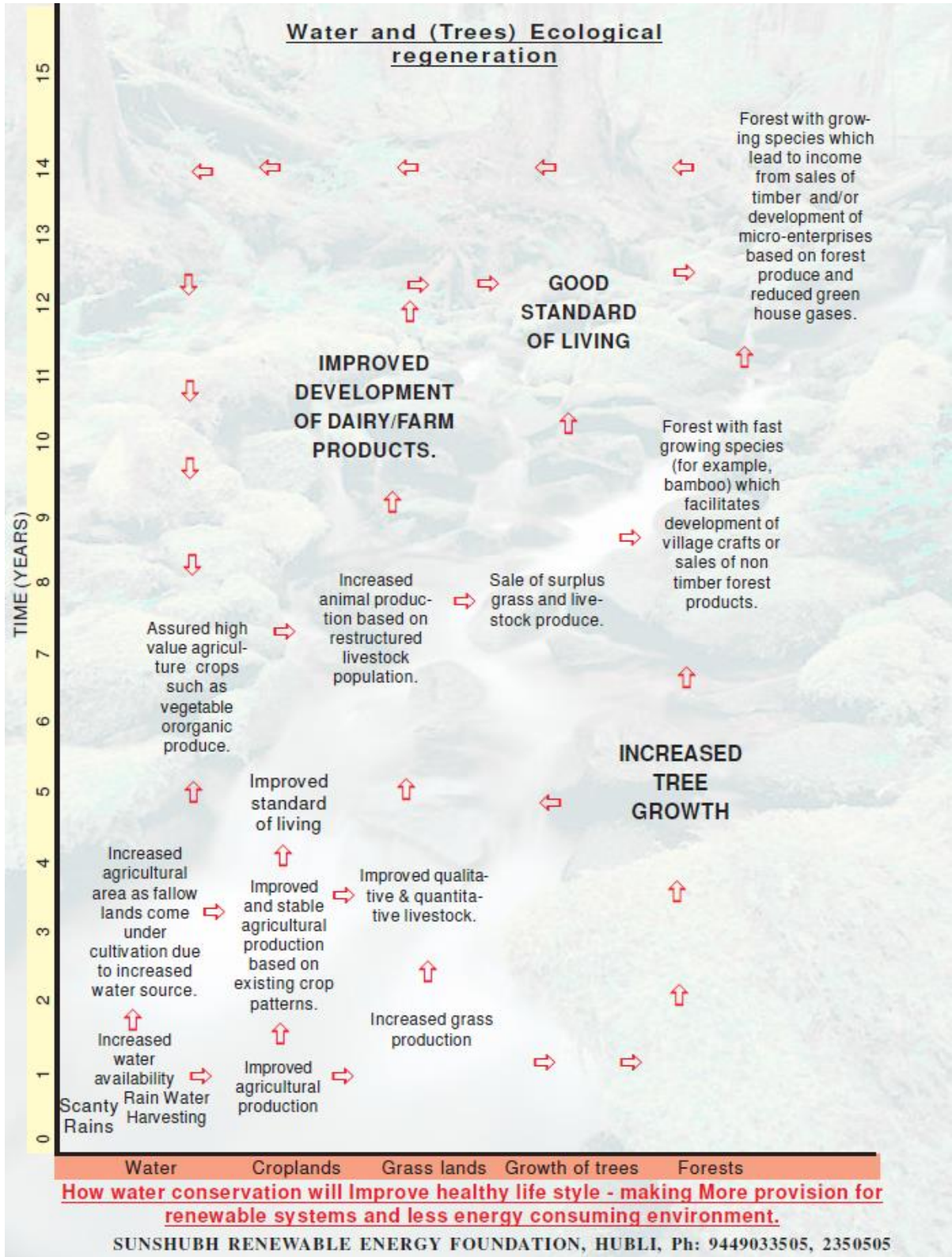


Figure 8 - Regeneration of ecology



## DISCUSSIONS ON EXECUTIVE SUMMARY

- Water management.
- Organic waste management.
- Clear windows
- Rainwater Harvesting Abuse and Use.
- Chemical waste disposal
- LPG (Fuel ) cylinders storage and management.
- HACCP practices.
- Utility Management.
- Food wastage and waste minimisation.
- Construction waste management.
- Asset management.
- Indoor Air Quality
- Fire Safety

It is important to discuss the geographical layout for better understanding.

