ENVIRONMENT AUDIT REPORT

2021-22

in compliance with the statutory requirements under the NAAC accreditation procedures

Rashtriya Shikshana Samithi Trust's
R V College of Engineering. (Autonomous)
Bangalore

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

SUNBSHUBH TECHNOVATIONS PVT LTD.

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Hubli – 580029. Karnataka. India.

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Dusseldorf. Germany Anbieter-Nr 1041388
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ABOUT SUNSHUBH TECHNOVATIONS PRIVATE LIMITED

Sunshubh Technovations Private Limited is registered in the year 2020 and has evolved from initial proprietary concern, Sunshubh Renewables & Research Centre. Sunshubh has been in operation since 2008. Sunshubh today is led by a team of well experienced Certified Energy Auditors and tech- savvy young engineers.

We believe in Identifying opportunities and executing solutions based on need with highest priority to Energy conservation over efficiency.

Since beginning, Sunshubh has been growing and today, we have wide range of clientele In the field of Industry : Tool room, Chemicals and refinery, Mining, Health, Hospitality, Food processing, Infrastructure and Educational institutions under NAAC compliance. Our approach has been very aggressive in equipping ourselves with the latest instruments.

After decade of professional experience, we restructured ourselves and thus the formation of a Private Limited company on 22nd July 2020.

Today we have with us the technical team comprising three Certified Energy Auditors, One Certified Energy Manager and support team of young and enthusiastic engineers to comply to the client requirements.

POLICY MATTERS

Learning from our training in Germany and their policies, SUNSHUBH does not supply any energy saving equipment's or systems. However, we do stand up to support and execute the measures to prove our findings right. This is mandatory to assure the client that we do not market any self-centred product or orient the Audit assignment to sell any third party product. Meaning to say **we stand neutral to all methodologies in the interest of adopting best technologies.**

We strongly believe in sharing our knowledge and training inhouse manpower for continual improvement in energy flow.

We have set a policy not to hire the instruments from third party but to procure every small or big ones to do justice to our clients.

CONTENTS

GLOSSARY

EXECUTIVE SUMMARY.

For details, please follow the discussions in the report.

Sl	Observations	Issues & Problems	Resulting losses	Remedial measures	Capital	Projected savings
1	Water manage-ment.	Flooding the lawns.	Excess water consumed.	Sprinkler.	@ Rs1000 /- per unit.	Energy & Water savings
2	Organic waste manage-ment.	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 Harveting 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 manage-ment.	Fire hazards	Loss of life and loss of assets	Organised 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.	Un accountability	Call for penalty or pollution	Land use change	Labelling & Transportation	Organised 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 awarenes s	NIL/Minimum	Emer-gency prepared ness.

CRITERION VII – INSTITUTIONAL VALUES AND BEST PRACTICES

With respect to environment.

Key Indicator - 7.1 Institutional Values and Social Responsibilities

Metric No.	Description	Compliance	Initiatives required
7.1.1 QIM	Measures initiated by the Institution for the promotion of gender equity during the last five years. Annual gender sensitization action plan Specific facilities provided for women in terms of: Safety and security - Energy	Partly Complied	Our The concept of home energy management in relation to the environmental impact may be initiated for the women. Detailed discussion on **CARBON HANDPRINT** should be discussed at length. The typical illustration is reproduced.

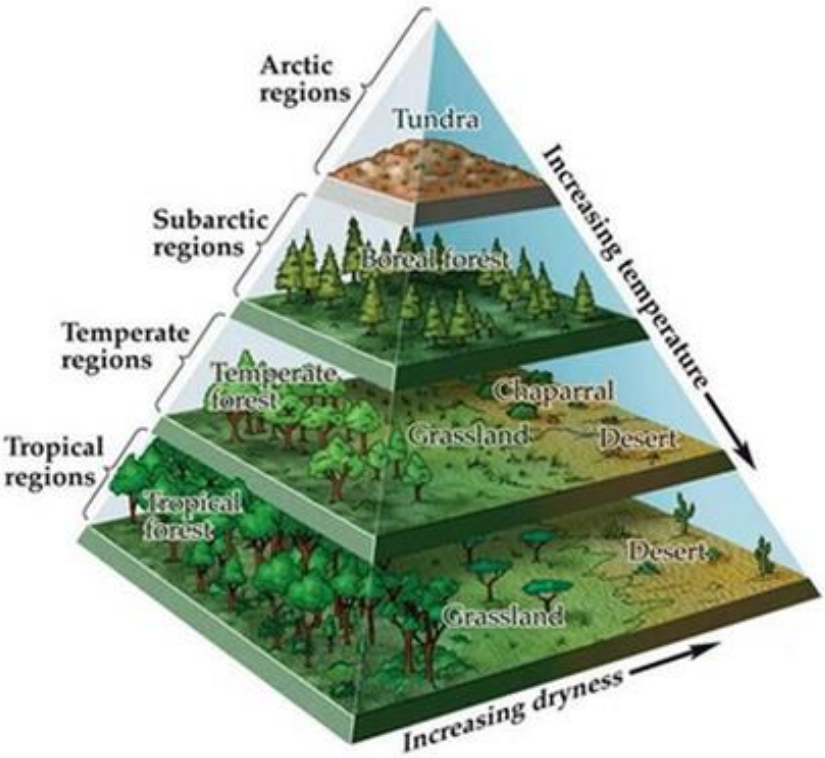

Figure 1 - Ecology Pyramid.

Figure 2 - Innovation key pointers

	Environmental Consciousness and Sustainability		Discuss on why the recent calamities keep occurring more often than before.
7.1.2 QnM	*The Institution has facilities for alternate sources of energy and energy conservation measures* • Solar energy • Biogas plant • Wheeling to the Grid • Sensor-based energy conservation • Use of LED bulbs/ power efficient equipment	Complied through parent society.	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. If renewable energy projects are installed the excess power can be exported to grid on non-working hours. Sensor based control is a must for energy use optimization.

			Complete the ongoing work at faster pace.
7.1.3 Q_lM	*Describe the facilities in the Institution for the management of the following types of degradable and non-degradable waste (within 500 words)* Solid waste management Liquid waste management Biomedical waste management E-waste management Waste recycling system Hazardous chemicals and radioactive waste management	Complied partially wrt 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_nM	*Water conservation facilities available in the Institution:* 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	Complied . Open ground percolation, Open well restoration. Percolation pond near to open well	The institution should consider in measuring the energy and power demand at various 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.
7.1.5 Q_nM	*Green campus initiatives include (4)*	Partially complied.	With disciplined vehicle parking the reduction in fuel consumption can be demonstrated in the college

	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.		campus. The students can be given a task of conducting such practical's on field and a competition in house should educate the society.
7.1.6 QnM	*Quality audits on environment and energy are regularly undertaken by the institution (5)* 7.1.6.1. The institutional environment and energy initiatives are confirmed through the following 1.Green audit 2. Energy audit 3.Environment audit 4.Clean and green campus recognitions/awards 5. Beyond the campus environmental promotional activities	Complied .	The audit findings should be predominantly projected by action from all stake holders of the institution.
7.1.7 Q_nM	*The Institution has disabled-friendly, barrier free environment* Built environment with ramps/lifts for easy access to classrooms. Disabled-friendly washrooms	The initiatives have been considered.	The demand for muscle power to climb the ramp may be considered as one such case and ideally establish the gradient of the ramp.

