

7.1.3 Quality audits on environment and energy regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following

- 1. Green audit / Environment audit
- 2. Energy audit
- 3. Clean and green campus initiatives
- 4. Beyond the campus environmental promotion and sustainability activities

#### **DVV** Findings

- Policy document on environment and energy usage
- Action taken reports and achievement report as clear and Green campus initiatives.
- Reports of the Audits.
- Certificate from the external accredited auditing agency (preferably government, concern department of affiliating university).
- Geo tagged photographs with caption and date.
- Any other supporting document for beyond the campus environmental promotions.

#### **HEI Input :**

#### A. All of the above

S. No.	Content	Page No.
1	Policy document on environment and energy usage	1
2	Action taken reports and achievement report as clear and green campus initiatives.	2-4
3	Reports of the Audits.	5-43
4	Certificate from the external accredited auditing agency (preferably government, concern department of affiliating university).	44-47
5	Geo tagged photographs with caption and date.	48-50
6	Any other supporting document for beyond the campus environmental	
	promotions.	51-52

**Principal** Sumathi Reddy Institute of Technology for Women Ananthasagar (V), Hasanparthy (M)



#### **Green and Energy Audit Policy**

#### **Green Audit**

By properly disposing the waste and taking steps to recycle biodegradable waste. The campus is keeping clean by using environmentally friendly materials and successful recycle program

SRITW College deems it essential in implementing green campus concepts on campus. SRITW believes in education combined with environment friendly practices to promote sustainable development. Awareness is being created amongst the staff and the students to reduce the use of plastic. Plastic glasses have been replaced with paper cups in the canteen.

The green ambience of the Institution is largely due to tree plantation which maintains the ecosystem. To ensure that the natural resources are utilized properly as per national policy environment.

#### The main objectives are follows:

- To grow a greater number of plants to produce more amount of oxygen
- To conserve energy by using alternate energy resources such as solar energy and power efficient equipment.
- Commitment to prevent to pollution and to continuously environmentally performance to conserve the nature for future generation.

#### **Energy audit**

The main objective of the energy audit is to pro ability in compliance with the applicable regulations, policies and standards to promote the Energy Management and Conservation in the College Campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of Environment Sustainability.

PRINCIPAL Principal Sumathi Reddy Institute of Technology for Women Ananthasagar (V), Hasanparthy (M)



#### Action taken reports and achievement report as clear and green campus initiatives.

#### Clear and green campus initiatives:

The Green Campus Policy of the college envisions a Clear and Green Campus where environment friendly practices and education combine to promote sustainable and ecofriendly practices in the campus and beyond the campus.

To Create awareness about environmental issues by organizing Events, Rallies, Awareness Campaigns, Cleanliness Drives, Seminars, Workshops, presentations, Tree Plantation Drives, Rangoli Competitions, Essay Competitions, etc.

#### Initiatives Taken to Implement the Clear and Green Campus Policy

- Landscaping with Trees and Plants
- Rainwater Harvesting/storage
- Solid Waste Management



Vehicles parking

Ananthasagar, Hasanparthy, Warangal -506371, Telangana. Website: www.sritw.org Phone no: 0870-2818302. Email: principal@sritw.org.





Swachh Bharat in the college campus



Solid Waste collector

Ananthasagar, Hasanparthy, Warangal -506371, Telangana. Website: www.sritw.org Phone no: 0870-2818302. Email: principal@sritw.org.





Landscaping with Trees and Plants



Greenery in the campus

Rijar Principal

Sumathi Reddy Institute of Technology for Women Ananthasagar, Hasanparthy, Warangal -506371, Telangana. Website: www.srith Asagar (V), Hasanparthy (M) Phone no: 0870-2818302. Email: principal@sritw.WaRANGAL - 506 371 (TS) KVQA Certification Services Pvt. Ltd.



## **Environment Management System**

## Acknowledgment KVQA Certification Services Pvt. Ltd.

K V HarGopal

25 October 2023

KVQA Certification Services Pvt. Ltd.

#### **Environmental Audit (Water and Waste Management)**

The KVQA Certification services Pvt. Ltd. acknowledges with thanks the cooperation extended to our team for completing the study at Sumathi Reddy Institute of Technology for Women (SRITW).The interactions and deliberations with SRITW team were exemplary and the whole exercise was thoroughly a rewarding experience for us. We deeply appreciate the interest, enthusiasm, and commitment of SRITW team towards environmental sustainability. We are sure that the recommendations presented in this report will be implemented and the SRITW team will further improve their environmental performance.

Kind regards,

Yours sincerely

KVQA CERTIFICATION SERVICES PVT. LTD.

## **Executive Summary**

The growth of countries across the world is leading to increased consumption of natural resources. There is an urgent need to establish environmental sustainability in every activity we do. In a modern economy, environmental sustainability will play a critical role in the very existence of an organization. An educational institution is no different. Built environment, especially an educational institution, has a considerable footprint on the environment. Impact on the environment due to energy consumption, water usage and waste generation in an educational institute is prominent. Therefore, there is an imminent need to reduce the overall environmental footprint of the institution.

As an Institution of higher learning, Sumathi Reddy Institute of Technology (SRITW) firmly believes that there is an urgent need to address the environmental challenges and improve their environmental footprint.

True to its belief, SRITW has implemented rainwater harvesting in the campus. Continuing with rainwater harvesting, the college can also investigate the following recommendations:

• Attain water positive status: SRITW should focus on capturing the harvested rainwater to substitute freshwater consumption, work on sustainable groundwater beyond the fence and create a framework towards attaining water positive status over a period. Presently, SRITW is consuming nearly 60 KL of fresh water per day. Since metering is not available, the water consumption is calculated rather than measure value.

The first step is to increase the water conservation activities in the campus to reduce water consumption at source. The next step is to increase the rainwater harvesting capacity to completely offset the freshwater requirements of the plant. SRITW can also explore adopting lakes, desilting of ponds and restoration of water bodies in localities surrounding the campus. Water getting harvested in those structures can offset the freshwater consumption of the college.