**NOT BURNING OR UPROOTING THE GRASS – SUPPORTS THE FOREST GROWTH.**

### WATER MANAGEMENT

The institute is located on the sloppy terrain. However, the voluntary team may be formed to educate the other stake holders in managing the water appropriately.

The images shown are typical methods followed by many of the people for keeping green cover live.



Figure 9 - Watering the lawn



Water is money. Water is Energy and water is life. Judicious use of water is crucial considering the availability of water we suggest that the team of gardeners get educated on...

How we should water, How much should we water, How often should we water and when to stop watering are few check points.

Proper watering is crucial to having the best-looking lawn on the block. Here are some key points:

Since we reside in tropical zone, it is important that we operate the sprinklers after sunset to avoid evaporation and allow the water to percolate deep into the top soil.

- Lawn needs *at least 1"-1 ½"* of water per week, year-round, during the winter, too.

Figure 10 - Sprinkler, Consumer much less water and time.



- It's important to retain moisture content hence, Water deeply 2-3 times per week, rather than daily.
- Watering early in the morning also is favoured, when possible.
- We will need more water during the day hours.
- Should not water the lawns for so long that, water runs down.
- It is important to have automatic sprinklers and also to check them regularly to be sure that we get complete coverage. Going a step further, one can place the moisture sensor and automate the operation of sprinklers if one can afford the system.

ENVIRONMENT AUDIT A

## PLACING OF WASTE COLLECTION BINS

*Figure 11 - absence of waste collection bins in the corridor*

It was suggested in the previous report that the waste collection bins should be placed outside every room.

It is important to implement the measure for imparting sense of responsibility and good civic sense.



Considering human tendency, not to walk the distance, the waste collection bins should be placed before every room for ease of handling and convenience. Once the people get to the habit the waste collection will automatically be self-driven.

Few options are provided. The management can select the method based on cost factor.

If the rural technology is opted, the colour code need to be maintained.

If sufficient bins are placed before every room with colour code i.e., Green bins for organic and compostable waste. Yellow/Red for non-compostable wastes. (The management may choose to have any colour options as required) the manpower required to clear the same will be reduced as well.

These locally sourced bins may be placed all along the campus.

We suggest that these bins be colour coded to segregate the waste at source.

This option may look to be off the date. It should be important in placing a small placard as to why hand sewed bins are being put to use.

• **The biggest being the empowering the rural youth in being economically self-sufficient and promoting ethnic skills.**

• Bins are organic and biodegradable. Hence do not contribute to the carbon emissions. Leading to a very innovative Carbon Handprint initiative.

• Readily visible and easy to empty when half full.

## BATTERY MANAGEMENT

Placing the batteries is the beginning of prolonging the life. It is important to increase the life of batteries than regenerate.

The batteries regeneration if incorporated, can also be a revenue earning model for the college by educating the students and training them by undertaking third party batteries for re-generation.



Figure 12 - Local sourced waste collection bin



This also takes the institute to reducing its Carbon Footprint and closely interacting with the Industries, other educational institutes and the society at large.

First is to enhance the life of these batteries by properly placing them.

All batteries should be placed in well-ventilated area. As battery disposal is turning out to be a serious issue, ways to prolong the life of the batteries is very important from the environmental point and also from the Financial implications. We will elaborate on why and how batteries underperform and/or fail much before the expected life tenure.

### GALVANIC CORROSION

Galvanic corrosion is caused by self-induced current created by electrical potential of two dissimilar metals in contact with an electrolyte. It can occur when two dissimilar metals (such



as copper tube and steel pipe) are connected in the presence of an electrolyte. Water is a weak electrolyte. i.e., When Two Dissimilar Metals Come into Contact - Electrolysis Occurs, Causing Corrosion - Rusting of Both Surfaces.

The similar case is present in the college battery bank. It is obvious that the battery discharges by itself at all times when charged.

