SRM
ARTS AND SCIENCE COLLEGE

(Affiliated to the University of Madras), (An ISO 9001:2015 Certified Institution)
Kattankulathur, Chengalpattu Dist - 603203

NAAC – CYCLE I

(2016-2021)

CRITERION VII

INSTITUTIONAL VALUES AND BEST PRACTICES

7.1.5 GREEN CAMPUS

Trusted scm

ENVIRONMENT, ENERGY & GREEN CAMPUS AUDIT

2020-21

SRM Arts & Science College

Kattankulathur

Chapter I

Executive Summary

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of higher educational institutions. It aims to analyze environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. To find out the environmental performance of the educational institutions and to analyze the possible solutions for converting the educational campus as eco-campus the conduction of Green Auditing of institution is essential.

Initially a questionnaire (see annexure A) survey was conducted to know about the existing resources of the campus and consumption pattern of the students and staffs in the college. In order to assess the quality of water, samples were collected from different locations of the college campus and analyzed for its parameters. An online "Environmental Awareness Quiz" of MCQs pertaining to topics in all 5 assessment areas was conducted for students and staff (see Annexure A). Collected data were analyzed and conclusions made. Finally a report pertaining environmental management plan with best practices, suggestions and recommendations on the Environmental, Energy and Green campus are documented. In addition, we have introduced "Sustainability Index" in each area, as a measure of performance. This is only an indicative metric designed to benchmark and improve upon year on year. We plan to fine tune the parameters and metrics from time to time in order to raise the standards continually.

Background

SRM Arts and Science College (SRMASC) was started in the academic year 1993, affiliated to the University of Madras. The college thrives on continuous learning and moulding the students in all facets of life enabling them to achieve success in academics and also approach life with zest and confidence.

SRM Group of Educational Institutions for higher learning is functioning under the aegis of the 4- decade old "Valliammai Society". The Society was founded for promoting the cause of Quality Education, by Dr. T. R. Paarivendhar, an Academician and Educationist. SRM Group runs a network of more than 17 Institutions and is one of the largest Educational Groups in the Country

The college environment inspires the students to different levels of education and practical exposure allowing them to excel in their chosen field of study. The college continuously works on to lead the students to achieve excellence and competence.

The college at present offers 12 under graduate courses and 10 Post graduate courses. The total strength of the college is around 2500 and 160 faculty members. Many of the students have secured University Ranks including the University First Rank. The students have been successfully placed in many reputed national and multinational companies. Many of the students pursue higher studies in India or abroad. Alumni Association is very active.

The Faculty work in harmony with the students

- They help in the development of their character
- Counsel and guide them and gradually infuse values of life
- Encourage out-of-the-box thinking
- Collaborate with industries and help students to link what they study with real life situations, to make their learning stronger

GOAL

SRM Arts and Science College has set achievable goals for the student community.

- To make them question and develop curiosity and thereby gain knowledge
- Develop a scientific temperament through practical exercises
- Provide platform for their creative thinking
- Aid in developing their leadership abilities through Seminars and Conferences
- Encourage them to pursue higher education

Vision

To provide quality education which would make learning effective. Education should be such that the student should be motivated to pursue higher studies. All learning should be for the betterment of the learner and the society around them. Education received should make the student a humane individual, who excels not only in academics but would understand the finer aspects of life. The teaching and learning community should work together to achieve effective and achievable goals.

Mission

SRMASC aims to mold the students to go out as conscious citizens with concern. To help this happen the faculty and the administration works symbiotically. A creative atmosphere helps in the students to think and make their learning effective. Every students ability is taken into consideration for him/her to grow in his/her field of capability. An atmosphere of learning with a supportive environment will certainly help the teacher and the taught.

Environment Policy

SRMASC will strive to seek,

- To implement sustainable resource management practices, based on reduce, reuse and recycle principles
- To buy / replace energy efficient electrical appliances to optimize energy consumption
- To make efficient and environmentally responsible use of water, environment compliance to solid waste management and reduce carbon foot print
- To encourage and facilitate feedback and suggestions on ensuring good practice
- To provide appropriate environmental educational programmes for students and staff

Academic Courses

Under Graduate	Post Graduate
• Bachelor of Computer Applications	➢ Master of Business Administration
• B.Sc Mathematics • B.Sc Computer Science • B.Sc Visual Communication • B.Sc Electronics & Communication Science • B.Sc Biotechnology • B.Sc Biochemistry • B.Sc Microbiology • B.Sc Hotel and Catering Management • BBA Bachelor Business Administration	➢ Master of Computer Application ➢ M.Sc Visual Communication ➢ M.Sc Computer Science and Technology (Integrated Five Years) ➢ M.Sc Computer Science ➢ M.Sc Biotechnology ➢ M.Sc Biochemistry ➢ M.Sc Applied Microbiology
• B.Com General • B.Com Accounting & Finance • B.Com Information System Management	➢ M.Com (General) ➢ M.Phil. in Physical Education

Facilities

SRM Arts and Science College has been developed and fully established with 4 Multi strayed Academic Blocks

- Main Block
- Post Graduate Block
- Management Studies & Computer Applications Block
- Hotel Management & Catering Block

The Buildings house fully furnished Laboratories, Centers of Excellence, Smart Class rooms/ Class rooms, Drawing halls, Conference halls, Offices for Head of the department's, Staff rooms, Seminar Halls, Department Libraries and other facilities as per UGC norms and Standards'.

The following are the facilities provides as per UGC norms and standards.

- ✓ Laboratories (Bio-Chemistry / Bio-Technology / Micro-Biology/Computer)
- ✓ Centres of Excellence
- ✓ Smart class rooms
- ✓ Drawing Halls
- ✓ Conference Hall
- ✓ Staff rooms
- ✓ Seminar Hall

SRMASC is located close to Chennai city. The college is well connected by public transportation system from all parts of Chennai, Chengalpattu and Kanchipuram town. One can easily access from Potheri railway station and SRM bus stop. In addition, SRM group runs own transportation facilities connecting all major parts of Chennai city.