• Install water efficient fixtures: The best way to conserve water is at the source. Therefore, SRITW will have to install water efficient fixtures to reduce water consumption. Some of the water efficient fixtures are:

Spring loaded push taps Low flush cistern

- Install sewage treatment plant / rootzone treatment: SRITW uses more than 100 KL of fresh water per day. Considering that 5 KL (least value) of water is being let to drain without treatment, good opportunity exists to reduce freshwater consumption by treating the sewage water and using the recycled water for gardening and flushing application. Install biogas plant and phytoremediation in series to recycle water and reduce freshwater consumption.
- **Install water flow meters**: Water flow meters are vital in understating the water consumption patterns of the campus. Presently, the water consumption is calculated rather than being measured. Water flow meters gives an accurate status if water consumption in the campus and from the water consumption values, the roadmap for water conservation activities can be prepared.
- Segregate waste at source: SRITW has provided bins for waste collection. SRITW must embark on awareness creation methods to increase the effectiveness of collection and provide more bins for proper waste segregation.
- Maintenance of waste management yard: The waste management yard is to be maintained just like raw materials storage room. Waste is nothing but a resource in wrong place. Therefore, by maintaining the waste management yard, quality of wastes can be maintained.

### **Environmental Audit**

SRITW and KVQA certification Services Pvt. Ltd. are working together to identify opportunities for improvement in water management, and waste management. This report highlights all the potential proposals for improvement through the audit and analysis of the data provided by SRITW for water consumption and waste management. The report details the process conducted for the analysis such as on ground surveys performed for listing the type of water consumers with consumption per year, types of waste generated and disposal mechanisms.

#### **Submission of Documents**

Environmental audit at SRITW was carried out with the help data submitted by SRITW team. SRITW team was responsible for collecting all the necessary data and submitting the relevant documents to KVQA certification Services Pvt. Ltd for the study.

#### **Preliminary Study**

After the receipt of documents, a desktop review of the data for quality check, followed by preliminary study was carried out by KVQA certification Services Pvt. Ltd. In case of discrepancy/inadequacy/non-clarity of data, KVQA certification Services Pvt. Ltd team got in touch with the SRITW team for clarification/additional information.

#### **Environmental Audit**

Data submitted and collected during the visit was used to assess the water and waste management practices of the campus and finally provide necessary recommendation for environmental improvement.

#### Note

Environmental audit is based on the data provided by SRITW team. The scope of the study does not include the exclusive verification of various regulatory requirements related to environmental sustainability.

KVQA certification Services Pvt. Ltd has the right to recall the study, if it finds (a) major violation in meeting the environmental regulatory requirements by the location and (b) occurrence of major accidents, leading to significant damage to ecology and environment.

## Water Conservation

To achieve a water positive status by continuous reduction of freshwater consumption should be the ultimate focus of SRITW. Increased and focused attention should be given to attain water sustainability in future by inculcating the discipline of water conservation.

Fresh water consumption of SRITW	: 50KL/day (KLD)
Rainwater harvesting	: carried out for roof area

#### **Recommendations for water conservation:**

**1) Volume reduction in flush tanks**: One simple method is to add a one-liter equivalent water bottle in the flush tank thereby reducing its consumption majorly. One-liter savings in the tank will help to save approximately by 20% and doesn't require any investment.



2) **Rainwater harvesting**: Water harvesting or more precisely rainwater harvesting is the technique of collection and storage of rainwater at surface or in subsurface aquifer, before it is lost as surface run off. In artificial recharge, the ground water reservoirs are recharged at a rate higher than natural conditions of replenishment.

According to a report by the Central Groundwater Board published in 2007, the selection of a suitable technique for artificial recharge of ground water depends on various factors. They include:

- a) Rainfall pattern
- b) Land use and vegetation
- c) Soil type and soil depth

- d) Thickness of weathered / granular zones
- e) Environmental and ecological impacts of artificial recharge scheme proposed

# 3) Display water balance/conservation status at entrance of all blocks for overall involvement of all students & staff

It is suggested to display specific water consumption numbers in terms of domestic use at the entrance of each block to create awareness among all students and stakeholders visiting the facility. This daily/continuous awareness creation will ultimately help in reduction of water consumption by students.

## Water Saving Gadgets

It is suggested to display specific water consumption numbers in terms of domestic use at the entrance of each block to create awareness among all students and stakeholders visiting the facility.

#### **Electronic Taps (e-taps)**

The latest trend in industries is to install electronic taps (e-taps). The advantages of using e-taps are as mentioned below:

- Unlike conventional taps, there is no twisting or turning in e-taps. They have a sensor, which cuts off water supply completely when not in use. This helps in saving up to 70% water during hand wash.
- E-taps enable hands free operation. No fear of cross contamination or contact with germs. E taps score very high on hygiene. It is the most ideal choice for multipurpose and multi-user washrooms.
- E-taps can work efficiently up to raw water TDS of 1,800 ppm.
- The touch free electronic taps, available in AC and DC models consume minimal power only. The AC model has an efficient battery back-up, while the DC model runs on just 4 alkaline batteries.



#### Electronic taps

#### **Operation of Electronic Taps**

This has been successfully implemented in several hotels & restaurants. Of late, several industries have also started implementing this proposal. Thus, there is a good potential to optimize the freshwater consumption by replacing the existing taps with e-taps.

#### **Electronic flush (e-flush) urinals**

The latest trend in industries is to install e-flush urinals. The advantages of using e-flush urinals are as mentioned below:

- E-flush urinals are fitted with a sensor, which senses the usage and flush with water for few seconds after use. This helps in saving 70% water during urinal flush.
- E-flush urinals enable hands-free operation and score very high on hygiene. It is the most ideal choice for multipurpose and multi-user washrooms.
- E-flush urinals can work efficiently up to raw water TDS of 1,800 ppm.
- The touch free e-flush urinals available in AC and DC models consume minimal power only. The AC model has an efficient battery back-up, while the DC model runs on just 4 alkaline batteries.







Electronic flush urinals

#### Hand wash Foam taps

Conventional taps are used in the hand wash areas which results in wastage of large quantities of fresh water. Foam taps are a better fit in these high consumption areas. They consume 25-30% less water than conventional taps.