*Figure 14 - Galvanic reaction: causes self-discharging and degradation.*



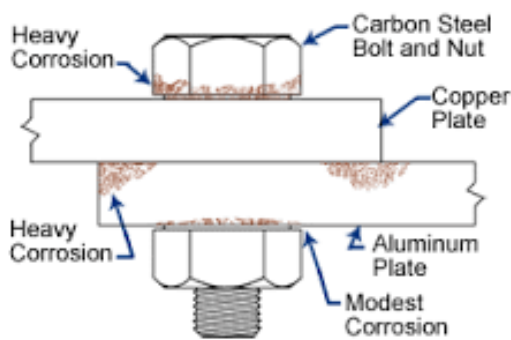
### How do we prevent Galvanic Corrosion - Electrolysis from occurring?

The quickest way to prevent Galvanic Corrosion or Electrolysis from occurring is to place two batteries away from each other without physical contact.

It is also required to prevent batteries resting or coming in contact with metal stand supports.

Placing the batteries on an insulated mat will be an added advantage.

We will discuss the regenerative system of used and weak batteries to



Effects of Galvanic Corrosion

enhance the life. It is important to know few points on handling of batteries. BU-703: Health Concerns with Batteries

Become familiar with the dos and don'ts when handling batteries.

Batteries are safe, but caution is necessary when touching damaged cells and when

handling lead acid systems that have access to lead and sulfuric acid. Several countries label lead acid as hazardous material, and rightly so. Lead can be a health hazard if not properly handled.

### LEAD

Lead is a toxic metal that can enter the body by inhalation of lead dust or ingestion when touching the mouth with lead-contaminated hands. If leaked onto the ground, acid and lead particles contaminate the soil and become airborne when dry. Children and foetuses are most vulnerable to lead exposure because their bodies are developing. Excessive levels of lead can affect a child's growth, cause brain

damage, harm kidneys, impair hearing and induce behavioural problems. In adults, lead can cause memory loss and lower the ability to concentrate, as well as harm the reproductive system. Lead is also known to cause high blood pressure, nerve disorders, and muscle and joint pain. Researchers speculate that Ludwig van Beethoven became ill and died because of lead poisoning.

By 2017, members of the International Lead Association (ILA) want to keep the lead blood level of workers in mining, smelting, refining and recycling below 30 micrograms per decilitre (30µg/dl). In 2014, the average participating employee checked in at 15.6µg/dl, but 4.8 percent were above 30µg/dl. (Source Batteries & Energy Storage Technology, Summer 2015.)

In 2019, the University of Southern California published the detection of lead in teeth of children living near the Exide Technologies battery recycling plant in Vernon, California

Lead occurs naturally in soil at 15–40mg/kg level. This level can increase multi-fold near lead battery manufacturing and recycling plants. Soil levels in developing countries, including on the continent of Africa, recorded lead contamination levels of 40–140,000mg/kg. (See [BU-705: How to Recycle Batteries.](#))

## **SULFURIC ACID**

The sulfuric acid in a lead acid battery is highly corrosive and is more harmful than acids used in most other battery systems. Contact with eye can cause permanent blindness; swallowing damages internal organs that can lead to death. First aid treatment calls for flushing the skin for 10–15 minutes with large amounts of water to cool the affected tissue and to prevent secondary damage. Immediately

remove contaminated clothing and thoroughly wash the underlying skin. Always wear protective equipment when handling sulfuric acid.

## CADMIUM

Cadmium used in nickel-cadmium batteries is considered more harmful than lead if ingested. Workers at NiCad manufacturing plants in Japan have been experiencing health problems from prolonged exposure to the metal, and governments have banned disposal of nickel-cadmium batteries in landfills. The soft, whitish metal that occurs naturally in the soil can damage kidneys. Cadmium can be absorbed through the skin by touching a spilled battery. Since most NiCad batteries are sealed, there are no health risks in handling intact cells; caution is required when working with an open battery.

Nickel-metal-hydride is considered non-toxic and the only concern is the electrolyte. Although toxic to plants, nickel is not harmful to humans.

Lithium-ion is also benign — the battery contains little toxic material. Nevertheless, caution is required when working with a damaged battery. When handling a spilled battery, do not touch your mouth, nose or eyes. Wash your hands thoroughly.