Internet

The College has Internet connectivity through leased line that caters to all computer labs and departments and Library.

Student / faculty Strength and Infrastructure

I.	Number of students	2535
II.	Number of teachers	123
III.	Non-teaching staffs	61
	Total	2719

Physical Structure	Total	Under Green cover
Area of campus in acres	5 acres	44000 sq.ft
Built-up Area in sqft	38100	

Building (Area in sq.ft)	Main	MBA	VC	PG	Total
	14000	8500	6500	9100	38100

Activities

NSS

The NSS unit at SRM Arts and Science College has more than 800 registered students. Prof. S. Thalapathy, Department of Tamil, Coordinator. The NSS volunteers at SRMASC are involved in a wide spectrum of activities such as:

- Social service - the community around the campus
- Cleaning the SRM ASC campus
- Planting trees
- Conducting health camps in rural areas
- Organizing blood donation camps
- Advocacy on community health
- Creating AIDs awareness, helping NGOs to raise sponsorship and funds
- Working with tsunami victims in rehabilitation etc.

Red Cross

All the students are members of Red Cross Society. The activities include:

- Blood Donation Camps
- Awareness Programmes
- Conduct first aid programmes

Alumni

The College relies on a strong alumni network to spread its wings of glory. Students who are situated in India and in foreign countries are kept abreast of the activities of the college and their suggestions are being taken into account for the betterment of the institution

E-Governance

For ease of communication and transparency, following e-Governance portal is in place:

1. Student Portal 2. Alumni Portal 3. Parents Portal 4. Staff Portal

Sports

The college is equipped with tennis courts, a volleyball court, a basketball court and cricket nets. Indoor games have been given their due with many carom boards and chess boards. The college also showcases one of the best cricket teams in the city. Students have done the college proud many a time by winning many state level competitions.

IQAC & NAAC

The college is applying for NAAC accreditation for the first time. They have systematically prepared for the same. The college has constituted an IQAC team with senior teaching and non-teaching staff members.

The IQAC members are quite knowledgeable and aware of the requirements of NAAC. There are 3 team members who have been assigned the tasks of addressing environment related aspects in order to take care of Green audit, Environment audit and Energy audit

Collaboration with other Institutions, Organizations and Associations

- The Institution has signed 19 MOUs like CADD Labs, International Journal of Creative research and Thoughts, CSIM etc.
- Membership with 8 bodies namely University of Madras Library, British Council Library, Madras Management Association, Home Science Association of India, Madras Chamber of Commerce and Industry (MCCI), Information & Communication Technology Academy of Tamil Nadu, and Library Network Centre (INFLIBNET), Computer Society of India (CSI).

Chapter II

Management Commitment

The Management of the college has shown the commitment towards the green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on environment, campus farming, planting more trees in the campus etc. after the green auditing. The management of the college was willing to formulate policies based on green auditing report.

Scope and Goals of Green Auditing

A clean and healthy environment aids in effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues. Green Audit is the most efficient and ecological way to manage environmental problems. It is a kind of professional care which is the responsibility of each individual who are the part of economic, financial, social and environmental processes. It is necessary to conduct green audit in college campus because students become aware of the green audit, its advantages to save the planet and they become good citizen of our country. Thus Green audit becomes necessary at the college level.

A very simple indigenized system has been devised to monitor the environmental performance of SRMASC. It comes with a series of questions to be answered on a regular basis. This innovative scheme is user friendly and totally voluntary. The aim of this is to help the institution to set environmental examples for the community, and to educate the young learners.

Objectives of Green Audit

The main objective of Green audit is to assess the environmental quality and the management strategies being implemented. The specific objectives are:

- ✓ To assess the quality of the water and soil in the college campus
- ✓ To monitor the energy consumption pattern of the college
- ✓ To quantify the liquid and solid waste generation and management plans in the campus
- ✓ To assess the carbon foot print of the college

- ✓ To assess whether the measures implemented and have helped to reduce the Carbon Footprint
  To impart environment management plans to the college
- ✓ Providing a database for corrective actions and future plans
- ✓ To assess whether extracurricular activities of the Institution support the collection, recovery, reuse and recycling of solid wastes.
- ✓ To identify the gap areas and suggest recommendations to improve the Green Campus status

Benefits of Green Audit

- o Empower the organizations to frame a better environmental performance
- o More efficient resource management
- o To provide basis for improved sustainability
- o To enable waste management through reduction of waste generation, solid- waste & water recycling
- o To create plastic free campus and evolve health consciousness among the stakeholders
- o Recognize the cost saving methods through waste minimizing & managing
- o Enhance the alertness for environmental guidelines and duties
- o Impart environmental education through systematic environmental management approach and improving environmental standards
- o Financial savings through a reduction in resource use
- o To create a green campus & Enhancement of college profile
- o Developing an environmental ethic and value systems in youngsters
- o Green auditing should become a valuable tool in the management and monitoring of environmental and sustainable development programs of the college

Target Areas of Audit

- o Environment Auditing - Water Management, Solid waste Management & Carbon Foot Print
- o Energy Management Auditing – Energy (Electricity, Diesel Generator & Other Energy equipments)
- o Green Campus Auditing - Green Campus (Green cover, Bio-Diversity)

Methodology of Green Audit

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution. The criteria, methods and recommendations used in the audit were based on the identified risks.

The methodology includes: preparation and filling up of questionnaire, physical inspection of the campus, observation and review of the documents, interviewing responsible persons and data analysis, measurements and recommendations. The methodology adopted for this audit was a three step process comprising of:

Data Collection

In data collection phase, exhaustive data collection was performed using different tools such as observation, survey, communicating with responsible persons and measurements. Data collection was done from the primary sources.