Foam taps

#### Spring loaded Push taps

Spring loaded push type tap is an alternate device for minimizing hand wash water. The springloaded push taps operate with the simple mechanism of pressing the knob for water. The knob is automatically released back to close position in 5-7 seconds. This saves about 30-40% of water compared to the conventional taps.



Spring Loaded Push taps



#### Low flush cistern



Low Flush Cistern

The latest model closets are water efficient and operate in dual mode, with a single flush releasing 2 litres of water and the dual flush releasing 4 litres per flush. This results in excellent water savings.

#### **Install sewage treatment plant – Root zone treatment:**

SRITW uses more than 50 KL of fresh water per day. Considering 5 KL of water is being let to drain without treatment, good opportunity exists to reduce freshwater consumption by treating the sewage water and using the recycled water for gardening and flushing application. Install biogas plant and phytoremediation in series to recycle water and reduce freshwater consumption.

#### **Biogas Production Potential of Wastewater:**

The sewage water is a useful waster as 1% of it in any quantity is a sludge which when subjected to anaerobic digestion will produce biogas. Wastewater is the effluent from household, commercial establishments and institutions, hospitals, industries and so on. Sewage water source contains large amount of organic material which can be efficiently recovered in as sludge which and when subjected to anaerobic digestion, the sludge produces methane gas (biogas).

Biogas is a mixture of gases containing 50-75% Methane, and 25-50% Carbon dioxide while 0-10% Nitrogen, 0-3% Hydrogen disulphide and 0-2% Hydrogen may be present as impurities which is produced by anaerobic digestion of organic material i.e. a sequential enzymatic breakdown of biodegradable organic material (Biomass) in the absence of oxygen. The process is usually carried out in a digester tank known as biodigester. Biogas is an important energy source used as cooking gas, to generate electricity, etc. thus producing biogas from wastewater is an efficient and sustainable waste management and renewable energy technique. One of the major environmental problems of the world today is waste management and wastewater constitutes a huge environmental problem to the society thus the need for wastewater treatment to recover and also recycle the recovered water for usage.



**The physical process**: this is the mechanical treatment of the water that involves removal of debris from the raw wastewater right from the point it enters the plant. The screening and primary settling of debris. Wastewater enters the treatment plant through the inlet chamber from where it is channeled to the coarse screen that removes solid waste.

**The biological process**: This involves the bio treatment of the sewage in the bioreactors. It is the heart of the treatment plant where a biological process takes place. The bioreactors of a treatment

plant are usually large tanks consisting of several mammoth rotors and submersible mixers. While the rotor introduces atmospheric oxygen into the sewage, the submersible mixers keep the biomass in suspension thus several reactions takes place in the bioreactors.

From the bioreactor, the sewage enters the sedimentation tank. Here the biological process ends and sludge is separated from water such that the clean water is passed to the disinfection tank for disinfection and onward discharge for use while the sludge is removed by the returned activation sludge (RAS) pump that removes and sends part to the anaerobic digestion chamber while some are return to the anaerobic bioreactor for reactivation.

Production of biogas is an anaerobic digestion whereby microorganisms break down biodegradable material in the absence of oxygen to produce methane/carbon dioxide used to generate electricity and heat. Sludge from the treatment plant (primary and activated sludge) is the main feedstock (biodegradable organic matter) in the biogas production plant of a wastewater treatment plant and the biogas production process involves series of steps. The combine sludge resulting from primary and secondary water treatment is gathered, sieved and thickened to a dry solids content of up to 7% before entering the digesters. Optionally, the sludge can be pretreated by disintegration technologies with the aim to improve the gas yield. In the anaerobic digestion process, the sludge is pumped into the anaerobic continuously stirred tank reactors where digestion takes place.

In the process, microorganisms break down part of the organic matter that is contained in the sludge and produce biogas, which is composed of methane, carbon dioxide and trace gases. The raw biogas produced is dried and hydrogen sulphide and other trace substances removed and burned in burners after treatment. The digested sludge is dewatered, and the water reintroduce into the treatment plant while the remaining undigested matter used for organic fertilizer.



#### **Root zone treatment:**

Root Zone' is a scientific term used to cover all the biological activity among different types of microbes, the roots of plants, water soil and the sun. It consists planted filter-beds containing gravel, sand and soil. The RZWT system utilises nature's way of biologically processing domestic & industrial effluents. This effective technology called Decentralised Wastewater Systems (DEWATS) was developed in 1970s in Germany and has been successfully implemented in different countries mainly in Europe and America.

The root zone wastewater treatment system makes use of biological and physical-treatment processes to remove pollutants from wastewater. Due to its natural process, there is no need to add any input such as chemicals, mechanical pumps or external energy. This reduces both the maintenance and energy costs.

- To accomplish this, the root zone wastewater treatment undertakes the following steps:
- Pre-treatment done in a Settler a device that separates the liquid from the solid First treatment takes place in a Anaerobic Baffled Reactor a device with several identical chambers through which the effluent moves from top to bottom.
- Second treatment happens in an Anaerobic Filter a device filled with a filter material (cinder), through which the effluent moves from top to bottom.
- Third treatment takes place in a Planted Gravel Filter a structure filled with gravel material and planted

with water- resistance reed plants, which provide oxygen to the passing effluent.

## Waste Management

A renewed focus on sustainable growth and development is imperative as India strives to maintain its high GDP growth rate in its pursuit of achieving developed country status by the year 2022. However, the flip side of higher economic growth has resulted in increased consumption of the natural resources, increased waste generation and hence ecological degradation.

**Present status:** SRITW has initiated waste management activities inside its facility. Separate bins have been provided for different types of wastes. Waste bins are provided throughout the campus and students are being urged to use the bins effectively.

**Recommendation:** The waste management yard must be maintained in a similar fashion as that of a raw material storage room. Therefore, a total revamp of the waste storage yard is to be carried out. By doing so, the quality of the materials stored in the yard will not deteriorate and can be used a raw material for a subsequent process.

#### Enhance awareness creation, training and capacity building

SRITW should focus on implementing sustainable waste management practices. SRITW should regularly interact with Pollution Control Board and Treatment, Storage and Disposal Facilities (TSDF) operators to enhance knowledge on waste management. The team should also take efforts to communicate the waste management and other policies and activities to all students in the college.