Keep small batteries out of children's reach. Children younger than four are the most likely to swallow batteries, and the most common types that are ingested are button cells. Each year in the United States alone, more than 2,800 children are treated in emergency rooms for swallowing button batteries. According to a 2015 report, serious injuries and deaths from swallowing batteries have increased nine-fold in the last decade.

The battery often gets stuck in the oesophagus (the tube that passes food). Water or saliva creates an electrical current that can trigger a chemical reaction producing hydroxide, a caustic ion that causes serious burns to the surrounding tissue. Doctors often misdiagnose the symptoms, which can reveal themselves as fever, vomiting, poor appetite and weariness. Batteries that make it through the oesophagus often move through the digestive tract with little or no lasting damage. The advice to a parent is to choose safe toys and to keep small batteries away from young children.

#### Safety Tips

- Keep button batteries out of sight and reach of children. Remote controls, singing greeting cards, watches, hearing aids, thermometers, toys and electric keys may contain these batteries.
- Similar to pharmaceutical products, keep loose batteries locked away to prevent access by small children.
- Communicate the danger of swallowing button batteries with your children, as well as caregivers, friends, family members and babysitters.
- If you suspect your child has ingested a battery, go to the hospital immediately. Wait for a medical assessment before allowing the child to eat and drink.

#### VENTILATION

Charging batteries in living quarters should be safe, and this also applies to lead acid. Ventilate the area regularly as you would a kitchen when cooking. Lead acid produces some hydrogen gas but the amount is minimal when charged correctly. Hydrogen gas

becomes explosive at a concentration of 4 percent. This would only be achieved if large lead acid batteries were charged in a sealed room. Over-charging a lead acid battery can produce hydrogen sulphide. The gas is colourless, very poisonous, flammable and has the odour of rotten eggs. Hydrogen sulphide also occurs naturally during the breakdown of organic matter in swamps and sewers; it is present in volcanic gases, natural gas and some well waters. Being heavier than air, the gas accumulates at the bottom of poorly ventilated spaces. Although noticeable at first, the sense of smell deadens the sensation with time and potential victims may be unaware of its presence.

As a simple guideline, hydrogen sulphide becomes harmful to human life if the odour is noticeable. Turn off the charger, vent the facility and stay outside until the odour disappears. Other gases that can develop during charging and the operations of lead acid batteries are arsine (arsenic hydride,  $\text{AsH}_3$ ) and (antimony hydride,  $\text{SbH}_3$ ). Although the levels of these metal hydrides stay well below the occupational exposure limits, they are a reminder to provide adequate ventilation.

Regeneration of week batteries for the Second/Third lease of life.

Significance...

- The early regeneration results into second tenure of the batteries i.e., another term of 3 to 5 years as per Battery specifications.
- Optimised energy consumption. Thus, reduced cost of operation.
- Delayed disposal results into elimination of environment pollution.

- Reduced impact on CARBON FOOTPRINT.

### HACCP PRACTICES – GENDER EQUALITY

Sanitary Pad dispenser :

We appreciate the placement of the sanitary pad dispenser and also being used by the members. One improvement is however needed. The custodian of the pads contact details may be displayed. This should help to draw the attention of the stock holder to replenish the dispenser when empty.

Sanitary pad Incinerator:

The pad incinerator is in operation, but needs ready access. The women empowerment committee should be asked to check for all the women comfort necessities. It may be stressed more as a necessity and not as a luxury.

It would be important to display the usage instructions in Kannada, Hindi and English so that the members can operate the incinerator by themselves.

### FIRE PREVENTION & SAFETY

The fire extinguishers should be placed at the entrance of the room housing dangerous devices and chemistry lab. So that, they are handy when need to be used.







Figure 16 - No ready access to fire extinguisher.

The detailed information chart on fire extinguishers is to be prominently displayed and all staff should be educated and trained.

## PORTABLE FIRE EXTINGUISHERS

**IN CASE OF FIRE:**

- Call the fire department immediately.
- Do not use an extinguisher without proper training.
- Know which extinguisher is correct for what type of fire.
- Only use portable extinguishers when the fire is contained to a small area.