Following steps were taken for data collection:

The team visited each Block, Department, Library, Canteen, Gardens, and Campus etc. Data on the general information was collected by questioners, observation and interview.

Water usage and conservation data, Energy consumption of appliances was recorded by taking an average value in some cases. Plants were identified using standard taxonomic books.

Waste generated was measured directly at the source of production. Carbon Foot print data and Environmental Awareness levels was collected from students & staff using Google survey.

Data Analysis

Detailed analysis of data collected include: water usage, Quantities of solid waste, computation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the TamilNadu State Electricity Board (TNEB). Data related to water usage were also analyzed using appropriate methodology.

Recommendation

On the basis of results of data analysis and observations, some steps for reducing power and water consumption were recommended. Proper treatment methods for waste were also suggested. The above target areas particular to the college was evaluated through questionnaire circulated among the students for data collection. 5 categories of questionnaires were distributed. The formats of these are enclosed in respective audit.

Chapter III

Audit Stage - Planning

In SRM green auditing was done with the collaboration of TrustedSCM and IQAC coordinator. A training programme was organized by TrustedSCM to orient the staff on various aspects of green auditing. The green audit began with the teams walking around examining all the different facilities of the college, identifying the different types of appliances and utilities (lights, taps, toilets, fridges, etc.), as well as measuring the usage per item (Watts indicated on the appliance & ISEER star rating) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain appliances. Data collection was done in the sectors such as Energy, Solid Waste, Greening, Carbon footprint and Water.

Comments on Site Tour

Site inspection was done along with green audit coordinator. Audit team visited laboratories, libraries, class rooms, garden, college campus, solar power generation fields, play grounds etc. Questionnaires were answered during the site tour. They have shared their expectations about a green campus and gave suggestions for the audit recommendations. Data collected in different intervals were consolidated later.

Review of Documents and Records

Data verification was done with office records. Documents such as electricity bills, Annual report of the college, UGC report, Citizen Consumer Club records etc. were also verified as part of data collection.

Review of Policies

Discussions were made with the college management regarding their policies on environmental management. The management would formulate a revised environment /green policy for the college in the light of green auditing. The purpose of the green audit was to ensure that the practices followed in the campus are to be in accordance with the green Policy adopted by the institution.

Interviews

In order to collect information for green auditing different audit groups interviewed office staff, Principal, teaching and non-teaching staff and students of the college. Discussions were held to clarify doubts regarding certain aspects.

Site inspection

College and its premises were visited and analyzed by the audit-team several times to gather information. Campus trees were counted and identified. Play grounds, canteen, pantry, library, office rooms, class rooms and vehicle parking areas were also visited to collect data. The team also visited washrooms with specific permission; terrace to check water tanks, solar power plant, roof top garden and RO plant; open grounds for rain water harvesting, bore wells, sump, solid waste storage area and disposal methods.

OVERALL SUSTAINABILITY INDEX

The “Sustainability index” has been designed by TrustedSCM as part of the Green Audit process for HEIs. The scoring pattern is transparent and objective. Any score above 75 may be considered as "Good". The score can be improved by implementing recommendations given at the end of every audit report. The parameters chosen for evaluation and weightages would be revised periodically in order to make it relevant, wholesome and universally applicable and maintain high standards.

Audit Scope	Max Points	Score
Water Management	20	
Solid Waste Management	20	
Carbon Foot Print	20	
Energy Management	20	
Green Campus	20	
	100	

Parameters, weightages and break-up of the scores are mentioned under each section of the report

ENVIRONMENT AUDIT REPORT

2020-21

I	***WATER MANAGEMENT***
II	***SOLID WASTE MANAGEMENT***
III	***CARBON FOOT PRINT***

I. WATER MANAGEMENT AUDIT REPORT

2020-21

I. Water Management

Need

Water which is precious natural resource available with fixed quantum. The availability of water is decreasing due to increasing population of nation, as per capita availability of utilizable water is going down. Due to the ever rising standard of living of people, industrialization, urbanization, demand of fresh water is increasing day by day. The unabated discharge of industrial effluent in the available water bodies is reducing the quality of these ample sources of water continuously. Hence, the national mission on water conservation was declared by the then Hon. Prime Minister appealed to all citizens to collectively address the problem of water shortage, by conserving every drop of water and suggested for conducting water audit for all sectors of water use. A water audit is an on-site survey & assessment to determine and improve efficiency of water use.

Audit Parameters

Following are the key parameters used in water management audit:

1. Sources of water
2. Quality of water
3. Measurement & Consumption
4. Waste water disposal
5. Awareness and communication
6. Best Practices
7. Water Sustainability Index
8. Suggestions/ Recommendations

Observation and Inferences

1. **Sources of water**

   a) **Bore-well**

Total number of Bore-wells	-	2 Nos
Depth of Bore-wells	-	500 ft and 150 ft

   b) **Open well**

No: of Open wells	–	1 no
Depth of Open wells	-	60 ft

2. **Water Quality**

a) Testing of water sources:
Test done from NABL certified labs for bore wells, open well and RO water and reports obtained. RO water meets the requirement of drinking purpose, other water is not potable due to high TDS. Hence, used for wash rooms and gardening.

b) Purification methods:

There is a well maintained RO plant of 1000 ltr capacity. RO water per day of 2000 liters is generated for drinking & cooking purposes. Water quality has been tested in laboratory and test reports attached. Daily records are being kept for RO plant functioning and the values of TDS before and after. Register sample attached.