#### Achieve zero liquid discharge status

SRITW may install a Sewage water management (STP) to treat and recycle water. The treated water from STP can be used to substitute freshwater by utilizing the treated water in both high end and low-end applications.

### Conclusion

Environmental sustainability is a continuous process and there is always a scope for improvement. SRITW has displayed itself as an advocate of environmental sustainability by getting environmental audit carried out. The organization has implemented several initiatives and measures to enhance efficiency and to optimize resource intensity. The journey ahead in the path towards environmental excellence has immense scope for improvement as brought out by this report.

SRITW needs to focus and work on areas efficiency levels needs to be enhanced. For example: waste management. The observations and suggestions put forth by the report would help the facility in improving its environmental performance and pave way for ecologically sustainable growth.

This report may be taken as a guide and roadmap for achieving higher performance rating in environmental stewardship. As one of the pioneers and leaders SRITW shoulder the task of further 'learning – teaching – learning' to improve, excel, and continue the innovative efforts for success of their students and associates.

KVQA Certification Services Pvt. Ltd.



## **Green Landscape audit**

## Acknowledgment KVQA Certification Services Pvt. Ltd.

#### **K V HarGopal**

25 October 2023

KVQA Certification Services Pvt. Ltd.

#### **Green Landscape Audit**

The KVQA Certification services Pvt. Ltd. acknowledges with thanks the cooperation extended to our team for completing the study at Sumathi Reddy Institute of Technology for Women (SRITW).

The interactions and deliberations with SRITW team were exemplary and the whole exercise was thoroughly a rewarding experience for us. We deeply appreciate the interest, enthusiasm, and commitment of SRITW team towards environmental sustainability.

We are sure that the recommendations presented in this report will be implemented and the SRITW team will further improve their environmental performance.

Kind regards,

Yours sincerely KVQA CERTIFICATION SERVICES PVT. LTD. uthorised Signatory

### Introduction

#### The impact of urbanization on biodiversity loss

A decrease in biodiversity is caused by urbanization. Important habitat is lost or broken up into sections too small to sustain intricate ecological ecosystems as cities expand. As natural regions are absorbed by the urban jungle, species may become endangered or even locally extinct in the city.

It is ironic that non-native animals are frequently brought in unintentionally or on purpose for food, as pets, or for aesthetic purposes, and that this is due to urban expansion.

#### Documentation of Flora

Plans for conservation and sustainable management require a thorough understanding of the biodiversity of any given area. The preparation of a species inventory is the first duty in the conservation process. For effective plant conservation, a thorough understanding of the phenology, distribution, habitat, and habits of different plants is required.

The documentation of flora will help in identifying, documenting and promoting the conservation of native flora in India. This in turn will help in promoting native species for landscapes as they suit the growing interest in "low-maintenance" gardening and landscaping.

Many species are vigorous & hard and can survive winter, cold and summer heat. These species, once established, can flourish without irrigation or fertilization and are resistant to most pests & diseases.

#### **Need for Documentation of Flora:**

The knowledge building on significance and importance of various flora existing around us is the need of the hour. Loss of the biodiversity is likely to result in loss of various other taxonomic groups.

#### Serve as a ready reckoner:

Most of the campuses have huge landscape with diverse floral species. Nevertheless, the availability of information on these species is minimal. Hence, the documentation of the species would serve as an educational material on the details of species existing within the campus. Public Visibility:

Despite having various Biodiversity initiatives in place within the campus most of the campuses lack the visibility of the measures taken in conservation. The study will create awareness &visibility of the campus on various conservation measures implemented to the occupants as well as to the visitors. Also, the organization will gain visibility globally amongst its shareholders for the positive steps taken towards protecting biodiversity.

#### **Conservation of species:**

Due to urbanization most of the floral species are under tremendous pressure. The need of the hour is to conserve and protect these species. The study would help in identifying such species in the campus which need to be conserved.

### **SRITW Sequestering Carbon through Plantations**

Carbon sequestration through plantation is one of the important steps towards achieving carbon neutrality. In carbon footprint calculation of SRITW, carbon sequestration through plantation is considered and due credit has been given.

No. of trees considered for carbon footprint calculation

1600 treesCO2 absorbed by a tree in one year : 18 KG

Total CO2 sequestrated

- : 1600 trees x 18 KG of CO2 / year
- : 28,800 KGs of CO2



Amphi Theatre



Campus Landscaping



Landscaping at play area

### **Plantation & Maintenance techniques**

#### **Selection of Species:**

- Native species like Azadirachta indica (Neem), Pongamia pinnata (Pongam tree), Butea monosperma (Flame of the forest) and also fruit bearing species like, Psidium guajva (Guava), Annona squamosal (Custard apple), Punica granatum (Pomegranate), Phyllanthus emblica (Indian Gooseberry), and Citrus limon (Lime) to be selected for plantation
- Saplings of 2-3 ft height to be considered for plantation in public areas
- Plantation can be taken up as avenues (roadside plantation) and green belts (thick plantation in one area)
- Fruit plantation can be taken up in protected areas, institutions with large areas. Special care to be taken in maintenance since these plants also generate revenue.

#### **Digging of pits**

Pits to be dug about one month prior to the plantation date and it should be exposed to sunlight. This will help in killing of harmful disease-causing bacteria and virus.

- In places of no availability of proper sunlight, dry trash to be filled in the pit and burnt.
- Pit size should be normally 2ft<sup>3</sup> or 3ft<sup>3</sup>.
- Further to the digging of pit, the bottom of the pit should be loosened up to 6-9 inches. While digging, we can observe different soil profiles. Topsoil will be soft and contains enough

nutrients for nourishing the plant. The topsoil should be deposited on one end and hard soil on the other end. While filling the pit with soil, the topsoil only should be used. The topsoil from the non-plantation area around the pit to be collected and mixed with manure and used for filling of the pit.

### Transportation

- Visit to the nurseries and enquire about plant species like availability, size, age and girth prior to the plantation. Also, the size of the packet in which the plant is existing to be enquired.
- The saplings to be watered one or two days prior to the movement of plants to plantation area. The plants to be procured at least 15 days prior to plantation.
- The saplings to be watered as soon as they reach the plantation area and regularly thereafter.
- They should be kept in shade, non-windy & protected areas.