**FIRE CLASSIFICATION:**

**A** Use for ordinary combustibles. Contains water.

**C** Use for electrical fires. Do not use water on these fires! Contains dry chemicals, carbon dioxide or halogenated agents to smother the fire with foam.

**B** Use for flammable liquids. Contains dry chemicals or halogenated agents to smother the fire with foam.

**D** Use for combustible metals. Contains special liquids or dry powder agent.

### P. A. S. S. OPERATING PROCEDURE

**P** **PULL** the pin. Hold the extinguisher with the nozzle pointing away from you, and release the locking mechanism.

**A** **AIM** the nozzle at the base of the fire.

**S** **SQUEEZE** the lever slowly and evenly.

**S** **SWEEP** from side-to-side at the base of the flame.

Figure 17 - Fire extinguisher Operating instructions

It is also important that the handling instructions are Predominantly displayed. The sample poster is reproduced for replication.

Type Extinguisher	Fire						Comments
	CLASS A Combustible materials (e.g. paper & wood)	CLASS B Flammable liquids (e.g. paint & petrol)	CLASS C Flammable gases (e.g. butane and methane)	CLASS D Flammable metals (e.g. lithium & potassium)	Electrical Electrical equipment (e.g. computers & generators)	CLASS F Deep fat fryers (e.g. chip pans)	
Water	✓	✗	✗	✗	✗	✗	Do not use on liquid or electric fires
Foam	✓	✓	✗	✗	✗	✗	Not suited to domestic use
Dry Powder	✓	✓	✓	✓	✓	✗	Can be used safely up to 1000 volts
CO2	✗	✓	✗	✗	✓	✗	Safe on both high and low voltage
Wet Chemical	✓	✗	✗	✗	✗	✓	Use on extremely high temperatures

Figure 18 - Fire extinguisher: Class

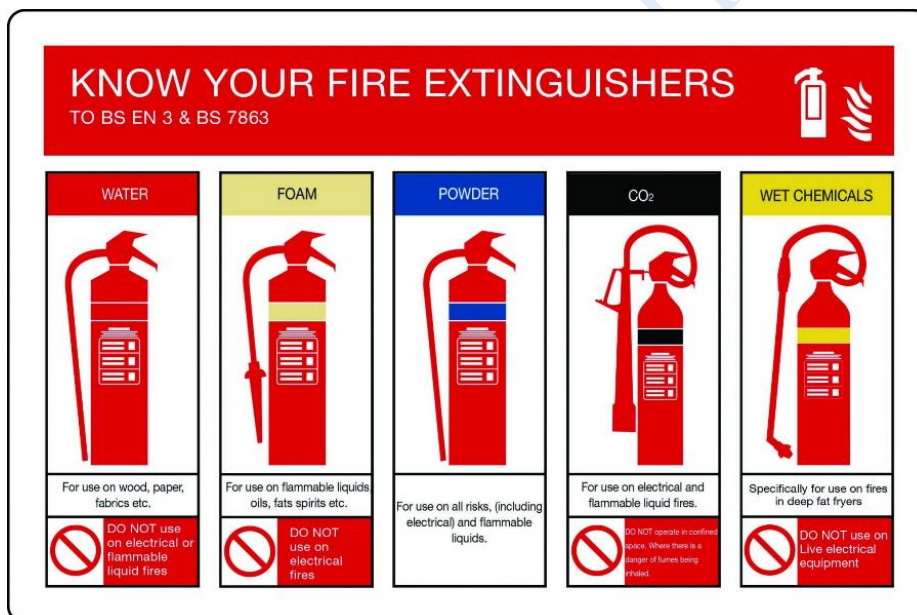


Figure 19 - Types of Fire extinguishers

In case of fire, the appropriate Fire extinguishers should be placed at the entrance but outside the room. The details of such classified Extinguishers is indicated for reference.

### RAINWATER MANAGEMENT.

Laying of rainwater opening pavers.

The rainwater is forced to flow over the pavers and as a result flood the low lying area.

It may be recalled that, in the previous report, it was suggested to divert the water on to the sides by creating small humps and creating water percolation holes between pavers.