	Signage including tactile path, lights, display boards and signposts Assistive technology and facilities for persons with disabilities (Divyangjan) accessible website, screen-reading software, mechanized equipment Provision for enquiry and information: Human assistance, reader, scribe, soft copies of reading material, screen reading		
7.1.9 Q_lM	*Sensitization of students and employees of the Institution to the constitutional obligations: values, rights, duties and responsibilities of citizens* Describe the various activities in the Institution for inculcating values for being responsible citizens as reflected in the Constitution of India within 500 words.	Need to explore.	The sensitization of switching off the non-required electrical appliances and devices should be encouraged. Like organizing the inhouse competition. Every student to table their energy bills in the previous year. The savings in the forth coming year should be recorded and 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_nM	*The Institution has a prescribed code of conduct for students, teachers, administrators and other staff*	Complied.	A range of activities can be brought in just as discussed in 7.1.9 above.

	and conducts periodic programmes in this regard. 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 programmes for students, teachers, administrators and other staff Annual awareness programmes on Code of Conduct are organized		
7.1.11 QlM	*Institution celebrates / organizes national and international commemorative days, events and festivals* Describe the efforts of the Institution in celebrating /organizing national and international commemorative days, events and festivals during the last five years within 500 words	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, 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.

			https://en.wikipedia.org/wiki/Constitution_of_India
7.2.1 QlM	Describe two best practices successfully implemented by the Institution as per NAAC format provided in the Manual.	Complied.	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.

The Bulletin on Energy Efficiency

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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
Managing Director, IREDA

INSIGHT

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

We 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_2 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_2 into the atmosphere is also reduced. Reduced CO_2 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

PART 1 – GENERAL

CARBON FOOTPRINT – ENVIRONMENT IMPACT 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

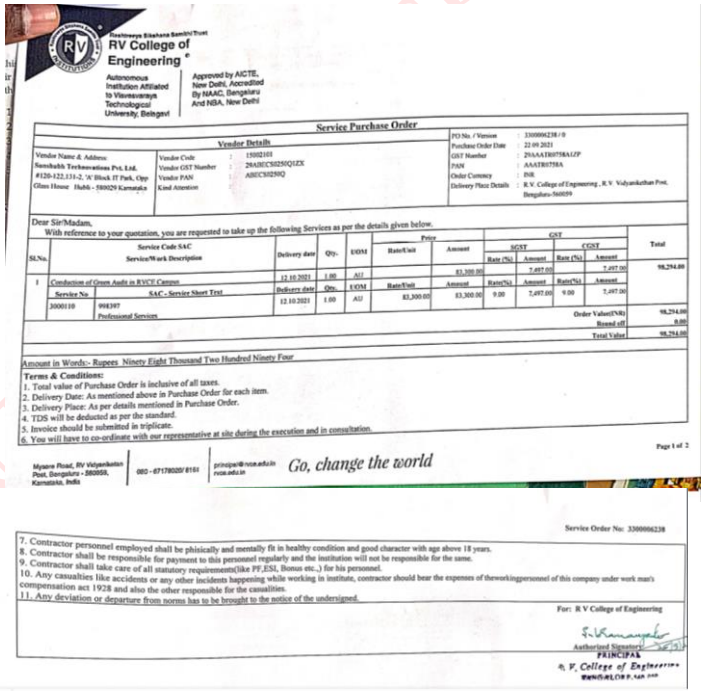
(*Indicative templet for display at all prominent areas, waiting rooms, canteen, library, relaxing areas in the campus.*)

ACKNOWLEDGEMENT:

SUNSHUBH TECHNOVATIONS PVT LTD.,is pleased to express its sincere gratitude to the management of Rashtriya Shikshana Samithi Trust's R V College of Engineering. (Autonomous) Bangalore Karnataka, 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 neglected to appreciate the sincere efforts put in by the 7th Criteria Team lead by the able and motivating Principal Dr K N SUBRAMANYA 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.



RV College of Engineering

Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

Approved by AICTE, New Delhi, Accredited By NAAC, Bangaluru And NBA, New Delhi

Service Purchase Order

Vendor Details

Dear Sir/Madam,

With reference to your quotation, you are requested to take up the following Services as per the details given below.

Terms & Conditions:

1. Total value of Purchase Order is inclusive of all taxes.
2. Delivery Date: As mentioned above in Purchase Order for each item.
3. Delivery Place: As per details mentioned in Purchase Order.
4. TDS will be deducted as per the standard.
5. Invoice should be submitted in triplicate.
6. You will have to co-ordinate with our representative at site during the execution and in consultation.
7. Contractor personnel employed shall be phisically and mentally fit in healthy condition and good character with age above 18 years.
8. Contractor shall be responsible for payment to this personnel regularly and the institution will not be responsible for the same.
9. Contractor shall take care of all statutory requirements(like PF,ESI, Bonus etc.,) for his personnel.
10. Any casualties like accidents or any other incidents happening while working in institute, contractor should bear the expenses of theworkingpersonnel of this company under work man's compensation act 1928 and also the other responsible for the casualties.
11. Any deviation or departure from norms has to be brought to the notice of the undersigned.

For: R V College of Engineering

PRINCIPAL

R. V. College of Engineering

Go, change the world

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 ENERGY STATUS.

We acknowledge the involvement of HODs & Coordinator

Dr K N Subramanya	Principal
Col Ishwar Doddamani	Deputy Director-Administration
Sunil Murthy	Civil Engineer – RV Campus.

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

***Criteria* 7.1.6**

ENVIRONMENT AUDIT COMPLETION CERTIFICATE

I, Mallikarjun A Kambalyal, endorse and confirm that the Environment Audit has been carried out on 29th Oct 2021 under the instructions of Principal, Dr K N Subramanya for R V College of Engineering, Bengaluru. This report is generated based on the site visits and evidence collected from the site.

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.

I also confirm and sign this certificate, in case the institution needs demonstration, my team of professionals shall be happy to do so.

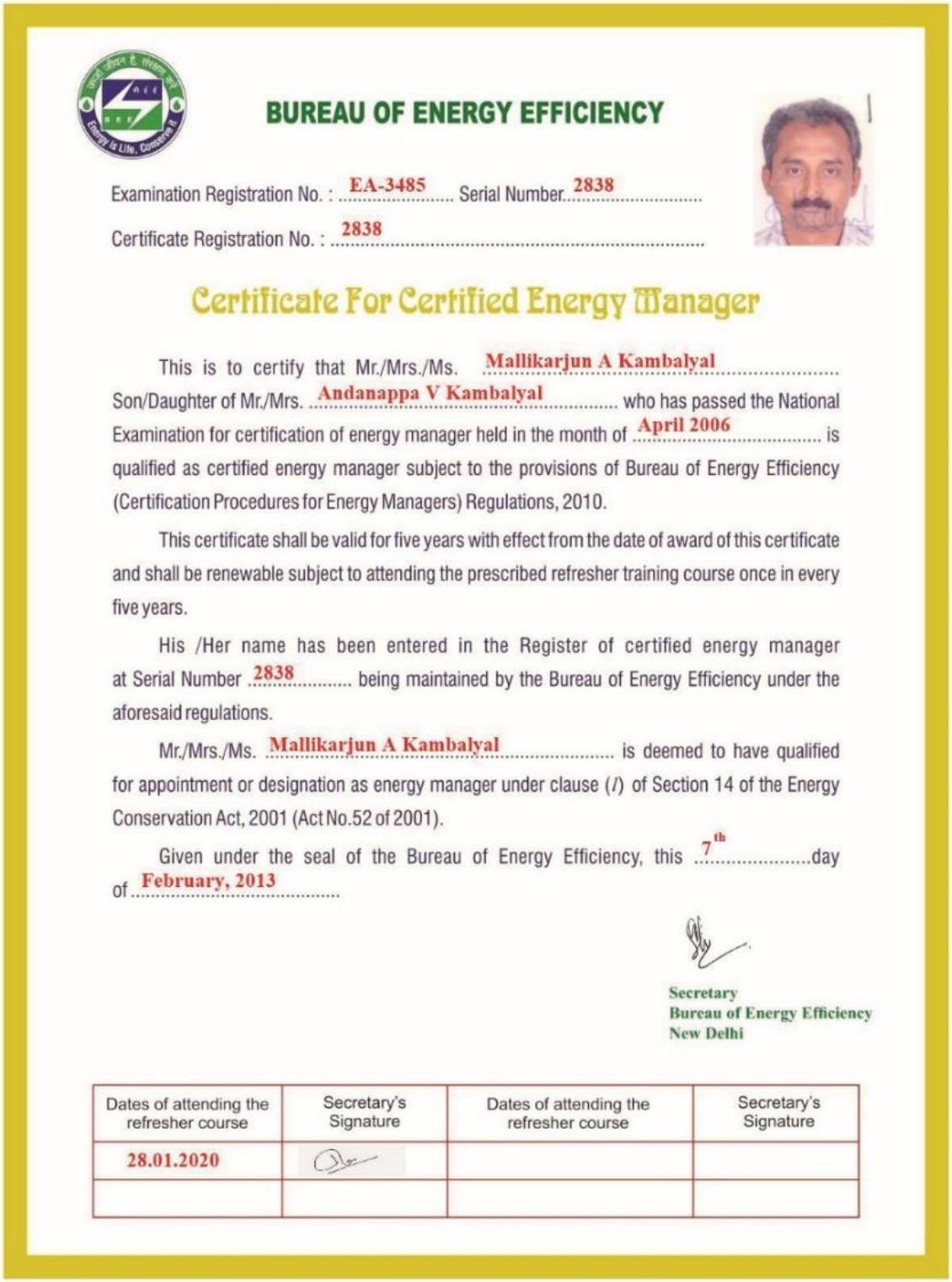
We present this report to much more than the legal or mandatory compliances. This report is tabled in two parts. The first forms the core discussions which are general in nature. The second section is subject specific under the statutory requirements of the NAAC accreditation norms. They are Audit reports on, green aspects, Energy aspects, Environment aspects, Health aspects and the discussions on net CARBON FOOTPRINT & the CARBON HANDPRINT initiatives.