3. **Measurement and Consumption**

Quantity of water used per day	-	55,274 liters
Overhead tank capacity	-	1,02,715 liters (4 tanks)
Sump capacity	-	No sump
Water flow meter installed	-	No
Waste water sources	-	From RO plant (after treatment), wash rooms, canteen, chemical labs

Water consumption per-capita ~20 liters per day

4. Water Conservation

Sl No	Desired conservation methods	Observation
1	**Rain water Harvesting (RWH)**	12 nos of RWH pits located around the buildings to ensure all water collected on roof tops is directed towards the pits to recharge ground water
2	Water level indicators/ controllers	Yet to be done
3	Water Flow meters	Yet to be done
4	**No leaky taps**	Water taps are well maintained
5	Automatic taps & urinals	Yet to be done
6	Drip irrigation	Yet to be done
7	**Re-use of RO reject water**	Being reused for gardeining

5. Waste water disposal

There is a 3.7 MLD capacity modern Sewage treatment plant catering to the larger campus out of which 57,000 litres per day is from SRMASC

The treated water is being periodically tested by TNPCB as well as private laboratory. Test Reports show that the treated water is well within norms. Report copies attached

6. Awareness and Communication

- Awareness through environment clubs and regular communications
- Communication through Eco club and webinars

7. Best Practices

- One of the best maintained STPs, where the recycled water recharges the ground water with minimal wastage
- The sludge is handed over to a composting facility for converting into manure for the garden
- Rain water harvesting properly implemented
- RO reject water being reused for gardening

8. Suggestions & Recommendations

- Rain water harvesting (RWH) pits to be closed to avoid garbage from outside
- To avoid overflowing / wastages from OHTs, sensor system to be installed
- More awareness campaigns & poster displays, for the students to save water
- Automated taps could be used so that usage of water can be reduced
- Drip irrigation can be implemented for gardening purpose

II. SOLID WASTE MANAGEMENT AUDIT REPORT

2020-21

Solid Waste Management

Need

Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone. Solid waste management reduces or eliminates the adverse impact on the environment and human health. A number of processes are involved in efficiently managing waste for an organization. It is necessary to manage the solid waste properly to reduce the load on waste management system.

The solid waste audit focused on volume, type and current management practice of solid waste generated in SRM campus. The solid waste collected was paper waste, plastic, bio-degradable waste, construction waste, glass waste, electronic (e-waste) and other miscellaneous waste. Solid waste disposal management audit is an on-site survey & assessment to determine and improve efficiency and effective waste disposal system.

Audit Parameters

Following are the key parameters used in waste management audit:

1. Sources of waste generation
2. Types / volume of waste generated
3. Segregation of waste
4. Disposal Mechanism
5. Best Practices
6. Awareness and communication
7. Solid Waste Sustainability Index
8. Suggestions/ Recommendations

Observation and Inferences

1. Sources of waste generation

Sl #	Source	Types of Waste
1	Students	Paper, Pen, Refill, Plastic water bottles, food waste, paper plates. other plastic materials, washings, Urinals and Electronic parts, Paper plates, Food wastes, sanitary napkins
2	Administration (Staff and Teachers)	Paper, Pen, Refill, Plastic & other plastic materials, Washings, Urinals, broken furniture & glass , E-waste
3	Natural accumulation (Garden, Playground & parking area)	Dry leaves, Paper waste, Paper plates, Food wastes
4	Others (Visitors)	Paper, plastics

2. Types / volume of waste generated

Sl #	Category	Types	Annual volume in KGs
1	E-Waste	Computers, Electrical appliances and Electronics parts	
2	Plastic waste	Pen, Refill, Plastic water bottles, & other plastic containers	
3	Solid Waste	Damaged furniture, Glass, Paper waste, Paper plates, Food wastes, metal	
4	Waste Water	Washings, Urinals, Bathrooms	
5	Bio medical waste	Sanitary Napkin	

3. Segregation of waste

- Bins kept at each floor with 4 colours to 1st level of segregation : Bio-degradable, Plastics, E-waste and Bio-medical waste
- The segregated waste is accumulated and handed over to an agency called Hand-in-Hand with whom SRM has an MOU for safe and proper disposal as per PCB norms, except E-waste.

4. Best Practices

- College has banned single-use plastics/ polythene covers in the campus
- Provided coloured bins for proper segregation of different types of waste

5. Suggestions & Recommendations

- Reduce use of virgin paper & switch to recycled paper.. As a further step move all transactions and communication within the college to electronic mode
- To switch from flex to cloth banners
- E-waste to be disposed through a recycler

III CARBON FOOT PRINT AUDIT REPORT

2020-21

Carbon Foot Print Management

Need

The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the earth's atmosphere through human activities is commonly known as carbon emissions. The question is what should be done to reduce carbon emissions. Often the challenge lies in choosing just the right approach that will contribute most to the objective. Naturally, the results of these interventions also have to be monitored and assessed. Many colleges want to reduce their carbon dioxide (CO2) emissions. But that's not so easy, given that a range of factors determine carbon emissions, including mobility, waste, and energy consumption. So, gaining insight into CO2 emissions is extremely important.

An important aspect of doing an audit is to be able to measure your impact so that we can determine better ways to manage the impact. ***We can determine what our carbon footprint is, based on the amount of carbon emissions created by fossil fuels.*** One aspect is to consider the distance and method traveled between home and college every day. It undertakes the measure of bulk of carbon dioxide equivalents exhaled by the organization through which the carbon accounting is done. It is necessary to know how much the organization is contributing towards sustainable development. As per latest estimates the average carbon emissions per capita in India is 1.9 MT / capita out of this transportation accounts for approximately 15%.

In the case of Educational Institutions, the major sources of carbon emission are diesel generator, cooking gas and vehicles. While vehicles are not driven much within the campus, the total emissions due to travel by students and staff from their home to the campus is an important parameter to be measured.