Creating these provisions will help the surrounding plants to get more water. Watering the subsoil will lead to increased rate of survival and need for less watering during the non-rainy days.

### **MEDICINAL PLANTATION.**

The College has a green carpet at every possible space well covering the sloppy terrain. As such, the rainwater percolates down and necessitates the objective.

An attempt by one of the colleges is shown. The same can be reproduced as suitable to the college establishment.

Additionally, similar placard may be posted at the entrance and extending the invitation to the citizens to visit the medicinal garden.

This initiative will take the information to the citizens and can help build dialog.

### **VERMICOMPOST**



*Figure 20 - Vermicompost*

The organic waste composting structure has been created, needs the attention of all the stake holders in making it successful. Collective effort will take the initiative to a great and meaningful implementation. The infrastructure is already in place.



The compost so formed should be exhibited for the information of the farming community through the children coming to college for education.

The chemical analysis of the organic manure so produced can be carried out by the science stream students and the same can be carried out of the campus.

The experience and pride of discussing the initiatives may be recorded and the same may be projected during the functions and honoured. These initiatives will be a motivator for other students to explore similar opportunities.

Just to quote, The commerce students may take-up a project where the local product say agricultural produce is marketed after value addition in any possible way.

These measures give financial stability to the weaker sections of the society and thus the moral responsibility of the establishment.

A typical working model where one can replicate the rural economy is by managing kitchen waste. This may be used to showcase the ways of developing the vermicompost.

The benefits of vermicompost if exhibited, the children can disseminate the same to their parents back home.



*Figure 21 - composted kitchen waste*

## GREY WATER MANAGEMENT



*Figure 22 - Grey water pond*

In today's context, use of soaps and cosmetics has increased multifold. The water that is let out along with the soap and cosmetic chemicals is termed as grey water. This water is containing valuable chemicals which form micro nutrients to the fertilizers. If this water is left open untreated, would cause foul smell and would be a breeding zone for mosquito and other harmful insects.

It is important to arrest the negative impact and extract the useful nutrients for good use. The botany department can initiate and do some research to come up with firsthand experience on benefits of grey water use.

Planting *Canna Indica* locally known as kaabaali and water hyacinth which is predominantly seen in polluted water ponds are known as water purifying plants. While kaabaali grows in greywater accumulated areas. Water hyacinth grows well in polluted water ponds.

The images of the two plants are reproduced below.



Canna Indica (Kaabaali)



Water Hyacinth.

More information can be drawn from the two links below.

<https://www.sciencedirect.com/science/article/pii/S0048969719347229>

[https://www.researchgate.net/publication/323278568\\_Waste\\_Water\\_Treatment\\_using\\_Water\\_Hyacinth](https://www.researchgate.net/publication/323278568_Waste_Water_Treatment_using_Water_Hyacinth)

#### **LIMITATIONS:**

Our recommendations are in the interest of conservation of Electrical Energy and Green Culture i.e., the reduction in CARBON FOOTPRINT. The compliance to the recommendations will be subjected to meeting the safety and Environmental rules and guidelines.



## **ACTION PLAN SUMMARY:**

Earmark the action plan.

- Invite subject experts for Tec talks,
- Organize in person panel discussions and interaction to propagate the knowledge and mitigate the problems in practicing the same.
- Prioritize the initiatives and execute.
- Observe the benefits and shortcomings.
- Workout further improvement by involving the staff and students.

## **MODE OF ACTION**

The process of environment protection should be carried out in three steps.

- Good housekeeping practices.
- Minor alterations using in house work culture and minimum investments on accessories as discussed.
- Capital investments, which may be required for installation of new methodologies may be taken up on phased manner.

We will be happy to assist you for any further advice/consultancy if required either on Rainwater management or on any of the measures discussed in the report.

We hope the measures are implemented in good spirit and to human convenience and comfort.

For SUNSHUBH TECHNOVATIONS PVT LTD.,

Mallikarjun A. Kambalyal. B.E. (E&C)

Certified Energy Auditors EA-3485

**NOTES**

ENVIRONMENT AUDIT REPORT

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