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.



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 (*l*) 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 7th 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
28.01.2020			

Figure 3 - Bureau of energy Efficiency Regd No: EA3485

Certificate of Successful Completion

Intertek

This is to Certify that

MALLIKARJUN A KAMBALYAL

has successfully completed the

Intertek

CQI & IRCA Certified ISO 14001:2015
Auditor Conversion Training Course

The Course includes the assessment and evaluation of Environmental Management Systems to conform to the requirements of ISO 14001:2015 and ISO 19011:2011

This course is certified by the Chartered Quality Institute (CQI) and the International Register of Certificated Auditors (IRCA)
– IRCA REFERENCE 18093 –

The course meets the training requirements for individuals seeking certification under the IRCA Auditor Certification Schemes

CQI | IRCA
APPROVED TRAINING PARTNER

Authorising Signature:

Course Dates: 14th – 16th July 2017 Certificate Number: 47730

Membership Application To Be Made Within 3 Years From Last Day of Course

121807

Figure 4 - ISO Certified Lead Auditor. Certificate No: 47730

Figure 5 - ISO Certified Lead Auditor. Certificate No: ENR-00253448

TÜVRheinland®
Genau. Richtig.

Teilnahmebescheinigung

Mr. Mallikarjun Andanappa Kambalyal

has successfully completed the

Manager Training Programme of the Federal Ministry of Economics and Technology

Germany, September 02 – 28, 2013

Energy Efficiency in Industrial Enterprises

Cologne, September 28th, 2013

Dr. Steffi Artl
(Geschäftsführerin)

Hubert Smarowos
(Geschäftsführer)

TÜV Rheinland Akademie GmbH • Alboinstr. 56 • 12103 Berlin

Figure 6 - Manager training programme, Germany

Manager Training Programme

Federal Ministry of Economics and Technology

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Certificate

Fit for Partnership with Germany

Mr Mallikarjun Kambalyal

has successfully participated in the

Manager Training Programme of the Federal Ministry of Economics and Technology with India

from September 2 to September 28, 2013 in Germany.

The programme was carried out by the TÜV Rheinland Akademie, Cologne.

The Manager Training Programme is funded by the Federal Ministry of Economics and Technology of the Federal Republic of Germany. GIZ is the general manager and coordinator of the programme.

Bonn, September 2013

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Reimut Düring	Christina Otto
Head of Manager Training Programme GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH	Senior Project Manager GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

Figure 7 - 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 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 green 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 green 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 green 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, green 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 green 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

UNDERSTAND THE 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 of all the above audits should be to make an organisation contribute zero emissions which are called bye 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.

FACTORS CONSIDERED

Source : https://en.wikipedia.org/wiki/Bangalore

GEOGRAPHY

Main article: Bangalore geography and environment

The Hesaraghatta Lake in Bangalore

Bangalore lies in the southeast of the South Indian state of Karnataka. It is in the heart of the Mysore Plateau (a region of the larger Precambrian Deccan Plateau) at an average elevation of 900 m (2,953 ft).[63]:8 It is located at 12.97°N 77.56°E and covers an area of 741 km^2 (286 sq mi).[64] The majority of the city of Bangalore lies in the Bangalore Urban district of Karnataka and the surrounding rural areas are a part of the Bangalore Rural district. The Government of Karnataka has carved out the new district of Ramanagara from the old Bangalore Rural district.[65]

The topology of Bangalore is generally flat, though the western parts of the city are hilly. The highest point is Vidyaranyapura Doddabettahalli, which is 962 metres (3,156 feet) and is situated to the north-west of the city.[66] No major rivers run through the city, although the Arkavathi and South Pennar cross paths at the Nandi Hills, 60 kilometres (37 miles) to the north. River Vrishabhavathi, a minor tributary of the Arkavathi, arises within the city at Basavanagudi and flows through the city. The rivers Arkavathi and Vrishabhavathi together carry much of Bangalore's sewage. A sewerage system, constructed in 1922, covers 215 km^2 (83 sq mi) of the city and connects with five sewage treatment centres located in the periphery of Bangalore.[67]

In the 16th century, Kempe Gowda I constructed many lakes to meet the town's water requirements. The Kempambudhi Kere, since overrun by modern development, was prominent among those lakes. In the earlier half of 20th century, the Nandi Hills waterworks was commissioned by Sir Mirza Ismail (Diwan of Mysore, 1926–41 CE) to provide a water supply to the city. The river Kaveri provides around 80% of the total water supply to the city with the remaining 20% being obtained from the Thippagondanahalli and Hesaraghatta reservoirs of the Arkavathi river.[68] Bangalore receives 800 million litres (211 million US gallons) of water a day, more than any other Indian city.[69] However, Bangalore sometimes does face

water shortages, especially during summer- more so in the years of low rainfall. A random sampling study of the air quality index (AQI) of twenty stations within the city indicated scores that ranged from 76 to 314, suggesting heavy to severe air pollution around areas of traffic concentration.[70]

Bangalore has a handful of freshwater lakes and water tanks, the largest of which are Madivala tank, Hebbal lake, Ulsoor lake, Yediyur Lake and Sankey Tank. Groundwater occurs in silty to sandy layers of the alluvial sediments. The Peninsular Gneissic Complex (PGC) is the most dominant rock unit in the area and includes granites, gneisses and migmatites, while the soils of Bangalore consist of red laterite and red, fine loamy to clayey soils.[70]

Vegetation in the city is primarily in the form of large deciduous canopy and minority coconut trees. Though Bangalore has been classified as a part of the seismic zone II (a stable zone), it has experienced quakes of magnitude as high as 4.5.[71]