Audit Parameters

Following are the key parameters used in carbon emissions audit:

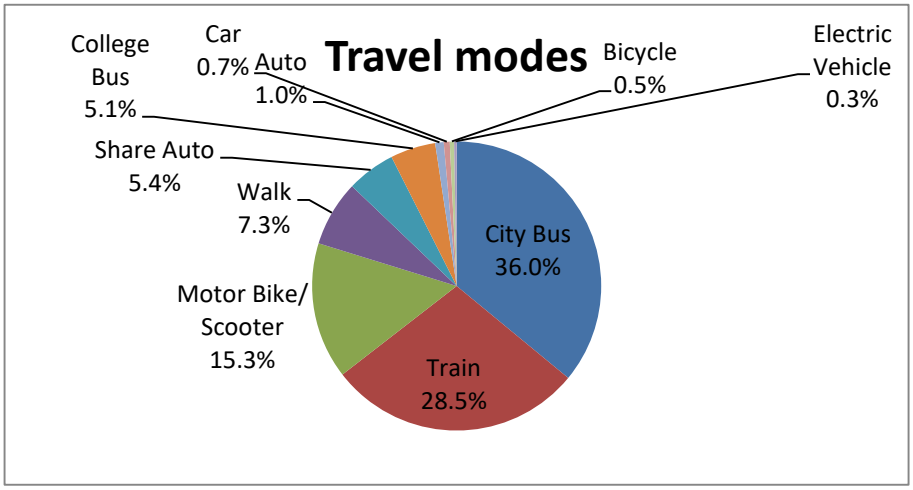
1. Sources & Measurement of Carbon foot print
2. Initiatives to reduce Carbon emission
3. Awareness and communication
4. Best Practices
5. Sustainability Index
6. Suggestions and Recommendations

Observations and Inferences

1. Measuring Carbon Foot print

- Diesel generator: There is a 250kva DG installed in the college premises, with an average consumption of 150 ltrs of diesel every month.
- Cooking Gas: Commercial LPG cylinders of 19 kg are used in 4 laboratories. They are refilled once in 2 months.
- Vehicular Emissions: A survey on travel to college pattern was taken in which 1088 students participated. This was to identify their mode of transport and the distance travelled.
- This has been extrapolated to 2719 nos (strength of students & staffs). The following tables reflect the data:

a) Mode of travel



Mode of travel	No: of respondents	Percent	Actual popn
City Bus	377	36.0%	978
Train	299	28.5%	776
Motor Bike/ Scooter	160	15.3%	415
Walk	77	7.3%	200
Share Auto	57	5.4%	148
College Bus	53	5.1%	138
Auto	10	1.0%	27
Car	7	0.7%	18
Bicycle	5	0.5%	13
Electric Vehicle	3	0.3%	8
Grand Total	**1048**		**2719**

b) Distance travelled by students to attend college

					180
Mode of transport	No: of students	One way distance per day	Avg one way distance per student per day	Two way distance per day	Distance per yr
Auto	26	197	8	393	70,798
Bicycle	13	145	11	291	52,304
Car	18	381	21	763	1,37,299
City Bus	978	25,907	26	51,814	93,26,440
College Bus	138	4,566	33	9,133	16,43,853
Motor Bike/ Scooter	415	6,469	16	12,939	23,28,948
Share Auto	148	554	4	1,108	1,99,504
Train	784	30,817	39	61,634	1,10,94,143
Walk	200	236	1	472	84,995
Grand Total	**2719**	**69,273**	**25**	**1,38,546**	2,49,38,284
** actual data received from 1048 students. Extrapolated to total population					

a) Carbon Emissions due to travel

Mode of transport	Distance per yr	Fuel used	Kms per ltr	Ltrs per yr	No: of persons per vehicle	ltrs per yr per person	CO2 emission in kg per ltr	CO2 kg per yr
Auto	70,798	petrol	30	2,360	1	2,360	2.39	5,640
Bicycle	52,304	na						
Car	1,37,299	petrol	12	11,442	2	5,721	2.39	13,673
City Bus	93,26,440	diesel	4	23,31,610	50	46,632	2.64	1,23,109
College Bus	16,43,853	diesel	4	4,10,963	40	10,274	2.64	27,124
Motor Bike/ Scooter	23,28,948	petrol	50	46,579	2	23,289	2.39	55,662
Share Auto	1,99,504	diesel	30	6,650	3	2,217	2.64	5,852
Train	1,10,94,143	electric						
Walk	84,995	na						
Grand Total	2,49,38,284							**2,31,059**

* No. of working days: 180

**Zero emissions considered for Electric train as it is clean energy within the city of transport. Emissions during generation of electricity at source have not been considered*

Inferences

- **231** Tons of Carbon dioxide emissions per year due to travel to the college by students
- This amounts to 85 kgs per student per year
- 37% of students are in the "Zero emission" category
- 78% of students use public transport & clean transport for travel

2. Best Practices

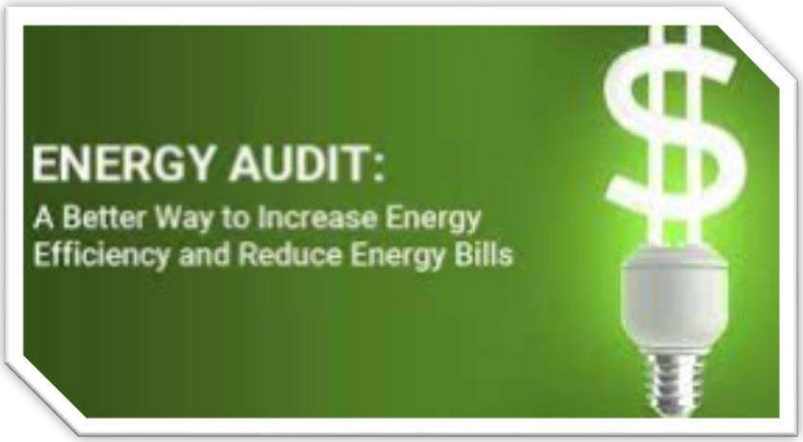
- 78% of the students & staff using either clean transport or public transport

3. Suggestions / Recommendations

- College to continue and sustain good practices of using public transportation by both students and staff

ENERGY AUDIT REPORT

2020-21



Need

As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption".

Electricity is the main source of energy to run an educational institution like SRM. It takes care of all requirements like lighting, fans, ACs, water motors, RO plants etc.

The scope of audit covers the entire electrical energy requirements of the college, the sources, measurement, consumption, conservation techniques, use of renewable energy and awareness among staff and students. The scope also includes cost benefit analysis of projects done, identification of areas for improvement and recommendations to move towards higher energy efficiency.

The main goals of energy audit are:

- Reducing energy consumption in a systematic manner by:
    - Constant monitoring and measurement
    - Identifying leakages / wastages
    - Alternate energy efficient methods / products
    - Creating awareness
    - Becoming self-sufficient in energy generation through sustainable methods like renewable energy
    - Saving environment through efficient energy usage as well as saving energy costs for the institution

Audit Parameters

Following are the key parameters used in Energy audit:

1. Energy sources
2. Measurement and Consumption
3. Awareness and communication
4. Best Practices
5. Energy Sustainability Index
6. Suggestions/ Recommendations

Observation and Inferences

(i) Management Commitment

The Management of the college has shown the commitment towards Energy audit during the pre-audit meeting. The institution has consciously taken several steps towards energy efficiency like LED lights and installed a roof top Solar power plant, a renewable and clean energy source to augment their energy needs. The management was willing to formulate policies and take actions based on energy audit report.

(ii) Analysis of Electrical Load

a. Connected load & Consumption Estimates

Loads	Wattage for one no.	Building/ Dept/ Block name/ number						Total No. of units	Avg. usage in Hrs / day	KWH per/ day	Consumption / day
		Main Block	PG Block	MBA Block	MBA Extn	Hotel Block	Total nos				
FANS	70	248	106	135	91	89	669	46830	8	374.64	46830
Tube Lights	40	212	263	112	83	127	797	31880	8	255.04	31880
CFL Tubes							0			0	0
LED Bulbs	9	8	7		3	33	51	459	8	3.672	459
LED Tubes	20	86	48	24	112		270	5400	8	43.2	5400
Centralised AC	3000					1	1	3000	8	24	3000
Standalone AC										0	0
1 Ton	1000	1					1	1000	4	4	1000
1.5 Ton	1500	3	13	1	16	6	39	58500	4	234	58500
2 Ton	2000	14	20	12	10		56	112000	4	448	112000
Projectors	200	2	4	1	1	2	10	2000	8	16	2000
Computers/Laptops	100	34	225	100	99	40	498	49800	8	398.4	49800
Printers/ Photocopiers	200	10	7	5	10	4	36	7200	3	21.6	7200
Television	56	2			3	4	9	504	8	4.032	504
Motor										0	0
5HP bore well motor	3728.5	1					1	3728.5	2	7.457	3728.5
1 HP RO pump motor	745.7	2					2	1491.4	2	2.9828	1491.4
0.5 HP diesel pump	372.85	1					1	372.85	0.5	0.18643	372.85
Other equipment										0	0
Lift (motor)	3711.3	1	1			1	3	11133.9	8	89.0712	11133.9
Total										1926.28	335299.65

b) EB Meter readings

Meter No	Units consumed 2018-19	Total Charges 2018-19	Units consumed 2019-20	Total Charges 2019-20	Units consumed 2020-21	Total Charges 2020-21	Units consumed Apr-Jun'21	Total Charges Apr-Jun'21
99094110926	679260	6109134	709851	63,92,719	203256	30,06,263	43398	707389

c) Alternate sources of Electricity

1. Diesel Generator

- Qty, Capacity, Average usage per month, connected load, Diesel consumed during each year

Qty	Capacity	Average usage per month	Connected Load (KVA)	Diesel consumed during every year in lit		Amount in INR
1	250 KVA	191.66 L	200	2018-2019	2300.00	162,070
		149.22 L	200	2019-2020	1790.70	122,548
		41.60 L	200	2020-2021	499.18	30,000

2. Solar power plant/ Wheeling to the Grid

- Installed capacity, Month-wise units generated since installation

Description	MONTHWISE UNIT GENERATED (KWh)					
Solar Power Plant 20 KVA	Apr-18	2197	Apr-19	1114	Apr-20	Not Available
	May-18	2085	May-19	1013	May-20	Not Available
	Jun-18	2192	Jun-19	1104	Jun-20	Not Available
	Jul-18	2045	Jul-19	1116	Jul-20	1816
	Aug-18	2165	Aug-19	1018	Aug-20	2116
	Sep-18	2139	Sep-19	1024	Sep-20	2011
	Oct-18	1963	Oct-19	1109	Oct-20	2142
	Nov-18	1876	Nov-19	974	Nov-20	2123
	Dec-18	2112	Dec-19	158	Dec-20	1993
	Jan-19	2215	Jan-20	1041	Jan-21	1986
	Feb-19	1893	Feb-20	2118	Feb-21	1892
	Mar-19	1056	Mar-20	1,614	Mar-21	2184

Description	MONTHWISE UNIT (KVA)					
Transformer 415 KVA	Apr-18	415	Apr-19	415	Apr-20	415
	May-18	415	May-19	415	May-20	415
	Jun-18	415	Jun-19	415	Jun-20	415
	Jul-18	415	Jul-19	415	Jul-20	415
	Aug-18	415	Aug-19	415	Aug-20	415
	Sep-18	415	Sep-19	415	Sep-20	415
	Oct-18	415	Oct-19	415	Oct-20	415
	Nov-18	415	Nov-19	415	Nov-20	415
	Dec-18	415	Dec-19	415	Dec-20	415
	Jan-19	415	Jan-20	415	Jan-21	415
	Feb-19	415	Feb-20	415	Feb-21	415
	Mar-19	415	Mar-20	415	Mar-21	415

d) Steps taken to conserve energy / Sensor-based energy conservation system:

(iii) Observations and Recommendations – Utilization of Solar plant

- Defective solar panels to be repaired / re-fixed to get maximum benefits
- Net-meter to be installed and Solar energy utilization to be optimized during holidays

(iv) Awareness among students and staff

a. TrustedSCM conducted an online quiz on "Environmental awareness" which included two questions on "Energy Conservation"

Measurement parameters	Min. Target	Actual achieved	Max points	Points achieved
No: of Awareness sessions conducted in the college during the year 20-21	1		2.5	
Awareness/ Knowledge of Students & Staff on the Energy Conservation	80%		2.5	

(v) Best Practices

- ✓ Good documentation system in place, helps in data availability
- ✓ Roof top Solar power plant -- 20 KW
- ✓ Online awareness session on Energy Conservation

(vi) ENERGY SUSTAINABILITY INDEX**

**Scores of 2019-20 considered, as the campus was non-functional during 2020-21 due to Covid*

***A performance measure developed by TrustedSCM Solutions for evaluating Higher Educational Institutions. The factors and benchmarks would undergo changes from time to time to enhance the standards from current levels*

(vii) Suggestions & Recommendations

1. Net metering to be installed to save solar energy wastages (~120 days holidays solar energy generated but not utilized, it will be re-credited, if we install Net meter)
2. Periodically all tub lights (40W tube lights) needs to be replaced by LED battens
3. Posters to be displayed in the campus, emphasising the importance of energy Conservation

GREEN CAMPUS AUDIT REPORT

2020-21

Green Campus

Need

Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen released by the trees of the campus is good for the people in the campus. So while you are busy studying and working on earning those good grades, all the trees in campus are also working hard to make the air cleaner for you.

Green Campus is an environment which improves energy efficiency, conserving resources and enhancing environmental quality by educating for sustainability and creating healthy living and learning environments. Green Campus rewards long term commitment to continuous environmental improvement from the campus community.

Audit Parameters

Following are the key parameters used in Green campus:

1. Green cover
2. Identification and classification of vegetation
3. Best Practices
4. Awareness and communication
5. Green Sustainability Index
6. Suggestions and Recommendations

Observation and Inferences

- Total area of campus: 5 acres (2,17,800 sq ft.)
- Open area available: 70,000 sq ft.
- Green Cover with trees, flowering plants area: 44,000 sq.ft. (tree canopy)
- Bio-diversity greenery with 20% is covered with trees, herbs & approx.

- Availability of a variety of vegetation including a few large trees has encouraged birds, insects and small animals like squirrels to find refuge in the campus
- Botanical garden work is under progress
- In-house composite manure system in place for garden purpose
- Two full-time gardeners are engaged in maintenance of garden
- Regular Green Environment awareness programs are conducted (NSS)

Awareness and communication

- Displayed plants common name and botanical name
- Conducting campaign on tree plantation regularly
- Two questions from the environmental quiz are related to green campus.

Best Practices

- ✓ Excellent & well maintained Garden with varieties of trees and plants
- ✓ Conducted awareness campaign on ban of Plastics
- ✓ Enthusiastic environment team members have made good efforts for the greenery
- ✓ World Environment Day – June 5, Awareness programs are organized on various Environmental topics. Planting trees, poster etc. are some activities on that day

Suggestions & Recommendations

- Conduct competitions among departments for making students more interested in making the Campus green
- Suggest, plant more herbal and medicinal value plants

ANNEXURE A

Environmental Quiz Summary & Data Collection Questionnaire

Environment Awareness Quiz

TrustedSCM conducted an online quiz (MCQ) to evaluate the awareness levels of students and staff of the college. The results are given below:

Participant Info

▪ No: of participants	
▪ Students	
▪ Staff	
▪ Participants scoring 10/10	
▪ Participants scoring 9/10	
▪ Average score	

Quiz questions and correct responses

Q no.	*Quiz Question*	*Topic*	*No: of correct answers*	*% correct*
1	Which gas is the highest among fossil fuel emissions?	Carbon footprint		
2	Which of these is not a fossil fuel?	Carbon footprint		
3	Which of the following sources of light consumes least energy?	Energy		
4	Photo-voltaic or PV technology is used to convert which energy into Electrical energy?	Energy		
5	Which of the following solid wastes is not bio-degradable?	Solid Waste		
6	Discarded Computer and Mobile phone parts are considered as which category of waste?	Solid Waste		
7	Which is NOT a method of conserving water?	Water		
8	When we let out sewage or chemical effluents into a water body (lake, river etc) without treatment, the following does NOT happen:	Water		
9	Biodiversity is the availability of large variety of plant and animal species. It is found most in...	Green		
10	Trees provide shade and shelter to birds, insects, squirrels, they purify the air by absorbing Carbon dioxide and emitting which gas?	Green		

Topic category wise correct responses

Environmental Audit			
▪ Water Conservation			
▪ Solid Waste Management			
▪ Carbon emissions			
Total			
Energy Audit			
❖ Energy Conservation			
Green Audit			
❖ Green cover and Bio-diversity			

Data Collection Questionnaire

1. **Water Management**

Sl#	*Questioners*	*Response*
1	What are the sources of water	
2	How many bore-wells? And depth of bore-wells : Nos, Depth(in feet)	
3	Water sump capacity in Liters	
4	Overhead water tank capacity (in liters): Nos,	
5	Quantity of water used per day (in liters)	
6	Are water flow meter installed?	
7	Approx. break-up of water usage	
8	Is RO Plant available? What is the capacity? How much RO water is produced / day	
9	Water usage for Gardening? Which water? How is the watering done? Approx. Qty	
10	Steps taken to conserve water / save water	
11	Is rain water harvesting done? How many pits done across the campus?	
12	Any leaky? Amount of water lost per day?	
13	Amount of water lost / day	
14	Waste water sources	
15	Any use of waste water	
16	Any waste water / effluent from labs? Where is this water let out? Is it treated before letting into ground / drain?	
17	Is quality of treated water tested periodically?	
18	Whether any green chemistry methods are practiced in your labs?	
19	Is there a sewage treatment plant installed? What is the capacity?	
20	If not, how is the sewage water disposed? From clarified water from septic tank is disposed outside of the campus	

2. Solid Waste Management

How the waste generated in the College is managed?	*Yes / No*	*Remarks*
A) Composting/ Vermicomposting		
B) Recycling		
C) Reusing		
D) Other ways		

Waste Generated in the college:

Sl. #	*Parameters*	*Response – Disposal method*	*Remarks*
1	E-waste		
2	Hazardous waste		
3	Solid waste		
4	Dry leaves		
5	Canteen waste		
6	Liquid waste		
7	Glass		
8	Unused		
9	Equipment		
10	Napkins		
11	Others (specify)		
Do you use re-cycled paper in college		-	
Any waste management methods used		-	

Different types of Waste generated and Disposal methods:

Sl #	*Types of Waste*	*Particulars*
1	E-Waste	Computers, Electrical and Electronics parts
2	Plastic waste	Pen, Refill, Plastic water bottles, & other plastic containers
3	Solid Waste	Damaged furniture, Paper waste, Paper plates, Food wastes
4	Chemical Waste	Laboratory wastes
5	Waste Water	Washings, Urinals, Bathrooms
6	Glass Waste	Broken Glass wares from Labs

3. Carbon Foot Print Waste Management

Sl #	*Questions*	*Response*
1	What is the total strength of students and teachers in your College?	
2	Total Number of vehicles used by the stakeholders of the college. (per day)	
3	No. of cycles used	
4	No. of two wheelers used (average distance travelled and quantity of fuel and amount used per day)	
5	No. of cars used (average distance travelled and quantity of fuel and amount used/ day	
6	No. persons using common (public) transportation (average distance travelled and quantity of fuel and amount used per day) :	
7	No. of persons using college conveyance by the students, non-teaching staff and teachers (average distance travelled and quantity of fuel and amount used per day	
8	Number of parent-teacher meetings in a year? Parents turned up (approx.)	
9	Number of visitors with vehicles per day?	
10	Number of generators used per day (hours). Give the amount of fuel used per day	
11	Number of LPG cylinders used in the canteen (Give the amount of fuel used	
12	Quantity of kerosene used in the canteen/labs (Give the amount of fuel used / day and amount spent).	
13	Amount of taxi/auto charges paid and the amount of fuel used per month	
14	Amount of taxi/auto charges paid per month for the transportation of office	
15	Average amount of taxi/auto charges paid per month by the stakeholders of the college	
16	Use of any other fossil fuels in the college (Give the amount of fuel used per day and amount spent)	
17	Suggest the methods to reduce the quantity of use of fuel used by the stakeholders/students/teachers/non-teaching staff of the college.	

Fossil Fuel Generation:

Source	*Fuel*	*Usage per day*	*UOM*	*Average CO2 generated per unit in KGs*
✓ Two wheelers	Petrol		Liters	
✓ Four wheelers	Petrol		Liters	
✓ Public transport	Diesel		Liters	
✓ College transport	Diesel		Liters	
✓ Diesel Generator	Diesel		Liters	
✓ LPG cylinders	LPG		Kg	

Total per day

4. Energy Management

A. Connected Load

Building / Department / Block Nam / No							
Loads	***Wattage for one no.***	***A***	***B***	***Total No***	***Total No of Units***	***Avg.usage in hrs/day***	***KWH / Day***
Fans							
Tube Lights							
CFL Tubes							
LED Bulb							
LED Tubes							
Central AC							
Standalone AC							
Projectors							
Computers							
Printers							
TVs							
Motor							
Other Equipments							

- KWH Kw / month :
- Energy generation by solar panels : KV Solar cells- kWh/month

B) EB Meter Readings:

METER No	***Units Consumed 2019-20***	***Total Charges 2019-20***	***Units Consumed 2019-20***	***Units Consumed 2019-20***	***Total Charges 2019-20***	***Units Consumed Apr-Jun'21***	***Total Charges Apr-Jun'21***

C) Alternate Source of Electricity

1. Diesel Generator: Qty, Capacity, Average usage / month, connected load, Diesel consumed each year
2. Solar Power Plant / Wind Turbine: Installed capacity, Month wise units generated since installation
3. Steps taken to conserve energy

5. Green Campus

1. Is there a garden in your college? Area?
2. List the plants in the garden, with approx. numbers of each species.
3. Whether you have displayed scientific names of the trees in the campus?
4. How much water is used in the gardens? (Mention the source and quantity of water used).
5. Who is in charge of gardens in your college?
6. Are you using any type of recycled water in your garden?
7. List the name and quantity of pesticides and fertilizers used in your gardens?
8. Do you have any composting pit in your college?
9. If yes what are you doing with the compost generated?
10. Is there any botanical garden in your campus? If yes give the details of campus flora.
11. Give the number and names of the medicinal plants in your college campus.
12. What is the type of vegetation in the surrounding area of the college?
13. What are the nature awareness programmes conducted in the campus? (2020-21)
14. What is the involvement of students in the green cover maintenance?
15. What is the total area of the campus under tree cover? Under tree canopy?
16. Share your IDEAS for further improvement of green cover.

List of plants in the campus:

Sl No	*Common / Local name*	*Botanical Name*	*Classification*	*No of trees*