The above said steps to be followed for movement of plants near to the pits within the plantation area. Enough water to be stored for watering the plants after plantation. Also, tools and manpower to be kept in place to ensure proper plantation of saplings. If the sapling is bushy with many branches, then the branches are to be trimmed before plantation.

### Plantation

- The poly bag around the root ball to be carefully cut with a knife/sickle/scissors without disturbing the roots
- Rope and stakes are to be kept ready to support the plant after plantation.
- Regular watering to be done to the plants
- Note: At least 5% of extra plants to be procured for timely gap filling and to ensure 100% survival. Care to be taken for these plants like other plants.

### **Recommendations for Enhancing Flora in Campus**

- 1. Implement Ecosystem Restoration
  - Develop naturalized areas in the Open Area segments
  - 'Theme Gardens' can be developed in unused areas of the campus to increase proportion of natural area

#### 2. Enhance Ecosystem Protection

• Protect and maintain the existing Open Area segments

#### **3.** Planting more fruit yielding trees

• Increase tree density and canopy cover in the built-up areas

#### 4. Increase native plants to boost native biodiversity

- Bees, butterflies and other insects
- Healthy native plant growth will help in easy identification of invasive alien species

#### 5. Preventing/ Decreasing Invasive Alien Species Spread

- Identify potential threatening species in advance and implement quarantine measures
- Commitment to complete eradication
- Manual Uprooting of small populations
- Develop natural areas to encourage bird roosting and nesting in built-up areas

#### 6. Introduce features to attract birds in the built-up areas

- Bird feeders
- Water troughs/ Bird baths
- Nesting material

#### 7. Improve measures for rainwater harvesting in paved and un-paved areas

- Open fields, parks, pavement landscapes, etc.
- Develop outdoor parks in open areas

## Conclusion

The campus's net emissions are significantly reduced by tree plantations, as the carbon sequestration calculation shows. Thus, in order to lower the campus's overall carbon emissions, SRITW must create a plan that incorporates tree planting.

AQC Global LLC



## **Carbon Footprint and Energy Audit**

## Acknowledgment AQC Global LLC

Arun Kumar AQC Global LLC 25 October 2023

#### Carbon footprint and Energy audit at Sumathi Reddy Institute of Technology for Women (SRITW)

The AQC Global LLC acknowledges with thanks the cooperation extended to our team for completing the study at Sumathi Reddy Institute of Technology for Women (SRITW). The interactions and deliberations with SRITW team were exemplary and the whole exercise was thoroughly a rewarding experience for us. We deeply appreciate the interest, enthusiasm, and commitment of SRITW team towards environmental sustainability.

We are sure that the recommendations presented in this report will be implemented and the SRITW team will further improve their environmental performance.

Kind regards,

Yours sincerely,

GLOBAL LLC Adved Signatury

### **Executive Summary**

The growth of countries across the world is leading to increased consumption of natural resources. There is an urgent need to establish environmental sustainability in every activity we do. In a modern economy, environmental sustainability will play a critical role in the very existence of an organization.

An educational institution is no different. Built environment, especially an educational institution, has a considerable footprint on the environment. Impact on the environment due to energy consumption, water usage and waste generation in an educational institute is prominent. Therefore, there is an imminent need to reduce the overall environmental footprint of the institution.

As an Institution of higher learning, Sumathi Reddy Institute of Technology (SRITW) firmly believes that there is an urgent need to address the environmental challenges and improve their environmental footprint.

True to its belief, SRITW has solar PV for generating clean energy for its campus. 200 KWp of solar panels has been installed in the campus. SRITW has installed solar water heater of 1000 litres capacity for their hostels. SRITW is also in the process of replacing conventional lamps with energy efficiency lamps. AQC Global LLC Team congratulates SRITW team for their efforts.

Keeping SRITW's work in energy efficiency, we recommend the following to be taken by the competent team at SRITW.

**Work towards achieving carbon neutrality**: AQC Global LLC emphasizes creating an additional carbon sink To 3 billion tons of CO2 equivalent through additional forest and tree cover by 2030. SRITW's net carbon emission for the year 2022-23 is **120 MT CO2e**. SRITW should focus on energy efficiency, renewable energy, and carbon sequestration as tools that will enable them to offset the present carbon emissions and achieve carbon neutrality.

**Installation of biogas plant**: In 2022-23, SRITW had used 2.32 MT of LPG. There is an opportunity to install a biogas plant to generate biogas from sewage water. Presently, sewage water is being let out to the drain without treatment. An opportunity exists to generate biogas from the untreated sewage water and use the generated biogas to substitute LPG used in the college. By generating biogas from sewage water, about 0.93 MT of LPG can be replaced which will result in carbon savings of 2.79 MT CO2e.

**Improve energy efficiency of the college**: It is recommended to adopt latest energy efficient technologies for reducing energy consumption in fans, lighting, and air conditioners. We recommend the following projects to be implemented at the earliest.

- Replace conventional 70W ceiling fans with energy efficient BLDC fans of 30W
- Installation of Air conditioners energy savers

### **Carbon Footprint and Energy Audit**

Together, Sumathi Reddy Institute of Technology for Women (SRITW) and the AQC Global LLC are attempting to find ways to reduce carbon emissions and enhance energy efficiency. This report presents every improvement proposal that could be made based on the audit and data analysis of SRITW's lighting, air conditioning, ceiling fans, and biogas potential data.

The carbon emissions from college operations are also included in the report. Scope 1 and scope 2 emissions for carbon are computed using SRITW's submitted data. The report highlights how lowering power consumption can potentially reduce greenhouse gas (GHG) emissions. The potential for reducing greenhouse gas emissions through power consumption reduction is highlighted in the report.

#### **Submission of Documents:**

With the assistance of data provided by the SRITW team, an energy and carbon footprint audit was conducted at the organization. The SRITW team was in charge of gathering all the information required for the study and sending the pertinent papers to AQC Global LLC.

#### **Carbon Footprint and Energy Audit:**

Data submitted and collected was used to calculate the carbon footprint of the campus and assess energy consumption and finally provide necessary recommendations for environmental improvement.

#### Note:

Carbon footprint and energy audit are based on the data provided by SRITW team and discussions the AQC Global LL team. The scope of the study does not include the exclusive verification of various regulatory requirements related to environmental sustainability.

AQC Global LLC has the right to recall the study if it finds (a) major violation in meeting the environmental regulatory requirements by the location and (b) occurrence of major accidents, leading to significant damage to Ecology and environment.

### **Possibilities for development**

Carbon footprint calculations were also performed as part of the SRITW environmental improvement study. Finding the current level of emissions from campus operations and the steps that SRITW can take to offset the emissions are the goals of the campus's carbon footprint calculation. By planting trees, increasing the share of renewable energy, and implementing energy-efficient procedures, the college can become carbon neutral in the future by offsetting the emissions.

#### **Carbon footprint calculations:**

To help delineate direct and indirect emission sources, improve transparency, and provide utility for different types of organizations and different types of climate policies and business goals, two "scopes" (scope 1 and scope 2) are defined for GHG accounting and reporting purposes.

For calculating carbon footprint of the campus, Scope 1 & Scope 2 emissions are being considered. Since day scholars use College provided transportation and hostellers stay in campus.

#### **Scope 1: Direct GHG Emissions**

Direct GHG emissions occur from sources that are owned or controlled by the company, for example, emissions from combustion in owned or controlled DG sets, canteen, vehicles, etc.; emissions from chemical production in owned or controlled process equipment. Direct CO2 emissions from the combustion of biomass shall not be included in scope 1 but reported separately.

#### SRITW Scope 1 emissions for 2022-23:

Sources of Scope 1 emissions in SRITW:

- LPG used for canteen
- Diesel used for generator

	Fuel Type	Description	Activity Data	Units	CO2 eq. Emissions (tons)
1	LPG	Canteen	1.92	MT	5.72
2	Diesel	Transportation	11.24	KL	30.43
3	Diesel	Generator	0.94	KL	2.48

Total Scope 1 emissions of SRITW : 38.63 Tons (for year 2022-23)

#### **Scope 2: Electricity Indirect GHG Emissions**

Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by a company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated.

#### SRITW Scope 2 emissions for 2022-23:

Electricity purchased from grid : 40,482 Units : 11,740 Units

Solar energy produced

**Scope 2 Breakup** 





#### **GHG Emission Summary of SRITW**

Scope 1	44.90	MT CO2 eq.
Scope 2	75.80	MT CO2 eq.
Total	120.70	MT CO2 eq.

## Develop a roadmap to increase contribution of renewable energy in the overall energy consumption

To have a continued focus on increasing renewable energy utilization to 100% which will also lead to reduction in GHG emissions, it is suggested to develop a detailed roadmap on renewable energy utilization. The road map should broadly feature the following aspects,

- Percentage substitution with renewable energy that SRITW wants to achieve in a specified time frame
- Key tasks that needs to be executed to achieve the renewable energy target
- A regular review mechanism to ensure progress along the lines of the roadmap should be framed
- The roadmap should also highlight important milestones/key tasks.

#### Renewable energy roadmap should be used as a base to frame GHG emissions reduction target:

It is suggested to use the developed renewable energy roadmap to correlate the GHG reduction that each of the renewable energy project will achieve. This approach will provide a base to set targets for reduction in GHG emissions. The action plan for renewable energy will shoulder the action plan for GHG emissions reduction and work towards achieving carbon neutrality.

#### Evolve a system to monitor the implementation of various GHG mitigation opportunities

SRITW has an action plan to reduce its GHG emissions. SRITW should also evolve a system to monitor the implementation of various GHG mitigation opportunities. It is recommended to use a Gantt chart to mark out the action plan for the activities and track its implementation. Gantt chart will serve as an excellent way to instantly monitor and comprehend all different tasks in one place which would ease tracking of implementation.

## Install 25 kWp of Solar PV in SRITW campus

Renewable energy is one of the important steps to be taken up by the college to reduce their overall carbon footprint. Considering an availability of a minimum 5100 sq. feet of rooftop area, 50 kWp of solar Photovoltaic (PV) can be installed. However, for this report calculation, only 25 kWp capacity is considered.

A renewable energy capacity of 25 kW of solar panel may be installed can generate 40,500 units of electricity per year. Additionally, 25 kWp of solar rooftop can **offset 33 MT CO2e** per annum.

RESCO model for solar rooftop installation.

A Renewable Energy Service Company (RESCO) is an ESCO Energy service company which provides energy to the consumers from renewable energy sources. RESCO or BOOT model is about pay as you consume the electricity.

- Solar Power Plant is owned by the RESCO or Energy Company
- Customer must sign a Power purchase Agreement (PPA) with actual investor at mutually agreed tariff and tenure
- Customer only pays for electricity consumed
- RESCO developer is responsible for its annual operations & maintenance (O&M)
- The RESCO gets the benefit by selling the surplus power generated to the DISCOM



Source: www.bluebirdsolar.com

### **Install biogas plant at SRITW campus**

An opportunity exists to generate biogas from the untreated sewage water and use the generated biogas to substitute LPG used in the college. SRITW had used 1.92 MT of LPG. By generating biogas from sewage water, about 0.83 MT of LPG can be replaced which will result in carbon savings of 2.11 MT CO2e.

#### **Biogas Production Potential of Wastewater**

The sewage water is a useful waster as 1% of it in any quantity is a sludge which when subjected to anaerobic digestion will produce biogas. Wastewater is the effluent from household, commercial establishments and institutions, hospitals, industries and so on. Sewage water source contains large amount of organic material which can be efficiently recovered in as sludge which and when subjected to anaerobic digestion, the sludge produces methane gas (biogas).

Biogas is a mixture of gases containing 50-75% Methane, and 25-50%Carbon dioxide while 0-10% Nitrogen, 0-3% Hydrogen disulphide and 0-2% Hydrogen may be present as impurities which is produced by anaerobic digestion of organic material i.e. a sequential enzymatic breakdown of biodegradable organic material (Biomass) in the absence of oxygen. The process is usually carried out in a digester tank known as biodigester. Biogas is an important energy source used as cooking gas, to generate electricity, etc. thus producing biogas from wastewater is an efficient and sustainable waste management and renewable energy technique. One of the major environmental problems of the world today is waste management and wastewater constitutes a huge environmental problem to the society thus the need for wastewater treatment to recover and also recycle the recovered water for usage.



**The physical process**: this is the mechanical treatment of the water that involves removal of debris from the raw wastewater right from the point it enters the plant. The screening and primary settling of debris. Wastewater enters the treatment plant through the inlet chamber from where it is channeled to the coarse screen that removes solid waste.

The biological process: This involves the bio-treatment of the sewage in the bioreactors. It is the heart of the treatment plant where a biological process takes place. The bioreactors of a treatment plant are usually large tanks consisting of several mammoth rotors and submersible mixers. While the rotor introduces atmospheric oxygen into the sewage, the submersible mixers keep the biomass in suspension thus several reactions takes place in the bioreactors.

From the bioreactor, the sewage enters the sedimentation tank. Here the biological process ends and sludge is separated from water such that the clean water is passed to the disinfection tank for disinfection and onward discharge for use while the sludge is removed by the returned activation sludge (RAS) pump that removes and sends part to the anaerobic digestion chamber while some are return to the anaerobic bioreactor for reactivation.

Production of biogas is an anaerobic digestion whereby microorganisms break down biodegradable material in the absence of oxygen to produce methane/carbon dioxide used to generate electricity and heat. Sludge from the treatment plant (primary and activated sludge) is the main feedstock (biodegradable organic matter) in the biogas production plant of a wastewater treatment plant and the biogas production process involves series of steps. The combine sludge resulting from primary and secondary water treatment is gathered, sieved and thickened to a dry solids content of up to 7% before entering the digesters. Optionally, the sludge can be pretreated by disintegration technologies with the aim to improve the gas yield. In the anaerobic digestion process, the sludge is pumped into the anaerobic continuously stirred tank reactors where digestion takes place.

In the process, microorganisms break down part of the organic matter that is contained in the sludge and produce biogas, which is composed of methane, carbon dioxide and trace gases. The raw biogas produced is dried and hydrogen sulphide and other trace substances removed and burned in burners after treatment. The digested sludge is dewatered, and the water reintroduce into the treatment plant while the remaining undigested matter used for organic fertilizer.

## **Calculations:**

Sewage water available per day	:	5 KL (Least value considered for calculation)
Sludge in 10KL of sewage water	:	1% (100 kg)
From 6kg of organic waste	:	1 kg of biogas can be produced
Therefore, from 50 kg	:	8.33 kg of biogas can be produced
Kg of biogas	:	0.45kg of
LPG Per day equivalent LPG production	:	3.25 kg per
day Annual LPG production for 250 days	:	937.50 kg
Annual emission reduction potential	:	2.79 T CO2



## **ENERGY EFFICIENCY**

Annual energy consumption of SRITW campus is 2,95,048 units. There are major blocks in the campus which consumes energy for their operation. Major energy consumers are:

- 1. Fans
- 2. Air conditioners

#### **Replace Conventional Ceiling Fans with Energy Efficient BLDC Fans:**

During the Energy Audit at SRITW, a detailed study was carried out to identify the potential for replacing the existing ceiling fans with BLDC super fans. There are 337 fans operating in SRITW campus.

Instead of conventional ceiling fans, latest technology BLDC fans which consume only 30W can be installed in the newly constructed building. A brushless DC (BLDC) motor is a synchronous electric motor powered by direct-current (DC) electricity and having an electronic commutation system, rather than a mechanical commutator and brushes. A BLDC motor has an external armature called the stator, and an internal armature called the rotor. The rotor can usually be a permanent magnet. Typical BLDC motor-based ceiling fan has much better efficiency and excellent constant RPM control as it operates out of fixed DC voltage. The proposed BLDC motor and the control electronics operate out of 24V DC through an SMPS having input AC which can vary from 90V to 270V.

#### **Calculations:**

With the replacement of existing ceiling fans with Super Fans the energy consumption is likely to reduce by 55% per fixture. Considering 100 fans being replaced with super-efficient BLDC fans, 3.50 kW can be saved. Considering the average operating hours to be 2000 and unit cost as Rs. 8.80,

The calculations are as follows:

Total no. of fans in college	:	650
Energy consumption per fan	:	70 W
Total energy consumption of fans	:	70W X 100 fans
	:	7 kW
Super-efficient BLDC fans energy		
consumption	:	30 W Savings from 70W to 30 W
	:	55%
Total savings in fans energy consumption	:	55% of 7kW
	:	3.85 kW
Savings per year	:	3.85 kW X 2000 hrs X Rs. 8.80 / unit

	:	Rs. 0.68 Lakhs
Investment	:	Rs. 2, 50, 000
	:	44 months
Annual emission reduction potential	:	6.00 T CO2

#### Install Air conditioners energy saver for spilt air conditioners:

**Present status**: As per the data obtained from SRITW team, the campus has majorly 1.5 TR units installed. There are 10 spilt air conditioners installed and operate 10 hours a day. Recommendation:

We recommend installing "Airtron", an energy saver that can be installed at every individual unit of AC. The Airtron is the world's most advanced AC SAVER, with all the controls of a Precision AC. The Airtron's dual sensors reference the Room and Coil & Ambient Temp, and uses complex, multiple algorithms in a "closed -loop circuit" to reduce the Compressor Run-Time, to ensure the high savings while maintaining and displaying the Set temperature accurately. The Airtron is Programmable for geographical location and climate and adapts automatically to changes in season and ambient conditions.

This unique device has been developed on Patent-Published technology and approved by leading MNC'S, PSU'S and Govt. Departments. The Airtron is validated by EESL (Energy Efficiency Services Ltd.), Ministry of Power, Government of India, for 44% savings. The Airtron has been validated on all AC's- Inverters,5 Star, Splits, Multi-Splits, Packages, ducts, Windows, Cassettes from 1.0-20.0TR, LG ltd, Videocon Ltd, Tata Communications, L&T, Nestle, Ashok Leyland etc. The AIRTRON comes with a Remote for setting the Room Temperature, and in a Non-Flammable Polycarbonate Enclosure, with SMPS Power Supply, to tolerate w ide Voltage and Current fluctuations, Surges, Spikes and Sags.