CLIMATE

Bangalore has a tropical savanna climate (Köppen climate classification *Aw*) with distinct wet and dry seasons. Due to its high elevation, Bangalore usually enjoys a more moderate climate throughout the year, although occasional heat waves can make summer somewhat uncomfortable.[72] The coolest month is January with an average low temperature of 15.1 °C (59.2 °F) and the hottest month is April with an average high temperature of 35 °C (95 °F).[73] The highest temperature ever recorded in Bangalore is 39.2 °C (103 °F) (recorded on 24 April 2016) as there was a strong El Niño in 2016.[74] There were also unofficial records of 41 °C (106 °F) on that day. The lowest ever recorded is 7.8 °C (46 °F) in January 1884.[75][76] Winter temperatures rarely drop below 14 °C (57 °F), and summer temperatures seldom exceed 36 °C (97 °F). Bangalore receives rainfall from both the northeast and the southwest monsoons and the wettest months are September, October and August, in that order.[73] The summer heat is moderated by fairly frequent thunderstorms, which occasionally cause power outages and local flooding. Most of the rainfall occurs during late afternoon/evening or night and rain before noon is infrequent. November 2015 (290.4 mm) was recorded as one of the wettest months in Bangalore with heavy rains causing severe flooding in some areas, and closure of a number of organisations for over a couple of days.[77] The

heaviest rainfall recorded in a 24-hour period is 179 millimetres (7 in) recorded on 1 October 1997.[78]

Climate data for Bangalore (1981–2010, extremes 1901–2012)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	32.8 (91.0)	35.9 (96.6)	37.3 (99.1)	38.3 (100.9)	38.9 (102.0)	38.1 (100.6)	33.3 (91.9)	33.3 (91.9)	33.3 (91.9)	32.4 (90.3)	31.7 (89.1)	31.1 (88.0)	38.9 (102.0)
Average high °C (°F)	27.9 (82.2)	30.7 (87.3)	33.1 (91.6)	34.0 (93.2)	33.3 (91.9)	29.6 (85.3)	28.3 (82.9)	27.8 (82.0)	28.6 (83.5)	28.2 (82.8)	27.2 (81.0)	26.5 (79.7)	29.6 (85.3)
Average low °C (°F)	15.8 (60.4)	17.5 (63.5)	20.0 (68.0)	22.0 (71.6)	21.7 (71.1)	20.4 (68.7)	19.9 (67.8)	19.8 (67.6)	19.8 (67.6)	19.6 (67.3)	18.0 (64.4)	16.2 (61.2)	19.2 (66.6)
Record low °C (°F)	7.8 (46.0)	9.4 (48.9)	11.1 (52.0)	14.4 (57.9)	16.7 (62.1)	16.7 (62.1)	16.1 (61.0)	14.4 (57.9)	15.0 (59.0)	13.2 (55.8)	9.6 (49.3)	8.9 (48.0)	7.8 (46.0)
Average rainfall mm (inches)	1.9 (0.07)	5.4 (0.21)	18.5 (0.73)	41.5 (1.63)	107.4 (4.23)	106.5 (4.19)	112.9 (4.44)	147.0 (5.79)	212.8 (8.38)	168.3 (6.63)	48.9 (1.93)	15.7 (0.62)	986.9 (38.85)
Average rainy days	0.2	0.4	1.1	3.1	6.7	6.2	7.2	9.9	9.8	8.3	3.8	1.4	58.1
Average relative humidity (%) (at 17:30 IST)	41	32	29	35	47	62	65	67	64	65	61	53	52
Mean monthly sunshine hours	262.3	247.6	271.4	257.0	241.1	136.8	111.8	114.3	143.6	173.1	190.2	211.7	2,360.9
Source 1: India Meteorological Department[79][80]													
Source 2: NOAA (sun: 1971–1990)[81]													

POLLUTION CONTROL

Bangalore generates about 3,000 tonnes of solid waste per day, of which about 1,139 tonnes are collected and sent to composting units such as the Karnataka Composting Development Corporation. The remaining solid waste collected by the municipality is dumped in open spaces or on roadsides outside the city.[134] In 2008, Bangalore produced around 2,500 metric tonnes of solid waste, and increased to 5000 metric tonnes in 2012, which is transported from collection units located near Hesaraghatta Lake, to the garbage dumping sites.[135] The city suffers significantly with dust pollution, hazardous waste disposal, and disorganised, unscientific waste retrievals.[136] The IT hub, Whitefield region is the most polluted area in Bangalore.[137] Recently a study found that over 36% of diesel vehicles in the city exceed the national limit for emissions.[138]

Anil Kumar, Commissioner Bruhat Bengaluru Mahanagara Palike BBMP, said: "The deteriorating Air Quality in cities and its impact on public health is an area of growing concern for city authorities. While much is already being done about collecting and monitoring air quality data, little focus has been given on managing the impacts that bad air quality is having on the health of citizens."[139]

WASTE MANAGEMENT

In 2012 Bangalore generated 2.1 million tonnes of Municipal Solid Waste (195.4 kg/cap/yr).[143] The waste management scenario in the state of Karnataka is regulated by the Karnataka State Pollution Control Board (KSPCB) under the aegis of the Central Pollution Control Board (CPCB) which is a Central Government entity. As part of their Waste Management Guidelines the government of Karnataka through the Karnataka State Pollution Control Board (KSPCB) has authorised a few well-established companies to manage the biomedical waste and hazardous waste in the state of Karnataka.[*citation needed*]

Economy:

Recent estimates of the economy of Bangalore's metropolitan area have ranged from $45 to $83 billion (PPP GDP), and have ranked it either fourth- or fifth-most productive metro area of India.[10] In 2014, Bangalore contributed US$45 billion, or 38 per cent of India's total IT exports.[144] As of 2017, IT firms in Bengaluru employ about 1.5 million employees in the IT and IT-enabled services sectors, out of nearly 4.36 million employees across India.[145]

With an economic growth of 10.3%, Bangalore is the second fastest-growing major metropolis in India,[146] and is also the country's fourth largest fast-moving consumer goods (FMCG) market.[147] *Forbes* considers Bangalore one of "The Next Decade's Fastest-Growing Cities".[148] The city is the third largest hub for high-net-worth individuals and is home to over 10,000-dollar millionaires and about 60,000 super-rich people who have an investment surplus of ₹45 million (US$630,900) and ₹5 million (US$70,100) respectively.[149]

The headquarters of several public sector undertakings such as Bharat Electronics Limited (BEL), Hindustan Aeronautics Limited (HAL), National Aerospace Laboratories (NAL), Bharat Earth Movers Limited (BEML), Central Manufacturing Technology Institute (CMTI) and HMT (formerly Hindustan Machine Tools) are located in Bangalore. In June 1972 the Indian Space Research Organisation (ISRO) was established under the Department of Space and headquartered in the city. Bangalore also houses several research and development centres for many firms such as ABB, Airbus, Bosch, Boeing, General Electric, General Motors, Google, Liebherr-Aerospace, Microsoft, Mercedes-Benz, Nokia, Oracle, Philips, Shell, Toyota and Tyco.

Bangalore is called as the *Silicon Valley of India* because of the large number of information technology companies located in the city which contributed 33% of India's ₹1,442 billion (US$20 billion) IT exports in 2006–07.[150] Bangalore's IT industry is divided into three main clusters – Software Technology Parks of India (STPI); International Tech Park, Bangalore (ITPB); and Electronics City. UB City, the headquarters of the United Breweries Group, is a high-end commercial zone.[151] Infosys and Wipro, India's third and fourth largest software companies are headquartered in Bangalore, as are many of the global *SEI-CMM Level 5 Companies*.

The growth of IT has presented the city with unique challenges. Ideological clashes sometimes occur between the city's IT moguls, who demand an improvement in the city's infrastructure, and the state government, whose electoral base is primarily the people in rural Karnataka. The encouragement of high-tech industry in Bangalore, for example, has not favoured local employment development, but has instead increased land values and forced out small enterprise.[152] The state has also resisted the massive investments required to reverse the rapid decline in city transport which has already begun to drive new and expanding businesses to other

centres across India. Bangalore is a hub for biotechnology related industry in India and in the year 2005, around 47% of the 265 biotechnology companies in India were located here; including Biocon, India's largest biotechnology company.[153][154]

CULTURE

Main article: Culture of Bengaluru

Bangalore Karaga, one of the oldest and most important festivals in Bangalore
Yakshagana – a theatre art of coastal Karnataka is often played in town hall

Bangalore is known as the "Garden City of India" because of its greenery, broad streets and the presence of many public parks, such as Lal Bagh and Cubbon Park.[172] Bangalore is sometimes called as the "Pub Capital of India" and the "Rock/Metal Capital of India" because of its underground music scene and it is one of the premier places to hold international rock concerts.[173] In May 2012, Lonely Planet ranked Bangalore third among the world's top ten cities to visit.[174]

Bangalore is also home to many vegan-friendly restaurants and vegan activism groups, and has been named as India's most vegan-friendly city by PETA India.[175][176]

Biannual flower shows are held at the Lal Bagh Gardens during the week of Republic Day (26 January) and Independence Day (15 August). Bengaluru Karaga or "Karaga Shaktyotsava" is one of the most important and oldest festivals of Bangalore dedicated to the Hindu Goddess Draupadi. It is celebrated annually by the Thigala community, over a period of nine days in the month of March or April. The Someshwara Car festival is an annual procession of the idol of the Halasuru Someshwara Temple (Ulsoor) led by the Vokkaligas, a major land holding community in the southern Karnataka, occurring in April. Karnataka Rajyotsava is widely celebrated on 1 November and is a public holiday in the city, to mark the formation of Karnataka state on 1 November 1956. Other popular festivals in Bangalore are Ugadi, Ram Navami, Eid ul-Fitr, Ganesh Chaturthi, St. Mary's feast, Dasara, Deepawali and Christmas.[177][178]

The diversity of cuisine is reflective of the social and economic diversity of Bangalore.[179] Bangalore has a wide and varied mix of restaurant types and cuisines and Bangaloreans deem eating out as an intrinsic part of their culture. Roadside vendors, tea stalls, and South Indian, North Indian, Chinese and Western

fast food are all very popular in the city.[180] Udupi restaurants are very popular and serve predominantly vegetarian, regional cuisine.[181]

Education:

Universities

National Law School of India University, a premier law university

The Central College of Bangalore is the oldest college in the city, it was established in the year 1858. It was originally affiliated to University of Mysore and subsequently to Bangalore University. Later in the year 1882 the priests from the Paris Foreign Missions Society established the St Joseph's College, Bangalore. The Bangalore University was established in 1886, it provides affiliation to over 500 colleges, with a total student enrolment exceeding 300,000. The university has two campuses within Bangalore – Jnanabharathi and Central College.[211] University Visvesvaraya College of Engineering was established in the year 1917, by Sir M. Visvesvaraya, At present, the UVCE is the only engineering college under the Bangalore University. Bangalore also has many private engineering colleges affiliated to Visvesvaraya Technological University.

Some of the professional institutes in Bengaluru are:

- International Centre for Theoretical Sciences
- Indian Institute of Astrophysics
- Indian Institute of Science, which was established in 1909 in Bangalore
- Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)
- National Centre for Biological Sciences (NCBS)
- National Institute of Mental Health and Neuro Sciences (NIMHANS)
- Raman Research Institute
- National Law School of India University (NLSIU)
- Indian Institute of Management, Bangalore (IIM-B)
- Indian Statistical Institute
- Institute of Finance and International Management (IFIM)
- Institute of Wood Science and Technology
- International Institute of Information Technology, Bangalore (IIIT-B)
- National Institute of Design (NID),
- National Institute of Fashion Technology (NIFT),

- University of Agricultural Sciences, Bangalore (UASB)
- Bangalore Medical College and Research Institute (BMCRI)
- Sri Jayadeva Institute of Cardiovascular Sciences and Research (SJICR)

Some famous private institutions in Bangalore include Symbiosis International University, SVKM's NMIMS, CMR University, Christ University, Jain University, PES University, Dayananda Sagar University and M. S. Ramaiah University of Applied Sciences. Some famous private medical colleges include St. John's Medical College (SJMC), M. S. Ramaiah Medical College(MSRMC), Kempegowda Institute of Medical Sciences (KIMS), Vydehi Institute of Medical Sciences and Research Centre (VIMS), etc.[212][213] The M. P. Birla Institute of Fundamental Research has a branch located in Bangalore.[214]

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.

PART 2 – TECHNICAL DISCUSSIONS

DISCUSSIONS ON EXECUTIVE SUMMARY:

- Water management.
- Organic waste management.
- Rainwater Harveting 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.