In our case, Airtron installation can reduce the energy consumption of each fixture by 15% on a conservative basis. For total energy consumption, for air conditioners, as 20 units per hour, 3 units per hour can be saved. It is recommended to install Airtron energy saver in a phase wise manner preferably in the batches of 10 units.

Saving Calculation: Considering the operating hours to be 2000 and unit cost as Rs 8.80/-.

•	Monetary annual savings	:	Rs 45,000/-
•	Total investment	:	Rs 80,000/-
•	Payback period	:	22 months (2 years)
•	Annual emission reduction potential	:	4.92 MT CO2



Airtron AC energy saver device

## Conclusion

SRITW has initiated few energy efficiency activities in their campus. While AQC Global LLC appreciates the SRITW team for their efforts, we would like to emphasize that opportunity exists further reduce the energy consumption. Installation of renewable energy is to be given major focus. RESCO model can be adopted to install renewable energy without upfront capital investment. We in AQC Global LLC are sure that all the recommendations mentioned in the report will be implemented by SRITW team and the overall environmental performance of the campus will be improved.

Equipment	Supplier Name	Contact Person	Mail Address	Contact Number
AC Energy Saver	Gloabtel Convergence Ltd	Mr Chirag Morakhia	chirag@gloabtel.com	9324176440
AC Energy Saver	Magnatron International	Mr Kishore Mansata	indiaenergysaver@gmail.com	9748727966
BLDC Ceiling Fans	Atomberg Technologies Pvt Ltd	Ms Roshni Noronha	roshninoronha@atomberg.com	9987366655
BLDC Ceiling Fans	Versa Drives	Mr Sathish	sathish@versadrives.com	94885 94382
LED	Havells India Ltd	Mr. Sunil Sikka	sunil.sikka@havells.com	0120-4771000
LED	Kwality Photonics Pvt. Ltd.	Mr. K. Vijay Kumar Gupta	kwality@kwalityindia.com	+ 91 40 2712 3555
LED OSRAM Mr Nitin LightingPvt. Saxena Ltd.		N.saxena@osram.com	+91 124 626 1300	
LED Reckon Green Innovations Pvt Lto		Mr Krishna Ravi	krishna@reckongreen.com	9985333559

## **List of Vendors**



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## SUMATHI REDDY INSTITUTE OF **TECHNOLOGY FOR WOMEN**

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## This certificate is valid for the following product or service range

Providing Educational Services leading to the Award of Bachelor of Technology (B.Tech) in Computer Science and Engineering (CSE), Computer Science and Engineering in Artificial Intelligence and Machine Learning (AI&ML), Computer Science and Engineering in Data Science (DS), Computer Science and Engineering in Cyber Security (CS), Electronics and Communication Engineering (ECE).

1st Surveillance Due On: 25/09/2024: Done On: 2nd Surveillance Due On: 25/09/2025: Done On: Certificate No: KDACE202310027 Date Of Issue: 25, October, 2023 Valid Until: 24, October, 2026\*

Issued by

Authorised signatory KVQA





CB-EMS-045

To Check the Status of the Certification kindly log on to www.kvqa.in F-300, Sector - 63, Noida U.P. India. Ph- 011 -22711940, 22711941 Email : delhi@kvgaindia.com \*Subject to successful completion of surveillance audits

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SUMATHI REDDY INSTITUTE OF TECHNOLOGYFOR WOMEN

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has been assessed and found to conform to the requirements of

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for the following scope :

Providing Educational Services leading to the Award of Bachelor of Technology (B.Tech) in Computer Science and Engineering (CSE), Computer Science and Engineering in Artificial Intelligence and Machine Learning (AI&ML), Computer Science and Engineering in Data Science (DS), Computer Science and Engineering in Cyber Security (CS), Electronics and Communication Engineering (ECE).

Certificate No Initial Registration Date Date of Expiry 1st Surv. Due

: 23EEnLG96 : 25/10/2023 : 24/10/2026 : 25/09/2024

> IS Certification AB # 012226

Issuance Date : 25/10/2023 2nd Surv. Due : 25/09/2025







## AQC GLOBAL LLC

Head Office: Office No. 02, Ground Floor, Sharjah Media City, Sharjah, UAE. e-mail: info@aqcworld.com, Key Location: A-60, Sector - 2, Noida, Uttar Pradesh, 201301, India.

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1<sup>st</sup> Surveillance Done On: 20/09/2021 2<sup>nd</sup> Surveillance Done On: 15/09/2022



Certificate No: KDCKO202010117 Date Of Issue: 03, October, 2020 Valid Until: 02, October, 2023\*

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1st Surveillance Due On: 03/09/2024: Done On: 2nd Surveillance Due On: 03/09/2025: Done On:

Certificate No: KDACQ202310115 Date Of Issue: 03, October, 2023 Valid Until: 02, October, 2026\*

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Geo tagged photographs with caption and date.



Vehicles parking



Greenery in the campus

Ananthasagar, Hasanparthy, Warangal -506371, Telangana. Website: www.sritw.org Phone no: 0870-2818302. Email: principal@sritw.org.





Trash cans in campus



Campus greenery

Ananthasagar, Hasanparthy, Warangal -506371, Telangana. Website: www.sritw.org Phone no: 0870-2818302. Email: principal@sritw.org.





**Campus Landscaping** 

Rijar

Principal Sumathi Reddy Institute of Technology for Women Ananthasagar (V), Hasanparthy (M) WARANGAL - 506 371 (TS)



#### Beyond the campus environmental promotion and sustainability activities

SRITW has been organizing various awareness programs such a plantation of trees, Swachh Bharat programs, clean and green environment are organized.



Swachh Bharat rally



Swachh Bharat awareness activity and cleanliness campaign at Bhadrakali Bund, Warangal

WARANGAL - 506 371 (TS)





Paper clip of Swachh Bharat - Bhadrakali bund cleaning program

#### **Newspaper translation**

SRITW has organized a rally at Bhadrakali bund, Warangal to create awareness among the people on Swachh Bharat mission to maintain clean and healthy environment. The program has conducted by the NSS unit; around 150 NSS student volunteers participated and collected 50 KGs of plastic waste from the lake and handed over to municipal department.

## Principal