GEOGRAPHICAL LAYOUT

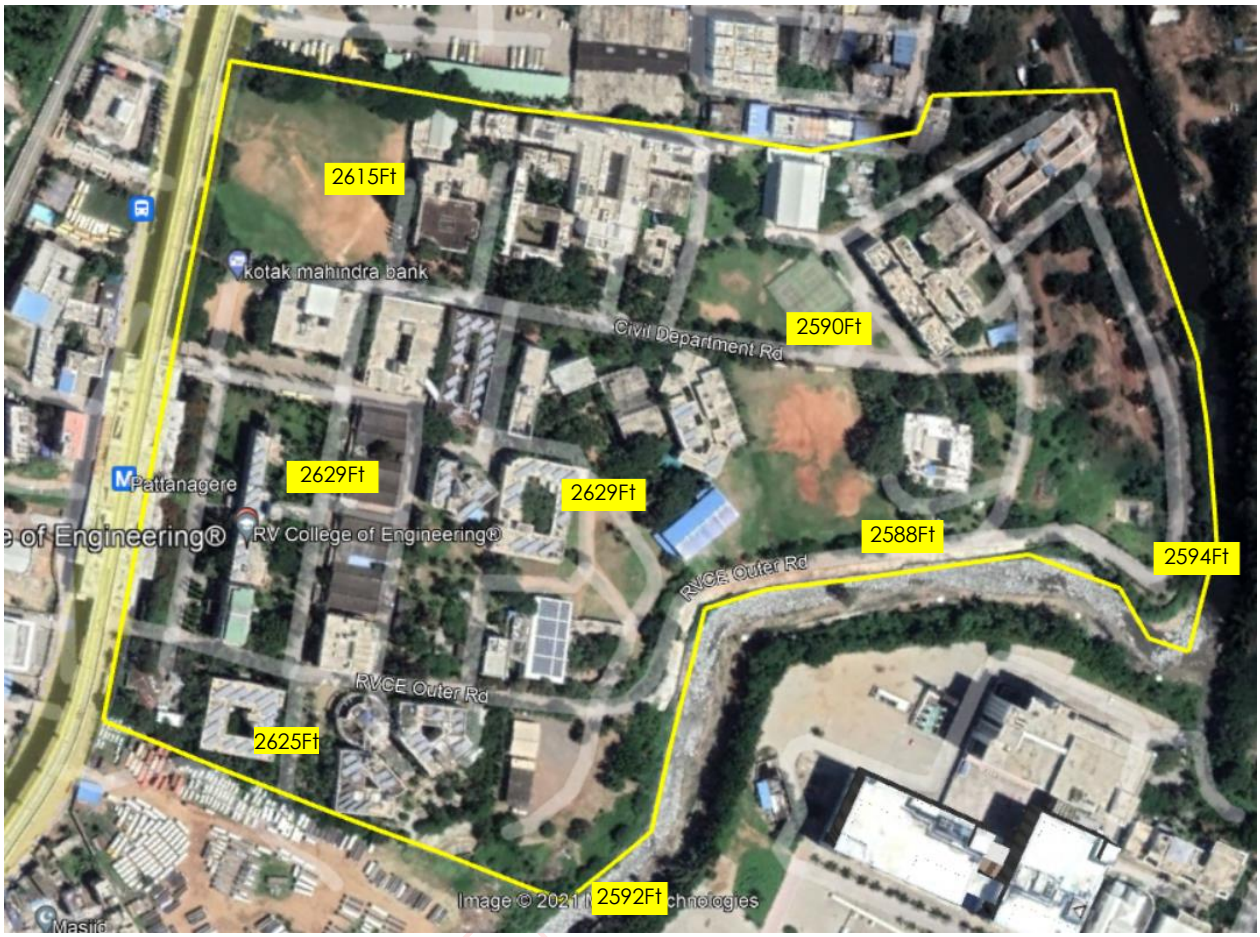
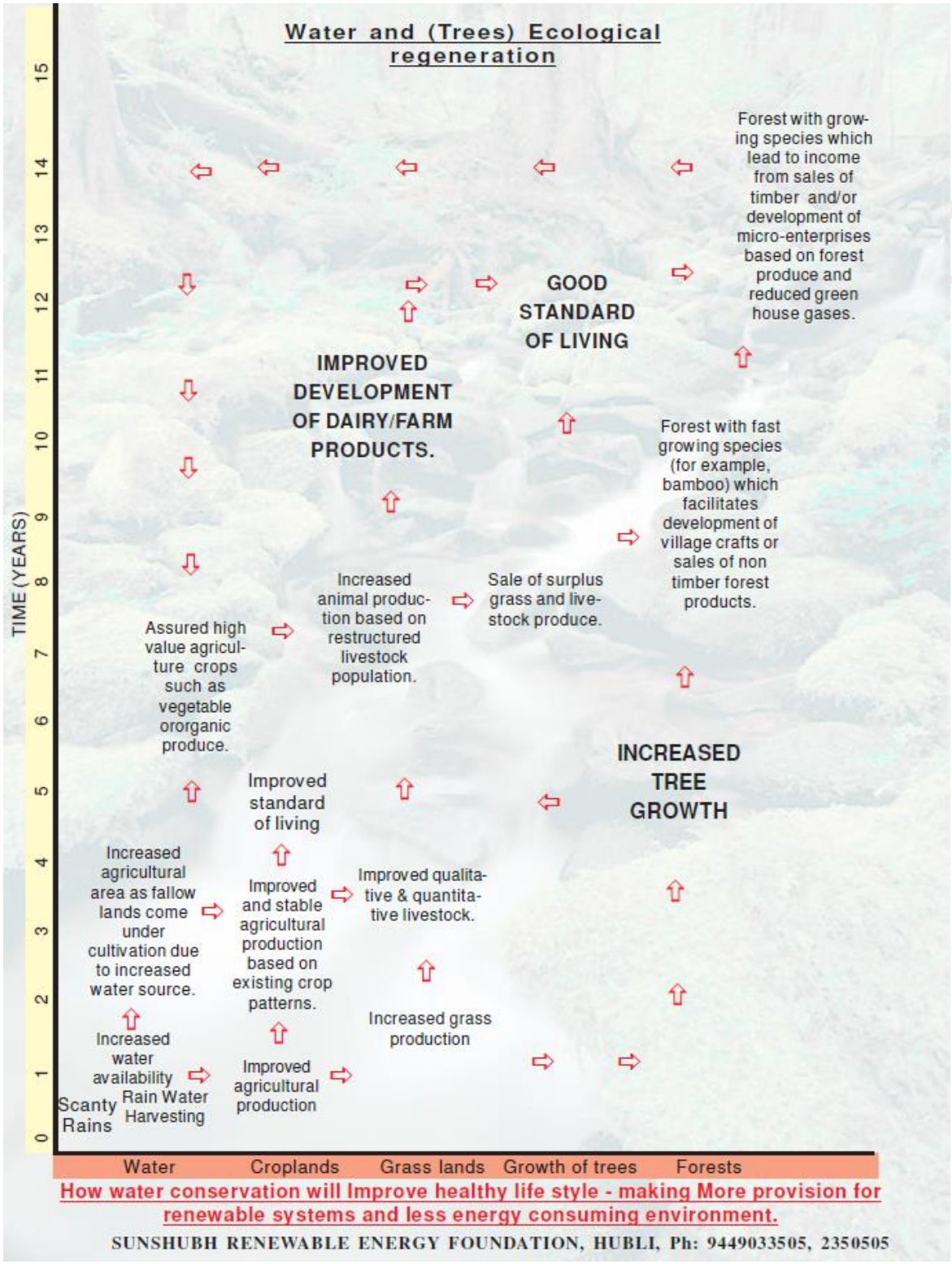


Figure 8 - Satellite view of the College campus.

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.



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

PLACING OF WASTE COLLECTION BINS.

Figure 9 - absence of waste collection bins in the corridor

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

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.

WATER MANAGEMENT.

The institute is located on the first floor. 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 10 - Watering the lawn

Figure 12 - Local sourced waste collection bin

Figure 11 - 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.

Figure 13 - Sprinkler, Consumer much less water and time.

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

Waste water from Laboratories.

Figure 14 -Storage of bulk acid containers in open

All the water from the chemistry laboratories should be treated before discharging to the open drains. Normally the acidic water destroys the water quality balance and results into disasters.

It is also important to make sure that the chemical storage bottles are stored in well protected and guarded rooms to prevent any accidents due to spillage of acidic chemicals.

LPG PLACEMENT:

LPG cylinders should be placed outside the hall as per the good practices. Being an Engineering institute, it is vital that safe storage instruction are followed.

The placement in the laboratory may lead to accidents.

Figure 15 -Placing LPG cylinders inside the hall

The waste collection bins should be avoided near the LPG storage area. However, a poster indicating safe storage practices should be displayed in the interest of educating the future engineers. A specific fire extinguisher with specific properties should also be placed near the storage area.

BATTERY MANAGEMENT:

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

Figure 16 - Placement of battery is in danger

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.

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

Figure 17 - Placement of battery without ventilation.

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. ie When Two Dissimilar Metals Come Into Contact - Electrolysis Occurs, Causing Corrosion - Rusting Of Both Surfaces.

Figure 18 - Galvanic reaction.

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

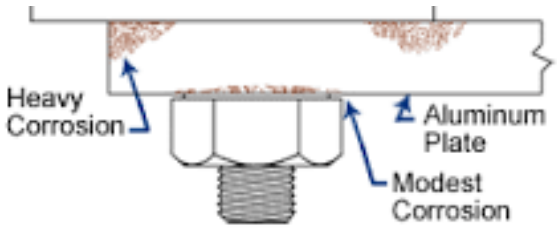
HOW DO WE PREVENT GALVANIC CORROSION - ELECTROLYSIS FROM OCCURRING?

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.

Figure 19 - Galvanic reaction : causes self discharging and degradation.



Effects of Galvanic Corrosion

We will discuss the regenerative system of used and week batteries to enhance the life. It is important to know few points on handling of batteries. BU-703: Health Concerns with Batteries

Become familiar with the do's 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 NiCd 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 NiCd 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, AsH_3) and (antimony hydride, 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 :

Figure 20 - Pad dispenser

The ladies hostel does not have the sanitary pad dispenser and the incinerators. It is important to place these dispensers within the reach on each floor and the incinerators in the washrooms very near to the exit for quick and ease of handling waste. 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.

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

SEWAGE TREATMENT:

Figure 21- STP Plant

The institute has well laid sewage treatment plant. However, The operating of sewage treatment plant should be in continuous mode or be put in auto mode to prevent fouling the environment.

FIRE PREVENTION & SAFETY :

Figure 22 - No ready access to fire extinguisher.

The fire extinguishers should be placed at the entrance and outside the room. So that, they are handy when need to be used.

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

A typical discussion is made for better understanding below.

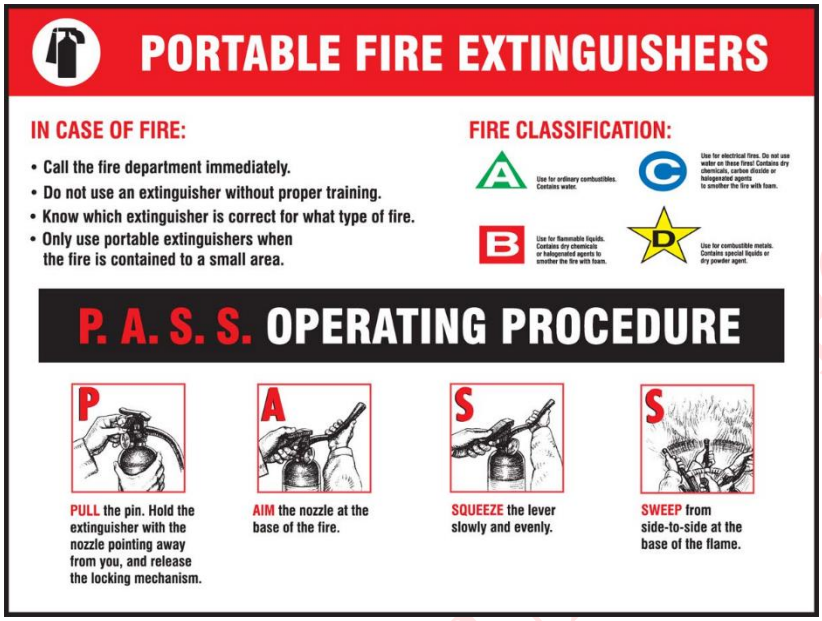


Figure 23 - Fire extinguisher Operating instructions

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

Type (Fire / Extinguisher)	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)	Comments
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 24 - Fire extinguisher: Class

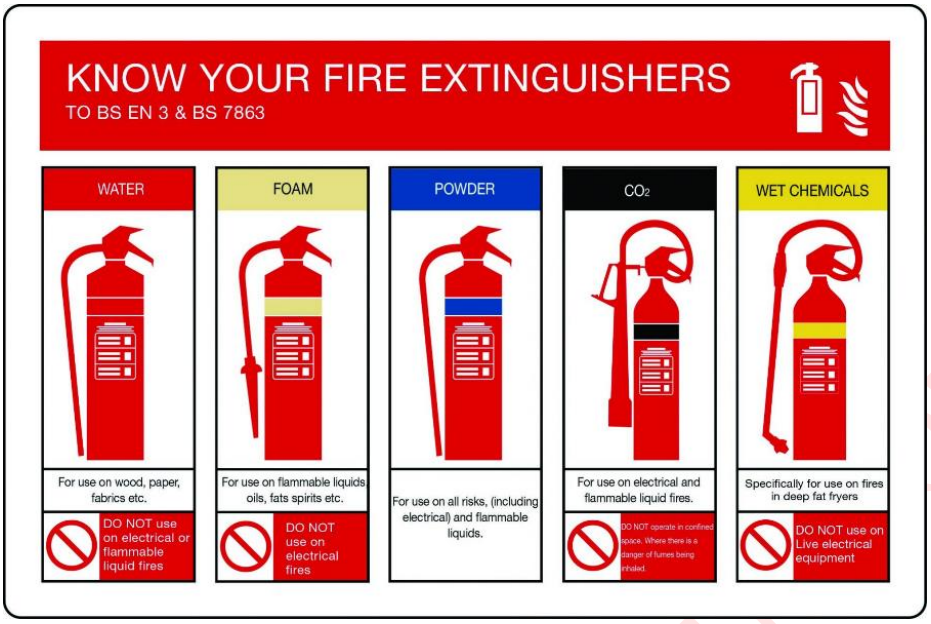


Figure 25 - Types of Fire extinguishers

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.

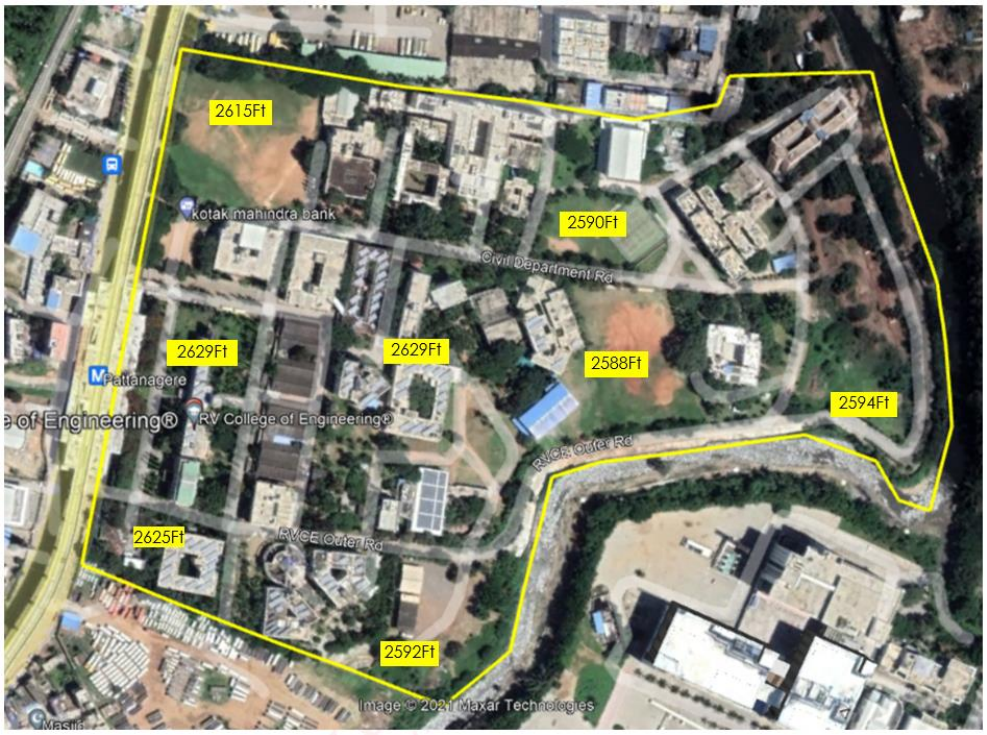


Figure 26 - Aerial view with elevation

As indicated here, the lowest level is at 2588 feet. The North East entry to the college campus lies at an elevation of 2625 feet. However, as we move to the college building, the elevation rises to 2629 Feet. The area between the departmental blocks is varying marginally and lowers down to 2588 very near to the Borewell point.

In order to green the area between the two academic blocks, all the terrace water may be retained in a separate tank and used for watering the plants during dry days. The rest of the rainwater touching the ground should be allowed to percolate while it is being channelised towards the area @ 2588 feet.

We suggest that the open pond of suitable size with depth not more than 4 feet be made where possible to retain the rainwater. For safety the surface runoff water should not be more than 4ft. This open pond can be covered with the grass either Mexican or St. Augustine Grass grass as per shading conditions.

While one looks for exotic plantations, we suggest not to weed out the grass, instead the over grown grass can be chopped retaining the

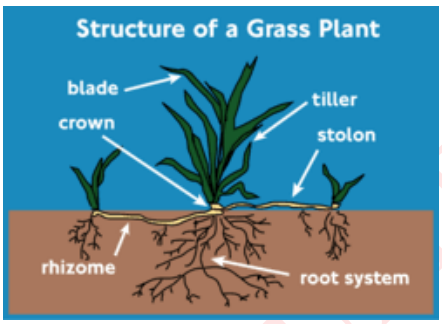


Figure 27 - Normally grown grass

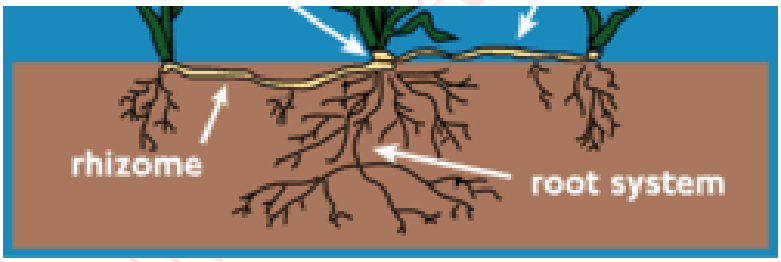


Figure 28 - Grass root system enabling rainwater percolation

The significance of the grass can be best viewed in the video link below and the concepts can be appropriately followed.
https://www.youtube.com/results?search_query=video+AGRI+-+Green+Gold++-+Documentary+by+John+D.+Liu.mp4

VERMICOMPOST:

Presently the institute has not made any provision for Vermicompost. The canteen left overs and the dry leaves can be composted and cultured manure used for gardening activities.

The organic waste composting structure should be 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 can be planed and discussed elaboratively before execution. The different species that help catalyse the composting process can be considered.

The compost so formed should be exhibited for the information of the farming community through the students 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 29 -Composted kitchen waste

GREY WATER MANAGEMENT.:

Figure 30 - Grey water pond

In today's context, use of soaps and cosmetics has increased multifold. The water that is let out along with soap, cosmetic and chemicals is termed as Grey water. This water is containing valuable chemicals which form micro nutrients to the fertilizers. If this water if 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 first hand 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 Hyacith.

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

The college can explore to benefit from the drainage water by conducting industry compliance projects.

These projects are funded by Ministry of environment, Water resources or The Ministry of Science and Technology

This drainage water flowing in Vrishabawathi river is a rich source of minerals and nutrients which are vital for plants and agricultural produce.

The quality of air also has a significant impact out of these projects.

The college gets more closure to the industries and many joint ventures could evolve out of this single project. Just to name a few,

- Air purification and de-odorant agencies.
- Fertilisers,
- Micronutrient extraction companies
- Water purification and treatment companies.
- ETP project developers.
- State Municipality and Corporation for urban waste water treatment.
- Research graduation courses on key elements on the outcome of the project.

Many more interested agencies who would benefit on commercial entities. As architects for waste water treatment by natural methods, SUNSHUBH TECHNOVATIONS Pvt Ltd can also be involved.

CONSTRUCTION WASTE MANAGEMENT:

Development is a continual process. It is important to identify the disposable waste and recyclable waste. The specified place be identified and all the waste be moved to the specified area.

It is important that, all the assets are valued and placed in their appropriate place. All the recyclable waste may be pooled and the opportunities for creativity and innovative entrepreneurial skills among the young engineers be promoted by earmarking the area as Innovation zone.

Figure 31 - Repair leftovers to be tagged for evacuation.

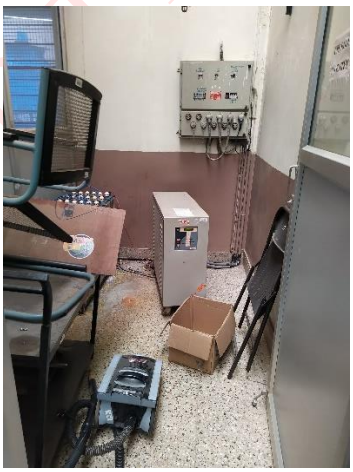


Figure 32 - Assets not in use.

Figure 33 - Assets for repairs

Figure 34 - Keeping waste away from Electrical room

Figure 35 - Construction waste to be marked for further action

INDOOR AIR QUALITY:

Considering the present pandemic conditions prevailing, Indoor air quality has gained importance and created awareness too. It was seen that all the airconditioned rooms are heavily polluted and also the rise in CO2 concentration is seen to rise with the duration of sitting within the closed doors.

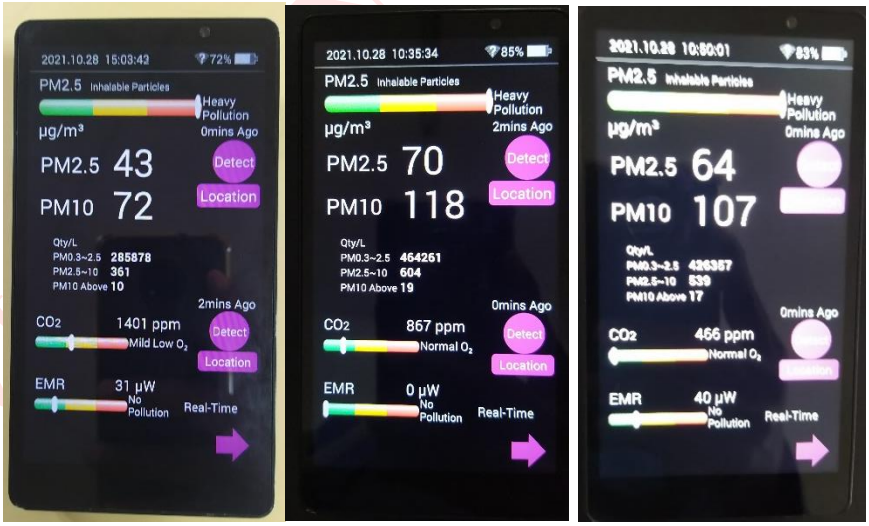


Figure 36 - Indoor Air Quality in AC rooms

Solution - Fresh air should be drawn in at regular intervals after filtering through HEPA media. If feasible CO2 sensors and sensor switches should be installed to regulate the CO2 level well below 800PPM.

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.

LIST OF INSTRUMENTS:

During the process of the Audit, the following lists of instruments were used.

Sr No.	INSTRUMENT	MAKE	APPLICATION
1	Digital Power Analyser (PC Interfaced)	SCHIVAN ARNOX	Electrical Machinery.
2	Accessories -3000 Amps	ARNOX	Higher load UPTO 3000 Amps,
3	Accessories -200 Amps	ARNOX	UPTO 200 Amps,
4	Thermal Imager	FLIR	Identify loose contacts and bearing losses
5	Power Analyser (Manual)	MECO	Electrical Machinery.
6	Infrared Thermometer	METRAVI	Thermal (Fuel) Energy.
7	Digital (Contact) Temperature & Humidity Meter.	METRAVI	Electrical Machinery. (A/C's And Cooling Towers)
8	Digital Tachometer	METRAVI	Electrical Machinery.(A/C's And Cooling Towers)
9	Lux Meter	METRAVI	General & Task Lighting.
10	Sound Level Meter	METRAVI	Electrical Machinery. Generator Sound Proofing
11	Digital Anemometer	METRAVI	Electrical Machinery.(A/C's And Cooling Towers)
12	Digital KW Meter	METRAVI	Electrical Machinery.
13	Digital Power Factor Meter	METRAVI	Electrical Machinery.
14	Lap Top Computer	HP	To Interface The Instruments For More Accurate - Sophisticated Readings In Sensitive Equipment.
15	Ultrasonic flow meter		Measure liquid flow.
16	Portable Vibration Meter.	METRAVI	Effect Of Filtration - Sewing System. Structural Stability
17	Live cable detector probe	-	Detect hidden cables for safety audit.
18	Power Analyser – EMM 5	Beluk	For remote communication and detailed audit.
19	Power Analyser – ELITE PRO	Beluk	Power Analyser.
20	ETV meter, KWh & PF meters for site recording.	Secure	
21	PT's for Transformer audits.	KALPA	On field auditing of transformer loading and imbalance evaluation.

Only appropriate instruments will used wherever necessary.

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:

Notes: