# ATME COLLEGE OF ENGINEERING
# MYSURU


## “Conserve to Serve”

ATME
College of Engineering

# CONTENTS

**INTRODUCTION:**

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. It aims to analyze environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. The green audits are tools that organizations use to identify their environmental impacts and assess their compliance with applicable laws and regulations, as well as with the expectations of their various stakeholders. 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. It provides staff and students better understanding of Green impact on campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent. In recent time, the Green Audit of an institution has been becoming a paramount important for self-assessment of the institution which reflects the role of the institution in mitigating the present environmental problems.

## OBJECTIVES:

The Green Audit of an institution is becoming a paramount important these days for self-assessment of the institution, which reflects the role of the institution in mitigating the present environmental problems. The college has been putting efforts to keep the environment clean since its inception. The purpose of the green audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards.

The main objectives of carrying out Green Audit are:

1. To document the quality drinking water
2. To secure the environment and cut down the threats posed to human health
3. The document the quality of recycled waste water for gardening
4. To avoid the interruptions in environment that are more difficult to handle

## BENEFITS OF GREEN AUDITING:

1. Empower the organizations to frame a better environmental performance.
2. More efficient resource management.
3. Benchmarking for environmental protection initiatives.
4. To provide basis for improved sustainability.
5. To create a green campus.
6. To enable waste management through reduction of waste generation, solid- waste and water recycling.
7. To create plastic free campus.
8. Recognize the cost saving methods through waste minimizing and managing.
9. Point out the prevailing and forthcoming complications.
10. Enhance the alertness for environmental guidelines and duties.
11. Impart environmental education through systematic environmental management approach and improving environmental standards.
12. Green auditing should become a valuable tool in the management and monitoring of environmental and sustainable development programs of the college.

## ABOUT THE ATMECE

ATME college of Engineering established in the year 2010 and one among the top 10 colleges in Mysuru. The ATME has created futuristic infrastructure with 3 lakh square feet of area and is permanently affiliated to Visvesvaraya Technological University, Belgaum.

ATMECE has state of the art infrastructure, augments learning which significant concern of the institution. Each academic block has well ventilated, spacious classrooms, tutorial room's laboratories catering to the complete VTU syllabus and beyond, staff rooms, rest rooms, etc. to meet all the curriculum, staff and student requirements. The Department of Civil Engineering is emerging as one of the fastest growing branches by imparting quality education to the students in all the major areas of Civil Engineering. The department offer B.E program in Civil Engineering with a yearly intake of 60 students .All the faculties in the department are well qualified with experience from both teaching and industry. A number Faculty Development Programs are conducted regularly to inculcate the technical skills, soft skills and the research. Further, the department encourages the students to participate in external and internal conferences, workshops, invited lectures and seminars along with extra-curricular/co-curricular activities like technical fests, sports/games, cultural fests, Annual Alumni Meets, to ensure overall development, nurturing of team spirit and organizational skills.

The infrastructural facilities are augmented in line with the increased demand. The department has sufficient class room and most of them are equipped with multimedia projectors. The department also had its own seminar hall and 8 well equipped laboratories. The department has set up its own library. The vibrant environment coupled with the Clean-Green campus ensures the all-round development of the students. Each lab is handled by one faculty supported by a co-faculty. Also, every lab has a lab instructors/technical assistant, who provides constant support and ensures maintenance of the laboratories. Every equipment in the lab is barcoded and the records of the same are maintained. In Software lab, all the computers are in working condition and LCD projectors with wi-fi connections are provided. Enough number of personal computers are available for the smooth conduction of the lab. All equipment is always checked for wear and tear and replaced with new or repaired one every semester. Before the commencement of every semester faculties used to ensure the availability of required software/equipment for the smooth conduction of the labs. Labs are equipped with sufficient hardware and licensed software to run program specific curriculum and off program curriculum. The number and area of the class rooms and labs are as per the AICTE

norms. Research lab is provided with four computers with Wi-fi connections. Department has its own seminar hall with LCD projector and screen with Wi-fi connections. The infrastructure also provides rest room for both girls and boys with all water facilities. The infrastructure also boasts of extensive Sports facilities. Adequate infrastructure has been provided for students to take part in extra-curricular activities.

**VISION:**

Development of academically excellent, culturally vibrant, socially responsible and globally competent human resources.

**MISSION:**

- To keep pace with advancements in knowledge and make the students competitive and capable at the global level
- To create an environment for the students to acquire the right physical, intellectual, emotional and moral foundations and shine as torchbearers of tomorrow's society
- To strive to attain ever higher bench marks of educational excellence.

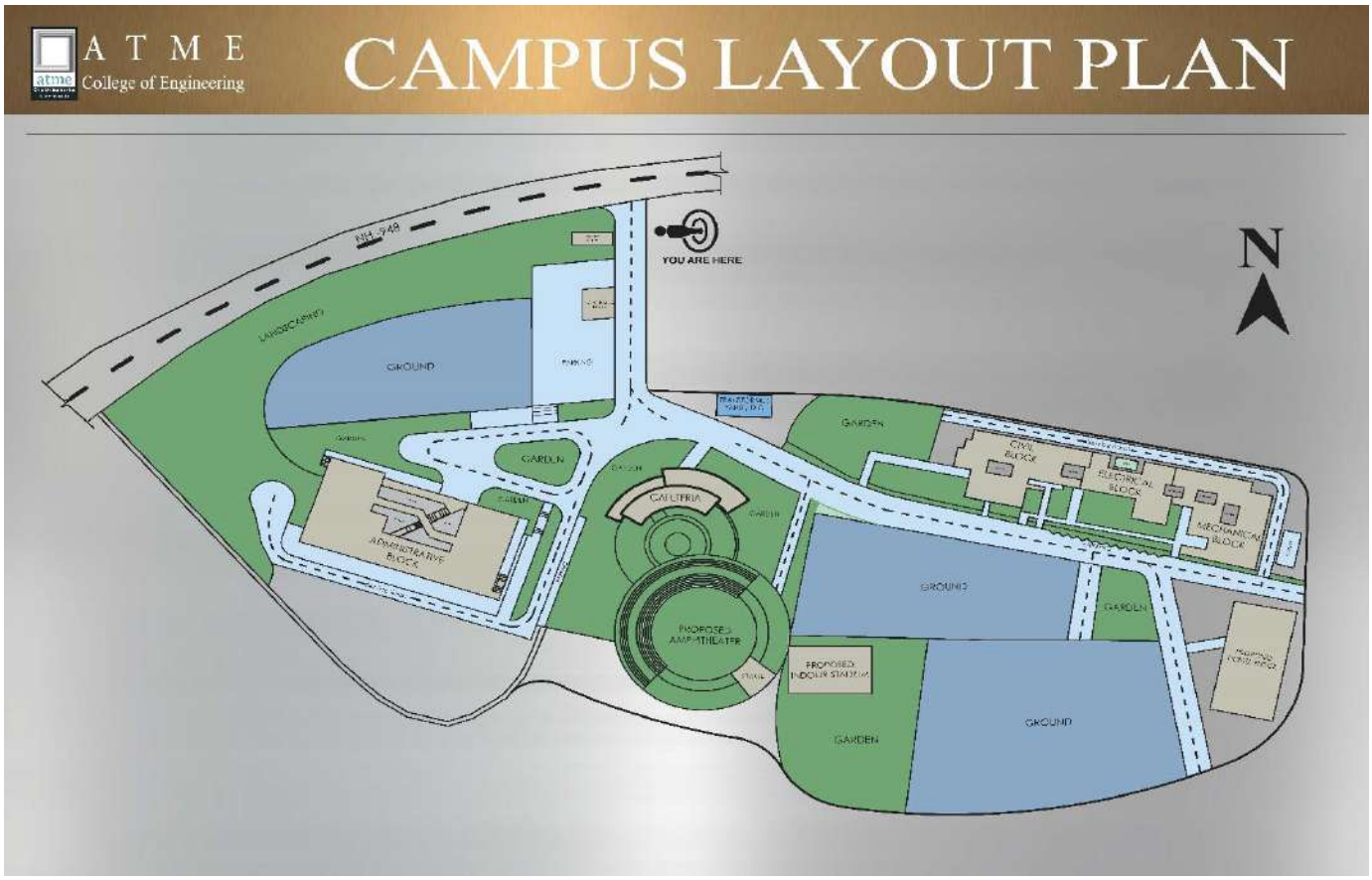
**TOTAL CAMPUS AREA AND COLLEGE BUILDING SPREAD AREA**

| | |
|---|---|
| **Campus Area** | **10.28 Acres** |
| **Build Up Area** | **15,829 Sqmt** |
| **Tree Covering** | **11,018 Sqmt** |
| **Free Space** | **10,268 Sqmt** |

**COLLEGE BUILT UP AREA**

| Area Type | Built-up Area (in Sq.m) |
|---|---|
| Instructional | 10,801 |
| Administrative | 2,330 |
| Amenities | 2,008 |
| Library | 690 |
| **Total Built-up Area** | **15,829** |

**BUILDING LAYOUT**




**CAMPUS INFRASTRUCTURE:**


CAFETERIA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## AUDITING FOR WATER MANAGEMENT

The purpose of a water audit report is to provide an assessment of current usage of water and to provide a roadmap towards fluctuations in the water usage in future. Water audit is an assessment of how much water is used and how much water can be saved in the college. Conducting a water audit involves calculating water use and identifying simple ways for saving water in the college. In many places people have difficult access to drinking water and other utility purposes, since often it is polluted with many ways. Water auditing is a mechanism for conserving water, which will grow in significance in the future as demand for water increases. There is a strong emphasis on principles, and on the relationship of water auditing with associated activities like environmental auditing, environmental management systems, resource conservation, flow measurement, water quality and legal frameworks.

Water usage need to be monitored or reducing the consumption of water which inturn reduces the cost. Water audits provide a way to catalogue all water uses in a facility and identify ways to increase water use efficiency. The results can help to prioritize steps to implement cost-effective water-saving measures. It is possible to cut the water usage by as much as 30 percent by implementing simple conservation measures and without drastically modifying the lifestyle. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The rainwater harvesting process of collecting water, treating and reuse of water concept is in process and will be implemented soon in the college. RO process is adopted in college to get water which is fit for drinking's sake.

## OVERALL UTILIZATION OF WATER IN COLLEGE

| Sections | Water Use/day |
|---|---|
| Drinking | 20 $m^3$ |
| Gardening | 8 $m^3$ |
| Toilets and urinals | 8 $m^3$ |
| Laboratories | 5$m^3$ |
| Leakages | 4 $m^3$ |

**Green Audit :1- Water management**

**Team Members Name:**

| Sl No. | Name | Department | Designation |
|---|---|---|---|
| 1 | Dr Suneeth Kumar S.M. | Civil Engineering | Professor |
| 2 | NAMITHA A P | Civil Engineering | Assistant Professor |
| 3 | Dr AVINASH K | Chemistry ( Chemicals) | Assistant Professor |
| 4 | PRASHANTH C | Civil Engineering | Assistant Instructor |
| 5 | RAGHU M | Mechanical Engineering | Assistant Professor |
| 6 | MADESHA S | Mechanical Engineering ( Lab Waste) | Foreman |
| 7 | PRADEEP KUMAR Y | Electronics And Communication Engineering ( E Waste ) | Assistant Professor |

## Campus Trees:

| Common Name | No. of plants | Types |
|---|---|---|
| Sky jasmine | 150 | show plants |
| Phams | 30 | show plants |
| Bamboo | 170 | show plants |
| Garden grass Bermoda | | show plants |
| MLA plant | 700 | show plants |
| Arabian jasmine | 25 | show plants |
| Orchid tree | 3 | show plants |
| Nerium tree | 35 | show plants |
| Magnolia champaca | 4 | show plants |
| Rudraksha tree | 1 | show plants |
| Dabbehullu | 30 | show plants |
| white dasavala | 20 | show plants |
| Red dasavala | 20 | show plants |
| Lanton plant | 250 | show plants |
| bouganvilla | 250 | show plants |
| Wild agave | 4 | show plants |
| pendas | 150 | show plants |
| brasia | 12 | show plants |
| ficus panda | 350 | show plants |
| ficus black | 15 | show plants |
| alphiniya purpureta | 15 | show plants |
| acalifa red | 300 | show plants |
| durantha verigeted | 30 | show plants |
| tecoma | 75 | show plants |
| fishtail plam | 15 | show plants |
| arentammam red | 30 | show plants |
| drecina | 80 | show plants |
| wasingtoniya | 6 | show plants |
| mainarecta plant | 80 | show plants |
| goladen cypres | 35 | show plants |
| altranetramov plant | 300 | show plants |
| cyscas revalutta | 1 | show plants |
| nuivda | 175 | show plants |
| tecoma plant | 125 | show plants |
| almonda | 150 | show plants |
| turpet wine | 160 | show plants |
| legastromiya megapotamica plant | | show plants |
| travlae palm | 18 | show plants |
| bismargia | 2 | show plants |
| goldan turmpet tree | 3 | show plants |
| pulmbago | 45 | show plants |
| reaphis plam | 30 | show plants |

| | | |
|---|---|---|
| maniplant singoniyam | 25 | show plants |
| exora drwf | 27 | show plants |
| goldan mellulace | 9 | show plants |
| spider lilly | 170 | show plants |
| scaflora | 75 | show plants |
| Neem tree | 300 | herbal plants |
| burflower tree | 15 | herbal plants |
| Tulsi plant | 15 | herbal plants |
| Aloe vera plant | 3 | herbal plants |
| Purple tree | 15 | Fruit trees |
| Jack fruit | 12 | Fruit trees |
| Star gooseberry | 5 | Fruit trees |
| Pomegranate | 4 | Fruit trees |
| Mango tree | 10 | Fruit trees |
| Almond plant | 25 | Fruit trees |
| Coconut tree | 10 | Fruit trees |
| Guava tree | 6 | Fruit trees |
| Papaya tree | 8 | Fruit trees |
| Moringa oleifera | 2 | vegetables garden |
| Areca catechu tree | 5 | vegetables garden |
| Singapore Cherries | 13 | vegetables garden |
| Wild onions | 125 | vegetables garden |
| Silver tree | 400 | |
| Magnet tree | 60 | |
| melia dubia tree | 200 | |
| Pongam tree | 35 | |
| Sagone tree | 25 | |
| kadu tree | 200 | |
| Disambiguation plant | 3000 | |
| Duranta plant | 250 | |
| Rojol plant | 250 | |
| Umbrella tree | 10 | |
| Peepal tree | 5 | |
| Banyan tree | 2 | |
| Vachellia nilotica subsp tree | 2 | |
| sandal wood | 4 | |
| Hoddale plant | 1000 | |
| Deciduous tree | 6 | |
| Diplocyclos palmatus | 18 | |
| Basri tree | 1 | |
| Nagadali | 5 | |
| **Total Trees** | **10,266** | |

Water Quality Related Document & Assessment Report

ATME
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## Water Analysis of Drinking Water
## Analysis carried out at Dept. of Civil Engineering, ATMECE.

Description of Sample taken :

| | | | |
|---|---|---|---|
| **Date** | 06-Aug-2019 | **Tested on** | 06-Aug-2019 |
| **Type** | Drinking Water | **Time** | 11:00 am |

| Sl.No | Parameters | Standard Limits | Result |
|---|---|---|---|
| 1 | Colour | Transparent | Transparent |
| 2 | Odour | Unobjectionable | Nil |
| 3 | Turbidity (NTU) | 5 | 0 |
| 4 | pH | 6.5 – 8.5 | 7.1 |
| 5 | Hardness | ≤ 300 ppm | 23 |
| 6 | Specific Conductance | 0.5-50 µS/m | 0.73 |
| 7 | Total Dissolve Solids | 250-350 ppm | 75 |
| 8 | DO | 0-12 mg/L | 4.2 |
| 9 | Chlorides | 250-1000 mg/L | 25 |
| 10 | Fluorides | 0-1.5 mg/L | 0 |
| 11 | Nitrites | 1-10 mg/L | 0 |
| 12 | Nitrates | 0-40 mg/L | 4.4 |

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ATME College of Engineering

## Water Analysis of Drinking Water
## Analysis carried out at Dept. of Civil Engineering, ATMECE.

Description of Sample taken :

| | | | |
|---|---|---|---|
| **Date** | 05-Sept-2019 | **Tested on** | 05-Sept-2019 |
| **Type** | Drinking Water | **Time** | 11:00 am |

| Sl.No | Parameters | Standard Limits | Result |
|---|---|---|---|
| 1 | Colour | Transparent | Transparent |
| 2 | Odour | Unobjectionable | Nil |
| 3 | Turbidity (NTU) | 5 | 0 |
| 4 | pH | 6.5 – 8.5 | 6.9 |
| 5 | Hardness | ≤ 300 | 24 |
| 6 | Specific Conductance | 0.5-50 µS/m | 0.68 |
| 7 | Total Dissolve Solids | 250-350 ppm | 71 |
| 8 | DO | 0-12 mg/L | 4.1 |
| 9 | Chlorides | 250-1000 mg/L | 23 |
| 10 | Fluorides | 0-1.5 mg/L | 0 |
| 11 | Nitrites | 1-10 mg/L | 0 |
| 12 | Nitrates | 0-40 mg/L | 4.1 |

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## Analysis carried out at Dept. of Civil Engineering, ATMECE.

Description of Sample taken :

| | | | |
|---|---|---|---|
| **Date** | 10-Oct-2019 | **Tested on** | 10-Oct-2019 |
| **Type** | Drinking Water | **Time** | 11:00 am |

| Sl.No | Parameters | Standard Limits | Result |
|---|---|---|---|
| 1 | Colour | Transparent | Transparent |
| 2 | Odour | Unobjectionable | Nil |
| 3 | Turbidity (NTU) | 5 | 0 |
| 4 | pH | 6.5 – 8.5 | 7.2 |
| 5 | Hardness | ≤ 300 | 24 |
| 6 | Specific Conductance | 0.5-50 µS/m | 0.71 |
| 7 | Total Dissolve Solids | 250-350 ppm | 73 |
| 8 | DO | 0-12 mg/L | 3.9 |
| 9 | Chlorides | 250-1000 mg/L | 24 |
| 10 | Fluorides | 0-1.5 mg/L | 0 |
| 11 | Nitrites | 1-10 mg/L | 0 |
| 12 | Nitrates | 0-40 mg/L | 4.2 |

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## Water Analysis of Drinking Water
## Analysis carried out at Dept. of Civil Engineering, ATMECE.

Description of Sample taken :

| | | | |
|---|---|---|---|
| **Date** | 05-Nov-2019 | **Tested on** | 05-Nov-2019 |
| **Type** | Drinking Water | **Time** | 11:00 am |

| Sl.No | Parameters | Standard Limits | Result |
|---|---|---|---|
| 1 | Colour | Transparent | Transparent |
| 2 | Odour | Unobjectionable | Nil |
| 3 | Turbidity (NTU) | 5 | 0 |
| 4 | pH | 6.5 – 8.5 | 7.1 |
| 5 | Hardness | ≤ 300 | 22 |
| 6 | Specific Conductance | 0.5-50 µS/m | 0.72 |
| 7 | Total Dissolve Solids | 250-350 ppm | 72 |
| 8 | DO | 0-12 mg/L | 4.1 |
| 9 | Chlorides | 250-1000 mg/L | 24 |
| 10 | Fluorides | 0-1.5 mg/L | 0 |
| 11 | Nitrites | 1-10 mg/L | 0 |
| 12 | Nitrates | 0-40 mg/L | 4.1 |

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## Water Analysis of Drinking Water
## Analysis carried out at Dept. of Civil Engineering, ATMECE.

Description of Sample taken :

| | | | |
|---|---|---|---|
| **Date** | 04-Dec-2019 | **Tested on** | 04-Dec-2019 |
| **Type** | Drinking Water | **Time** | 11:00 am |

| Sl.No | Parameters | Standard Limits | Result |
|---|---|---|---|
| 1 | Colour | Transparent | Transparent |
| 2 | Odour | Unobjectionable | Nil |
| 3 | Turbidity (NTU) | 5 | 0 |
| 4 | pH | 6.5 – 8.5 | 6.8 |
| 5 | Hardness | ≤ 300 | 21 |
| 6 | Specific Conductance | 0.5-50 µS/m | 0.69 |
| 7 | Total Dissolve Solids | 250-350 ppm | 71 |
| 8 | DO | 0-12 mg/L | 4.2 |
| 9 | Chlorides | 250-1000 mg/L | 23 |
| 10 | Fluorides | 0-1.5 mg/L | 0 |
| 11 | Nitrites | 1-10 mg/L | 0 |
| 12 | Nitrates | 0-40 mg/L | 3.9 |

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## Water Analysis of Drinking Water
## Analysis carried out at Dept. of Civil Engineering, ATMECE.

Description of Sample taken :

| | | | |
|---|---|---|---|
| **Date** | 06-Jan-2020 | **Tested on** | 06-Jan-2020 |
| **Type** | Drinking Water | **Time** | 11:00 am |

| Sl.No | Parameters | Standard Limits | Result |
|---|---|---|---|
| 1 | Colour | Transparent | Transparent |
| 2 | Odour | Unobjectionable | Nil |
| 3 | Turbidity (NTU) | 5 | 0 |
| 4 | pH | 6.5 – 8.5 | 7.2 |
| 5 | Hardness | ≤ 300 | 23 |
| 6 | Specific Conductance | 0.5-50 µS/m | 0.71 |
| 7 | Total Dissolve Solids | 250-350 ppm | 72 |
| 8 | DO | 0-12 mg/L | 3.8 |
| 9 | Chlorides | 250-1000 mg/L | 23 |
| 10 | Fluorides | 0-1.5 mg/L | 0 |
| 11 | Nitrites | 1-10 mg/L | 0 |
| 12 | Nitrates | 0-40 mg/L | 4.1 |

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College of Engineering

# ENERGY CONSERVATION IN ATMECE

## An Energy Audit Report

**ATME COLLEGE OF ENGINEERING**
**13 KM STONE, MYSURU KANAKAPURA BENGALURU ROAD, MYSURU-570028**

**2020-2021**

# CONTENTS

# 1. INTRODUCTION

**Energy Audit Objectives**

- The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs.
- To calculate the amount of power consumed and wasted in a network of specified location.
- To find and implement the solutions that is acceptable and feasible.

**Principles of Energy Audit**

Eliminate unnecessary energy usage. Improve efficiency of energy usage. Buying energy at low cost. Adjusting operations to allow purchasing energy at low prices. Control the cost of energy not the BTU. Control energy as a product cost. For same energy higher production. Energy saved is the money earned which can be used in the other productive means

- Preliminary energy audit is a relatively quick exercise to:
- Establish energy consumption in the organization
- Estimate the scope for saving
- Identify the most likely and the easiest areas for attention
- Identify immediate (especially no-/low-cost) improvements/ savings
- Identify areas for more detailed study/measurement

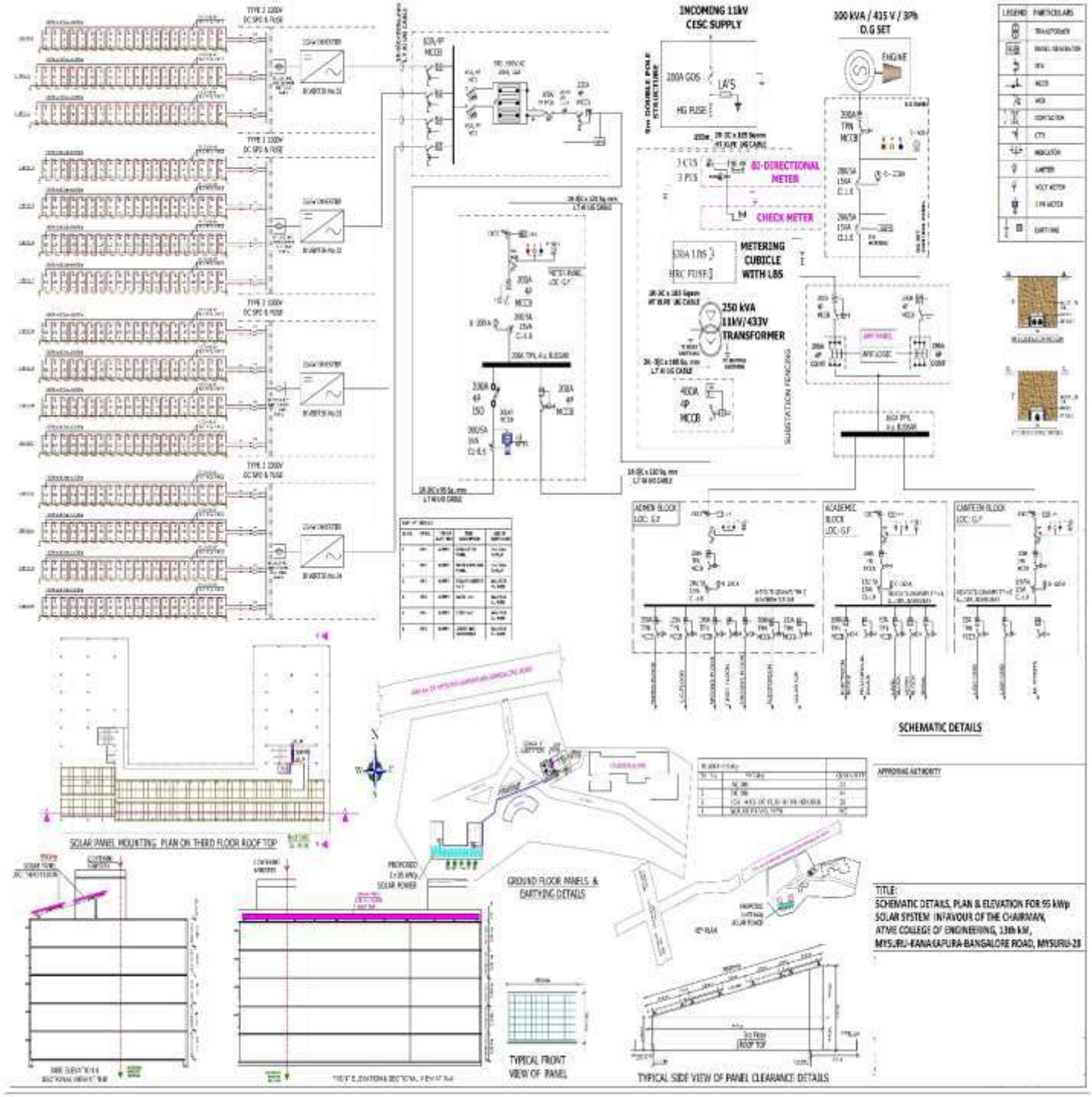
# 2. ABOUT THE ORGANIZATION

ATME College of Engineering (ATMECE) occupies a place of pride amongst the premier Technical Institutes of South India. Established in the year 2010, approved by AICTE, New Delhi and affiliated to Visvesvaraya Technological University, Belagavi, Karnataka. Within a decade, the Institute has marched towards the pinnacle of glory through its remarkable achievements in the field of Engineering Education. The ATME Trust was founded by Er. L. Arun Kumar and a group of like - minded people to bring out Industry-Ready professionals and new generation of entrepreneurs to address the demands of an ever increasing global market. The vision of the trust is to create an educational hub that churns out professionals imbibed with values, heritage and culture.

ATMECE is accredited by National Board of Accreditation for under graduate programs of Civil Engineering, Electronic & Communication, Electrical & Electronics and Mechanical Engineering. ATMECE is rated GOLD by QS I-GAUGE for its overall excellence and is an ISO 9001-2015 certified college.

The titles “The Best Emerging Private Engineering College in Karnataka” and “Most Promising upcoming Private Engineering College in Karnataka” were awarded to ATMECE for two consecutive years. ATMECE believes in imparting holistic education where the student community is the focal point of the learning process. The college offers a motivating environment for knowledge assimilation with a sense of social responsibility and human values.

# 3. ELECTRICAL LAYOUT DIAGRAM OF ATMECE



# 4. AUDITING PARAMETERS

- **REAL POWER:**

In our campus most of the loads are real loads. Ex. Lighting loads

- **REACTIVE POWER:**

In laboratories, we are using reactive loads.

- **POWER FACTOR:**

Since we are provided with super capacitor banks for compensation, we can able to maintain the power factor of 0.89% – 0.95%.

# 5. AUDITING METHODS

we have carried out the audit about Resistive loads and inductive load system in our campus.

**TYPES OF ENERGY AUDIT**

- ✓ Bench marking
- ✓ Walk-through or preliminary audit
- ✓ General audit/Detailed energy audit
- ✓ Investment-grade audit

we have carried out detailed energy audit. It is the most efficient type that is preferred for educational institution.

## 5.1 Flow Chart of Energy Audit Procedure

# 6. REPORT

## 6.1 Methodology for Detailed Energy Audit

### 6.1.1 Pre Audit Phase

- Plan and organize
- Walk through audit
- Macro data collection
- First hand observation and assessment

### 6.1.2. Audit Phase

- Analysis of energy use
- Identification of energy conservation opportunities
- Consolidation and refining ideas
- Select most promising techniques
- Cost benefit analysis

### 6.1.3. Post Audit Phase

- Implementation of ideas
- Follow up and periodic review
- Monitor the performance

**PRE-AUDIT PHASE:**

A structured methodology to carry out an energy audit is necessary for efficient working. An initial study of the site should always be carried out, as the planning of the procedures necessary for an audit is most important.

**PLAN AND ORGANISE:**

Planning and Organizing are the integral part of the detailed energy auditing. An initial visit to the site is organized. The areas to be inspected are listed. The details regarding the energy consumption of various blocks in the near past are procured and a planned analysis is carried out.

**WALK THROUGH AUDIT:**

It is also called a simple audit, screening audit or walkthrough audit. The main purpose of walk through audit is to obtain general information. More specific information can be obtained from the maintenance and operational people during the time walk through audit. It also involves a brief review of facility utility bills and other operating data and a walk-through of the facility to become familiar with the building operation. The major problem areas will be identified during this audit.

**MACRO DATA COLLECTION:**

Current level operation and practices within the campus is assessed and then the data regarding the number of electrical loads connected in each blocks is collected. The power ratings of each component and their respective hours of operation is observed.

**FIRST HAND OBSERVATION AND ASSESSMENT:**

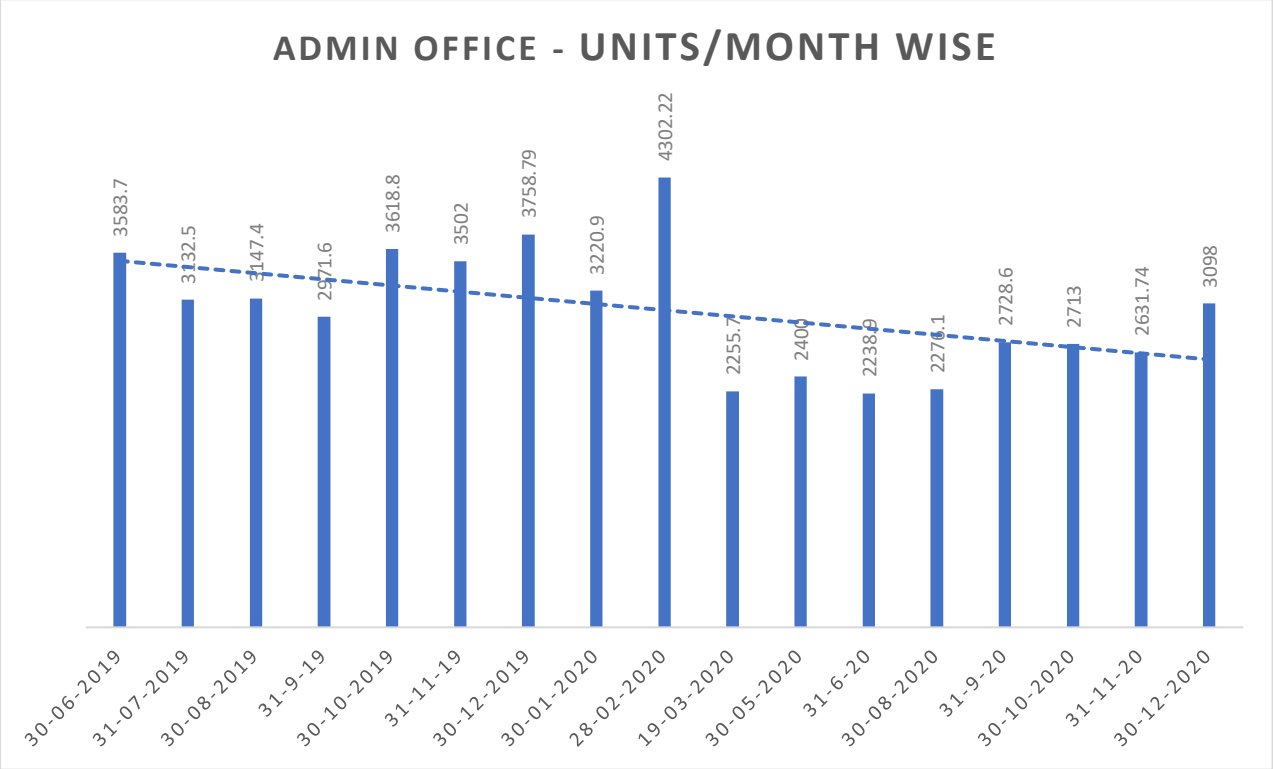
The data collected during the above observation is manipulated and then interpreted. The energy consumed in each block is measured and then the data is visually represented for better understanding. Thus the energy pattern of the campus can be determined in this assessment. Significance energy conservation opportunities that are appropriate to the campus can also be obtained.

## 6.2 OBSERVATION AND ANALYSIS

# 6.2.1 Department Wise Energy Consumption Details

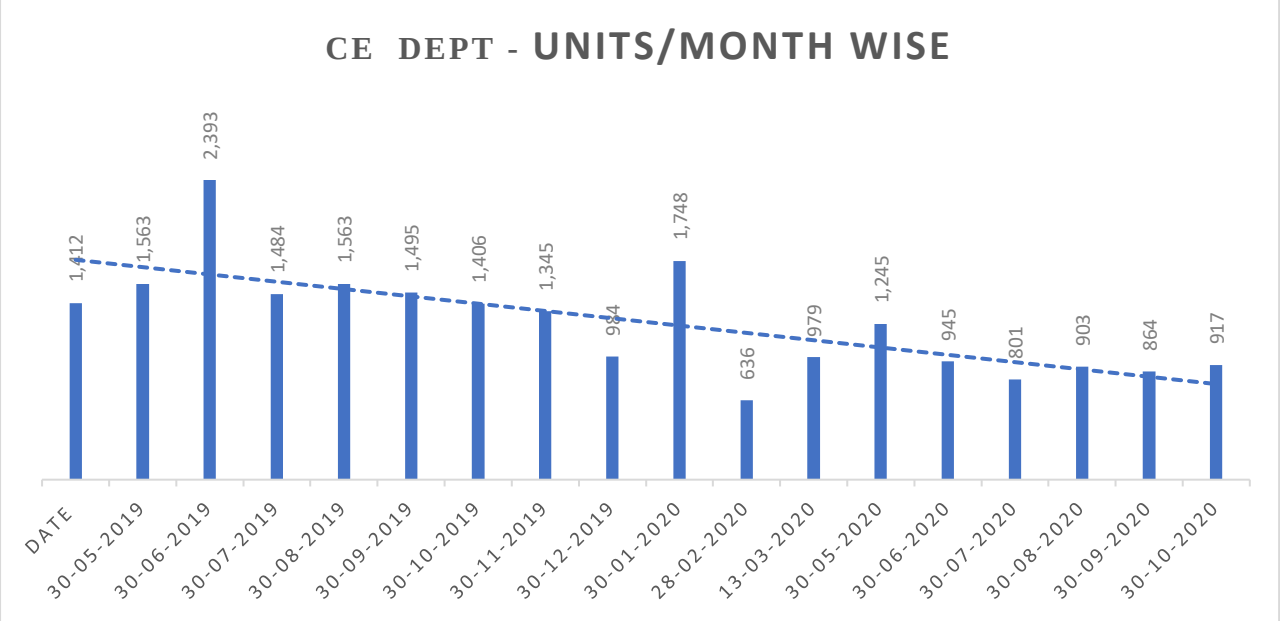
### 1. ADMIN Office and Department of Basic Science

- Total 3 ϕ Energy Trivector meter set up – 3 No's
- Total 1 ϕ Energy Trivector meter set up – 14 No's are installed
- Consumption details by Energy Meter is recorded manually twice a day at 9 AM and 5PM



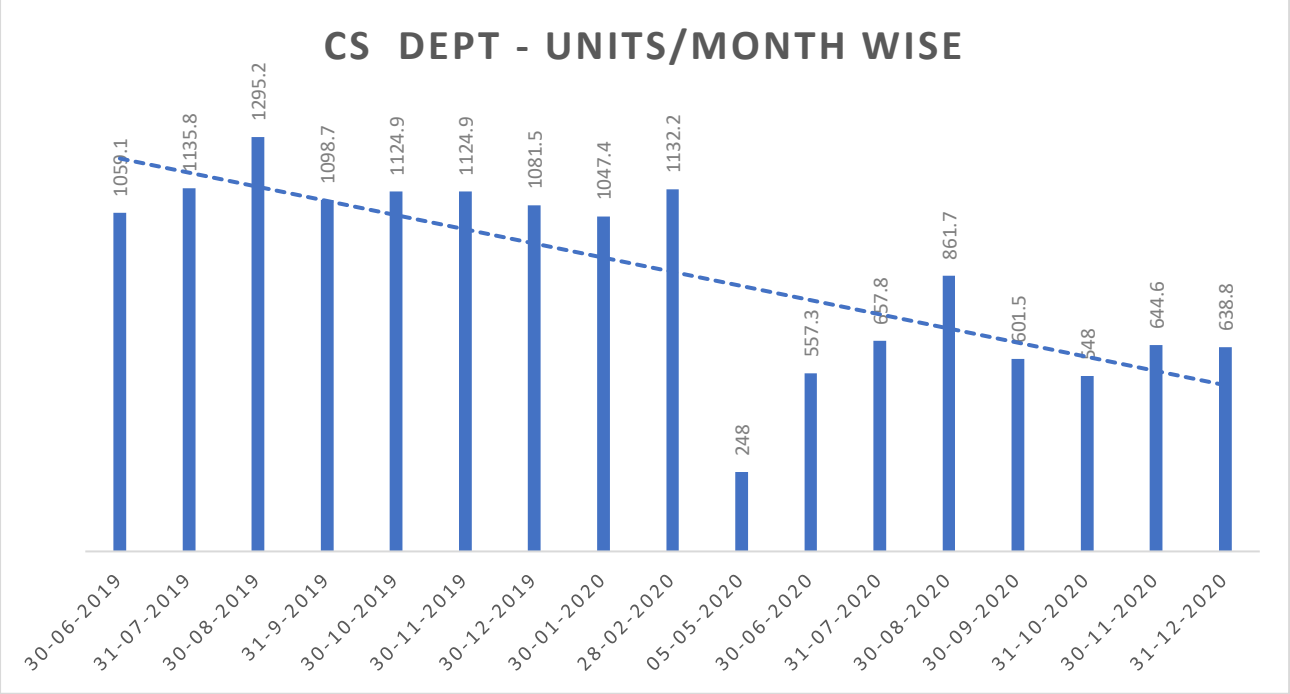

### 2. Department of Civil Engineering

- Total 3 ϕ Energy Trivector meter set up – 3 No's
- Total 1 ϕ Energy Trivector meter set up – 12 No's are installed
- Consumption details by Energy Meter is recorded manually twice a day at 9 AM and 5PM



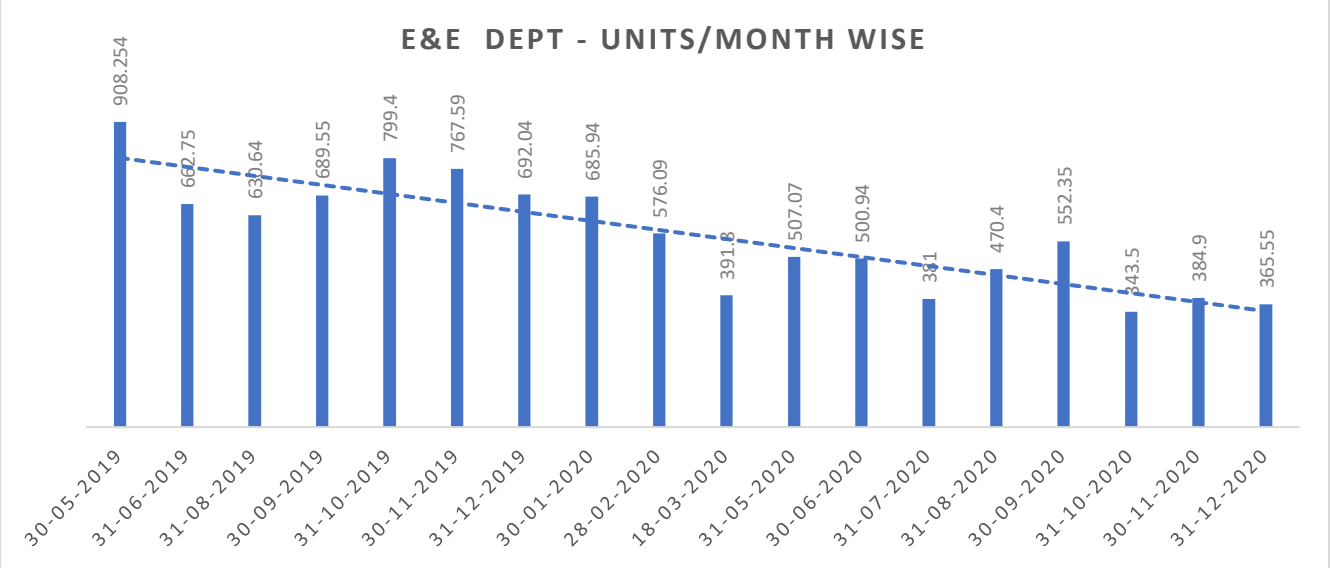

### 3. Department of Computer Science Engineering

- Total 3 ϕ Energy Trivector meter set up – 4 No's
- Total 1 ϕ Energy Trivector meter set up – 16 No's are installed
- Consumption details by Energy Meter is recorded manually twice a day at 9 AM and 5PM



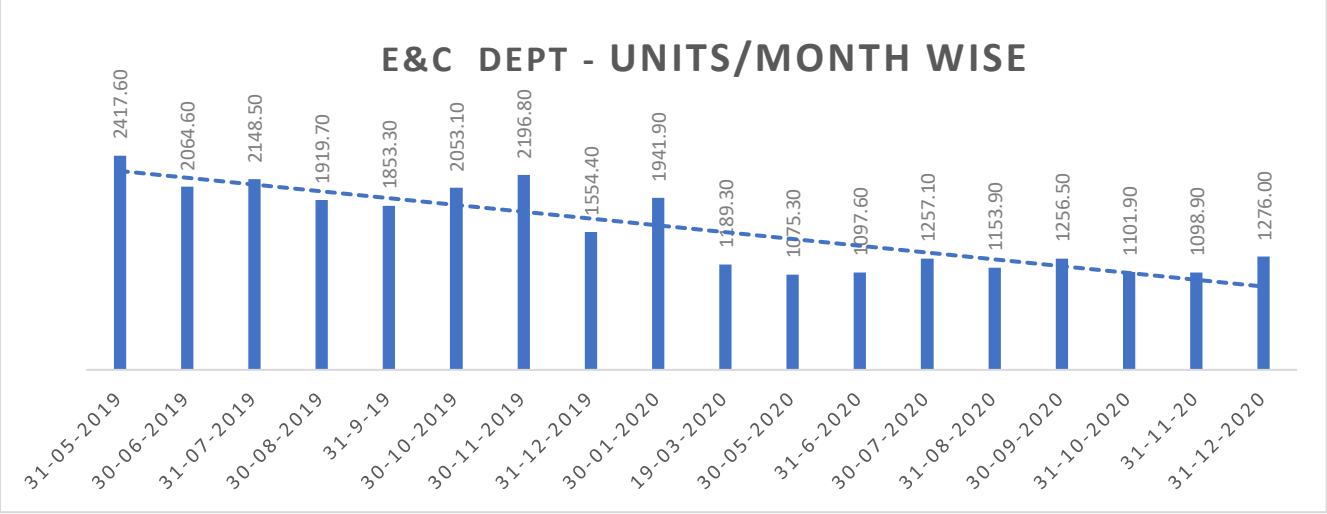
### 4. Department of Electrical and Electronics Engineering

- Total 3 ϕ Energy Trivector meter set up – 6 No's
- Total 1 ϕ Energy Trivector meter set up – 12 No's are installed
- Consumption details by Energy Meter is recorded manually twice a day at 9 AM and 5PM



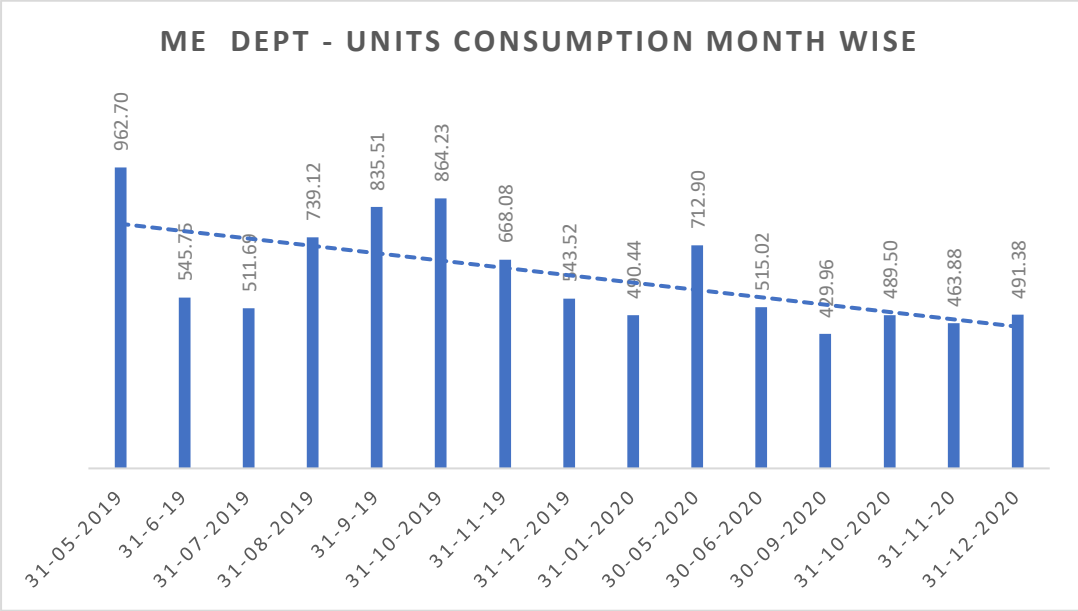

### 5. Department of Electronics and Communication Engineering

- Total 3 ϕ Energy Trivector meter set up – 9 No's
- Total 1 ϕ Energy Trivector meter set up – 15 No's are installed
- Consumption details by Energy Meter is recorded manually twice a day at 9 AM and 5 PM



### 6. Department of Mechanical Engineering

- Total 3 ϕ Energy Trivector meter set up – 3 No's
- Total 1 ϕ Energy Trivector meter set up – 12 No's are installed
- Consumption details by Energy Meter is recorded manually twice a day at 9 AM and 5PM

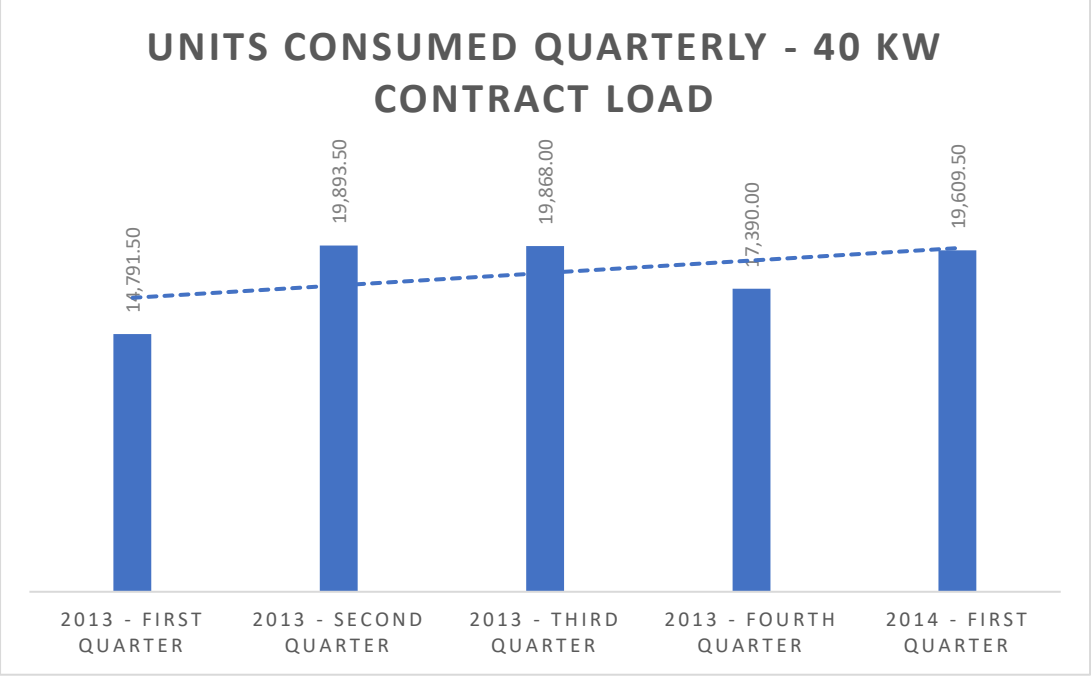



**Note:** Energy meter details are used to analyse the day consumption and Night consumption. Keeping this data, monitoring of consumption details is carried out and able to reduce the unwanted and night consumptions.

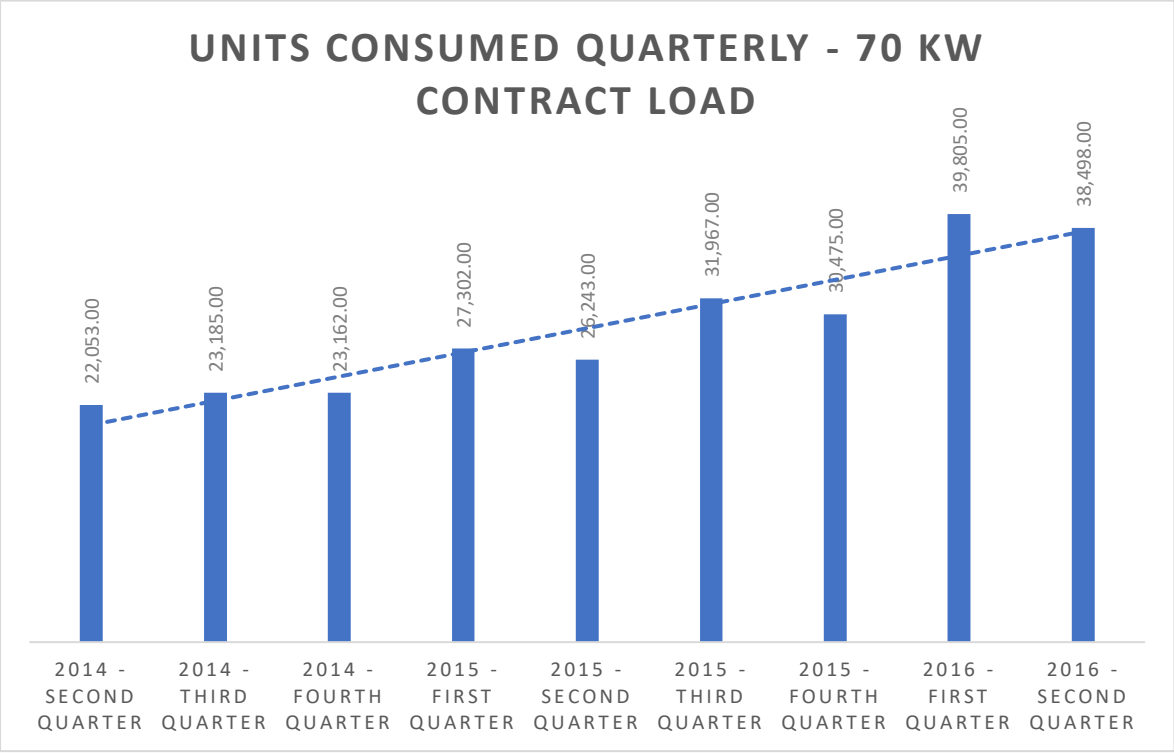
## 7. ATMECE Energy Consumption Details from 2013 to 2016

- For the year, 2013 to 2014 - Contract Load from CESCOM is 40 KW
- In the Year 2014 – Upgraded Contract Load from CESCOM is 70 KW

1. Quarterly Load Consumption Details with CD 40 Kw between 2013 to 2014




2. Quarterly Load Consumption Details with CD 70 Kw between 2014 to 2016



# 8. ENERGY SAVING OPTIONS ADOPTED BY ATMECE FROM 2017

1. **Adopting Roof Top Solar:** Solar Power Generation is ideal as it reduces carbon footprints. As Solar panels harness sunlight to generate electricity. So, they pose fewer pollution risks to the environment in comparison to conventional sources of energy.
2. **Adopting UPS Load Sharing Concept**: Through UPS load sharing concept, UPS energy consumption during working hours can be reduced**.**
3. **Switching from Regular Street Light to Solar LED**: A standalone solar photovoltaic street lighting system is an outdoor lighting unit used for illuminating street and to an open area. Recent advances in LED lighting have brought promising opportunities for application in street lighting. Combining LED's low power, high illumination characteristics with current photovoltaic (PV) technology, PV powered streetlight utilizing LED has been adopted in ATMCE campus.

## 8.1 Details of Adopting Roof Top Solar

The Solar Power from the Grid tied rooftop solar power plants will be synchronised to the grid as per the Net Metering provisions of CESCOM. The utility (CESCOM) pays for the generated electricity at a feed-in tariff of Rs.9.56/kWh (unit) under a Power Purchase Agreement which will be valid for 25 years. This is facilitated through the "Net Metering" (refer Working Principle Chapter) policy of Government of Karnataka. With this configuration, there would be no need to use batteries, thereby saving capital costs as well as operational & maintenance efforts and costs.

### 8.1.1 Technical Description

**Solar Modules/Panels:**

Solar Modules/Panels are made of semi-conductor materials which generate DC electricity when sunlight impinges on it. The most commonly used semi-conductor material is crystalline silicon cells. Detail technical specification of module selected for project is **SERAPHIM 315 Wp , SRP-6PA SERIES** -External Dimensions - 1956 x 992 x 50 mm, Weight/Module - 24 kg, Solar Cells - Poly crystalline 156 x 156 mm (72pcs), Front Glass - 3.2 mm tempered glass, low iron, Frame - Anodized aluminum alloy, Junction Box - IP65/IP67, Output Cables - 4.0 mm2 cable length:900 mm, Connector - MC4 Compatible Mechanical Load - 5400 Pa,

Electrical Characteristics of each panel in operating condition for Maximum Power Voltage -Vmp – 37.50 (V) and Maximum Power Current -Imp (A) – 8.40 (A).

Which is capable of generating 1,500units/ Kw/ Annum with 90% of grid availability in the peak hours.

**Module Mounting Structures:**

Modules are mounted on MS skillion truss type structure which is 7.5 Feet height towards south facing and keeping inclination of $5^0$ on other side its 11.5 feet height on which the solar modules are mounted. Module Mounting Structures is fixed orientation type which orients the solar panels in a single direction towards south keeping 2.28 meter

elevated form floor keeping inclination of $5^0$ of span of 8 meter length were modules are mounted with the provision of walkway on the complete way for service and cleaning of modules to keeping modules clean for better efficiency. 302 modules of 315Wp modules are installed in the space of and it is distributed for 4 inverters of 25KWp

**Inverters:**

Inverters convert the DC output from solar modules into AC form which is normally used for most appliances. Grid tie inverter is proposed for this project, which is recommended

by CESCOM. “Grid-tie inverters” can synchronise their output to the grid and thereby seamlessly integrate with the existing electrical network within the consumer premises. These inverters function only when grid supply and sunlight are available and do not function when either of them is not available. Grid-tie inverters do not require batteries.
Technical specification of inverter selected for Solar project is **GOODWE -GW25K-DT**

**Safety equipment for the unit :**
AC distribution box consists of **AC SPD** and **AC disconnect switch**. ACSPD is used for protection of inverter against surge voltages from the utility side due to lightning strikes on it. AC disconnect switch is used for disconnecting the Solar Energy meter from the Utility supply.

**Earthing:** Earthing is required for safety of the equipment as well as for saftey of people. ***AC side Earthing:*** Inverter earthing, Solar AC combiner box earthing is done by connecting them to Existing earth pit. ***D.C side Earthing :*** Solar panels frame, DC distribution box earthing is done by connecting them to new earth pit dedicated for D.C earthing.

**Monitoring of Generation:** This consists of Solar Energy meter, which is used for recording solar energy generated . **Bi-directional energy meter :** Bidirectional energy meter will replace the existing Energy meter. This will record the energy drawn from grid or exported to grid based on which CESCOM will be billing.

### 8.1.2 Working Principle of Solar Plant

The DC power generated from solar PV panels is converted to AC power using On-Grid Inverter and the power generated is synchronized to the grid downstream of the Net Meter. Net meter is a bidirectional meter that can measure electricity flow in both the directions – utility to consumer and consumer to utility that will be read by the utility for billing purposes. The Solar Plant generates power as long as both the grid supply and sunlight are

available. The generation at any point of time is dependent on the solar irradiation incident on the solar panels with the maximum being the rated capacity of the system. The generated solar power caters to the local load first. The local load would be the load under the meter to which the particular solar power plant would be connected. If local load is more than the solar generation, additional power is drawn from the grid. If the local load is less than the solar generation, the additional power is exported to the grid. The power flows in both scenarios are depicted as shown in Figure

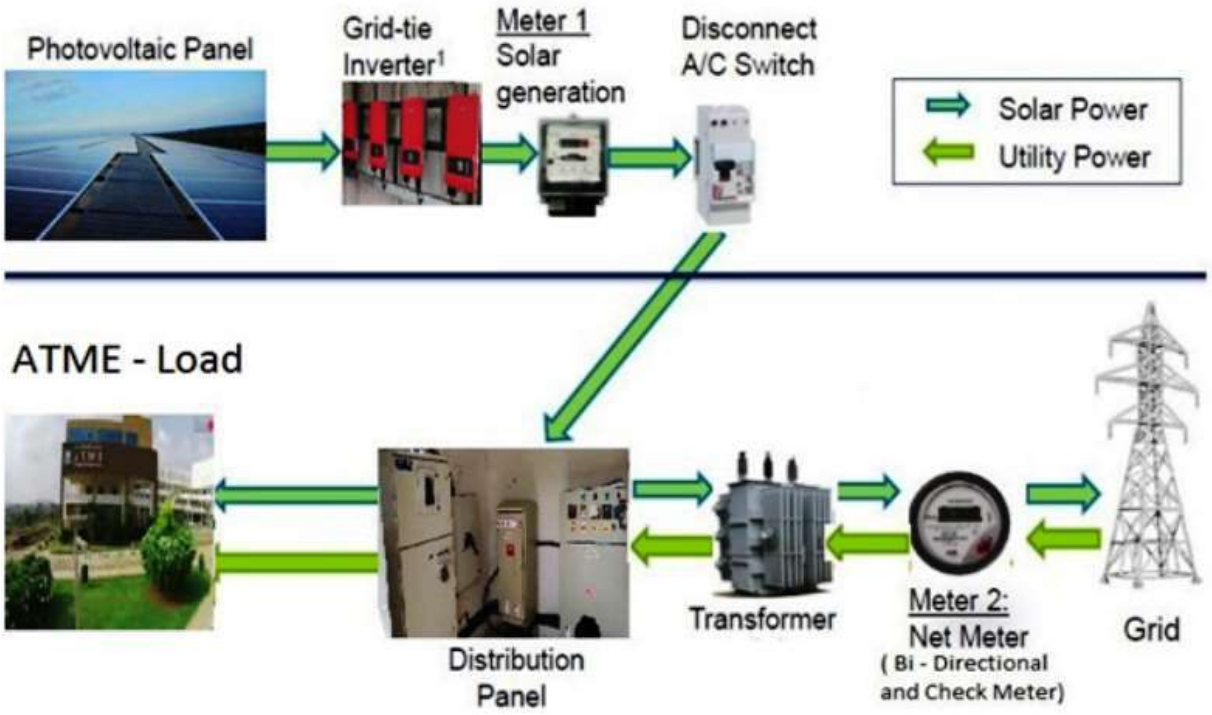



Fig: Power Flow

Note: The On-grid inverters will not be able to generate any solar power during grid outage even if solar irradiance is available.

- SERAPHIM 315 Wp Solar panels for 95 Kwp
- Good We Inverter of 25Kw of 4 No's
- For safety installed Lightening arresters, Metal board, inverter earthing.
- Modules are mounted on MS skillion truss type structure with $35^0$ inclination towards under space will be utilized.
- Contract period with Electricity board for 25 years with 9.56 piece per unit.

| | |
|---|---|
| **Assured units Generation 1500 units Annually/ kW**<br>➢ On an Average,if we consider 1 hour as a power failure per day.<br>➢ Average generation will be 5 Units /kW.<br>➢ Average Sunny days will be 310 days in Mysore. | 4,65,000 Units/ Year |
| **Savings in $CO_2$ Emission – Which is equal to planting 402 trees yearly of 14 years age grown to neutralize $CO_2$ in nature** | 58 tons annually |


## 8.2 Switching from Regular Street Light to Solar LED Streetlight

The Solar Panel will provide electricity to charge the battery during daytime. The battery's charging is controlled by a charge controller. The operation of the LED bulb is controlled by a control circuit using sensors such as Light Dependent Resistor (LDR) or voltage or current sensor. All these components are fixed on a pole as shown in Figure below. The solar panel is mounted at the top of the pole to minimize the possibility of any shading on the panels.

Technical Specification:

| Si No | Model Number | AP-SL-12W |
|---|---|---|
| 1 | Light fixture - LED | 12 Watts |
| 2 | Lumen output | 1320 |
| 3 | Ingress Protection | IP 65 |
| 4 | Charge Controller | PWM |
| 5 | Charge controller efficiency | 92% |
| 6 | Automatic Control | Dusk to Dawn |
| 7 | LED driver efficiency | 90% |
| 8 | Duty Cycle | 12 Hours |
| 9 | Solar Panel - Polycrystaline | 60 Wp |
| 10 | Battery - VRLA GEL | 75AH @ 12 Volts |
| 11 | Battery box | Metal |
| 12 | Autonomy (battery backup) | 2 Days |
| 13 | Pole (Galvanised) | 4.5 Meter |
| 14 | Coverage Area | 30 Ft batwing |
| 15 | Pole to pole distance | 25 Feet |

Features:

- Cost Efficient Solution
- Low Maintenance
- Easy to Install
- Good Light output
- Fully Automatic

Fig: Solar LED street light Setup at ATMECE

## 8. 3 UPS Load Sharing Option Adopted by ATMECE

- **Admin Ground Floor** – Computing facility laboratories (CCP, Browsing and CAED lab) – 10 Kva + 10 KVA UPS facility available.
  1. In Full load condition both can be switched on
  2. In Less load condition – Physical socket can be changed and required loads can be shared to one UPS and another UPS can be kept OFF
  3. CAED lab has a huge number of Systems - The total Number is systems is divided into 4 sectors so that the absolute required number of system can be kept ON, rest all system can be switched off

| **Centre computing facility - Admin Block - GF** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| UPS Capacity | Facility | Desktop Computer in Qty | Total College Hours Average - 8 Hours X 50 weeks X 5 days in hours = 2000 Hours | Lab hours/ year ( Odd + Even Sem) | Non lab hours / year( Approximate ) | Units consumed in Idea hours /UPS / Hour | Total Units saved in Kw/ year | Rate / KW | Saving /Years in Rs |
| 10 KVA | CAED Lab | 70 | | 700 | 1300 | 1 | 1300 | 9.56 | 12428 |
| 10 KVA | CCP Lab | 30 | | 600 | 1400 | 0.5 | 700 | 9.56 | 6692 |
| | Browsing Centre | 30 | | 1000 | 1000 | 0.5 | 500 | 9.56 | 4780 |
| | | | | | | | **2,500** | | **23,900.00** |
| | | | | | | | | | |
| If alternate UPS is used by Switching the Plugs on Average 50% of usage- Savings will be | | | | | 1,250 | Units/ Year | | 11,950 | Savings/ year |


Fig: UPS Loading sharing setup in Admin Ground Floor

- **Admin Block Second Floor**

  For Department of ECE (Staff room, Project , Research and all 4 labs) – 10 Kva + 10 KVA UPS facility available in this area.

  1. In Full load condition both UPS can be switched on
  2. In Less load condition – Staff, Project, and Research can be kept on another UPS can be switched off or kept in float mode.

| **Admin Block – SF E&C Dept** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| UPS Capacity | Location | Desktop Computer in Qty | Total College Hours Average - 8 Hours X 50 weeks X 5 days in hours = 2000 Hours | Lab hours/ year ( Odd + Even Sem) | Non lab hours / year( Approximate ) | Units consumed in Idea hours /UPS / Hour | Total Units saved in Kw/ year | Rate / KW | Saving /Years in Rs |
| 10 KVA | VLSI + µC + Project | 30+30 +10 | | 700 | 1300 | 1 | 1300 | 9.56 | 12428 |
| 10 KVA | Staff Room +DSP + Research | 30+30 +10 | | 700 | 1300 | 1 | 1300 | 9.56 | 12428 |
| | | | | | | | **2,600** | | **24,856.00** |
| | | | | | | | | | |
| If alternate UPS is used by Switching the Plugs on Average 50% of usage- Savings will be | | | | | 1,300 | Units/ Year | | 12,428 | Savings/ year |



Fig: UPS Loading sharing setup in Admin Second Floor

### 8.4 Replacing 10 KVA Online UPS with 16 Nos 100 AH battery to 600 VA UPS

10 KVA - Online UPS

600 VA - Online UPS

## 10 KVA - UPS- Power Consumption Details (Approximately)

| Working days | Working days | No. of Units Consumption/ hour | No. of Hrs | Total Units |
|---|---|---|---|---|
| Day - 8 Hours | 200 | 2 | 8 | 3,200.00 |
| Night Hours - 16 Hours | 200 | 0.8 | 16 | 2,560.00 |

| Non-Working days | No working days | No. of Units Consumption/ hour | No. of Hrs | Total Units |
|---|---|---|---|---|
| Day - 8 Hours | 165 | 1 | 8 | 1,320.00 |
| Night Hours - 16 Hours | 165 | 0.8 | 16 | 2,112.00 |
| Total Units Consumed / Year (Approximately) | | | | 9,192.00 |

- **600 VA - UPS - Power Consumption Details (Approximately)**

| | | No. of UPS | UPS Type | UPS - units | Units / Hour | Working days | | Day Consumption Hour | Day Consumption Total | Night Consumption Hour | Night Consumption Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Working days | Lab 1 | 16 | 600 VA UPS | 8 | 0.06 | 200 | | 8 | 768 | 16 | |
| | Lab 2 | 25 | 600 VA UPS | 13 | 0.06 | 200 | | 8 | 1248 | 16 | |
| | Staff | 10 | 600 VA UPS | 5 | 0.06 | 200 | | 8 | 480 | 16 | |
| | surveillance | 1 | 1.5 KVA | 1 | 0.1 | 200 | | 8 | 160 | 16 | 320 |
| | | | | | | Total - A 1 | | 2656 | | Total - A2 | 320 |

| | | No. of UPS | UPS Type | UPS - units | Units / Hour | Working days | | Hour | Total | Hour | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Non Working days | Lab 1 | 16 | 600 VA UPS | 8 | 0.06 | 165 | | | 0 | 16 | |
| | Lab 2 | 25 | 600 VA UPS | 13 | 0.06 | 165 | | | 0 | 16 | |
| | Staff | 10 | 600 VA UPS | 5 | 0.06 | 165 | | 8 | 396 | 16 | 792 |
| | surveillance | 1 | 1.5 KVA | 1 | 0.1 | 165 | | 8 | 132 | 16 | 264 |
| | | | | | | | Total - B 1 | | 528 | Total - B 2 | 1056 |

| Total Units Consumed / Year (Approximately) | Grand total -(A1 + A2 + B1 + B2) | 4560 |
|---|---|---|

**Approximate Estimated savings from replacing from10 KVA Online UPS to 600 VA Split Online UPS – 4,632 Units / Year**

**9. Into effect:** Evidence for adopting power saving concepts, indicating the self-sufficiency by renewable energy and Set unit's consumption of Target bench mark is achieved

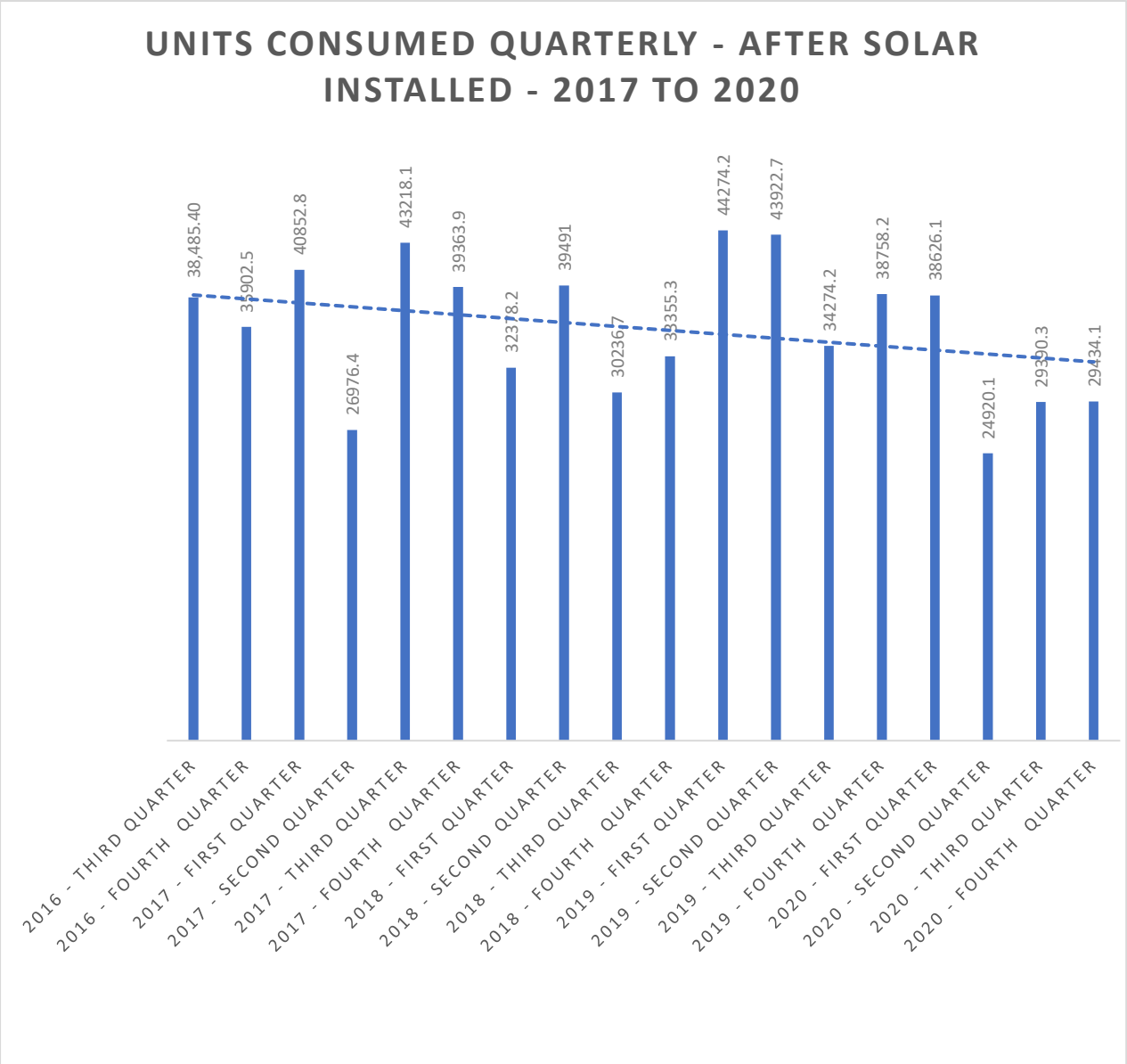



Fig: Quarterly Load Consumption Details between - 2016 to 2020 with Solar Installation

## 10. Conclusion

By the Detailed Energy Auditing, Consumption pattern was observed, analysed and achieved sustainable energy consumption by setting up of energy Benchmark. With a self-oriented motives and energy saving intentions, Identified energy conservation measures and adopted best practices by Solar roof top setup, switching to solar LED streetlighting and through effective UPS load sharing for economical and environmental benefits. Being an energy efficient organization, has put a step towards the direction of renewable energy, environmental protection and sustainable living.

**“Today’s wastage is tomorrow’s shortage”**

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CII – Godrej GBC

*Issued by : CII – Sohrabji Godrej Green Business Center, Hyderabad*

# Energy Audit Team

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| Ms. Swapna H | EE01024 | Electrical and Electronics Engineering | Assistant Professor |
| Mr. Channabasava N | EC00006 | Electrical & Electronics Engineering | Instructor |
| Mr. Yogesh K S | CS00003 | Computer Science and Engineering | Programmer |
| Mr. Soma Sundara | EC00002 | Electronics and Communication Engineering | Instructor |
| Mr. Ravi Kothathi Kempaiah | ME00001 | Mechanical Engineering | Assistant Instructor |
| Mr. B S Jayaram | CV00005 | Civil Engineering | Assistant Instructor |
| Mr. Sannappa D | PH00003 | Physics | Assistant Instructor |
| Mr. Ravikumara M P | ME00008 | Mechanical Engineering | Instructor |

ATME College of Engineering

# An Environmental Audit Report

**ATME COLLEGE OF ENGINEERING**
**13 KM STONE, MYSURU KANAKAPURA BENGALURU ROAD, MYSURU-570028**

**2020-2021**

## INDEX

**Executive Summary**

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. With this backgroundit becomes essential to adopt the system of the Green Campus for the institutewhich will lead for sustainable development.

Eco campus is a concept implemented in many educational institutions, all over the worldto make them sustainable because of their mass resource utilization and waste discharge in to theenvironment. Waste minimization plans for the educational institute are now mandatory to maintain the cleanliness of the campus. To find out the environmental performance of the educational institutions and to analyze the possible solutions for converting the educationalCampus as eco-campus, the Green Auditing of institution is essential.

The environmental auditing of 'ATME' College, Mysore, enables to assess the life style, action and its impact on theenvironment. This is the first attempt to conduct environmental auditing of this college campus. Thisaudit is mainly focused on pollution management, renewable energy resource, rain water harvesting and waste management practices etc. Initially a questionnaire-survey was conducted to knowabout the existing resources of the campus and resource consumption pattern of the students andstaff in the college. In order to assess the management of pollution,the data about waste and sewage treatment plant of our college was collected,tabulated and analyzed. Finally reports pertaining to environmental management plan with strengths, weaknesses along with the suggestion on the environmental issues of campus are documented.

**ABOUT THE COLLEGE**

ATME College of Engineering was established with single object of providing the most modern education with cutting edge technology to the students.It has become synonymous for outstanding education facilities offered, which are the best among the many other Engineering colleges in Mysuru, Karnataka.ATME is spread over 20 Acres of green area close to the Mysuru city, which has become a universally accepted place for education offering the latest teaching techniques. It has certainly become one of the popular Engineering colleges in Mysuru, Karnataka, where education is considered as the most powerful weapon, which can be used to change the world.ATME,Mysuru, not only offers facilities for the students to have overall growth, vision for the development and accountability for the future but also provides highly excellent and dedicated faculties who are having

sacred aim to equip the students with the necessary knowledge and skills to outshine in the global environment, which is becoming competitive day by day.ATME is today considered as one of the Best Engineering colleges in Mysuru, Karnataka which remains on the top by the academic performance and also by the significant achievements of the students at the University level.At ATME Mysuru, one can realize that, a dream does not become true unless it is well supported by the interest, determination and hard work.

**Vision Statement of the College**

Development of academically excellent, culturally vibrant, socially responsible and globally competent human resources.

**Mission Statement of the College**.

➢ To keep pace with the advancements in knowledge and make the students competitive and capable at the global level.

➢ To create an environment for the students to acquire the right physical, intellectual, emotional and moral foundations and shine as torch bearers of tomorrow's society.

➢ To strive to attain ever-higher benchmarks of educational excellence.

## 1. Introduction

Environmental auditing is a valuable compliance and risk management tool available to an industry. The periodic review of the environmental performance allows one to identify and find out remediesto potential compliance concerns and other longer-term concerns (issues requiring some form of clean up and/or remediation). An auditing program helps an operator to control the costs proactively that are associated with environmental compliance, rather than reactively. The practice of environmental auditing is a good business practice that encourages the involved members to implement. This guide is intended to provide with a general overview of environmental auditing and its usefulness to an institution.

**It is paramount that any company that contemplates conducting an environmental audit seek the advice of competent legal counsel. There are many legal issues to consider when conducting an audit, which are not addressed in this chapter.**

### What is an Environmental Audit?

An environmental audit as defined in ISO 14000 is a systematic, documented verification process of objectively obtaining and evaluating audit evidence to determine whether specified environmental activities, events, conditions, management systems, or information about these matters conform with audit criteria, and communicating the results of this process. The International Chamber of Commerce defines environmental auditing as, "a management tool comprising a systematic documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of contributing to safeguarding the environment by facilitating management control of environmental practices and assessing compliance with company policies which could include meeting regulatory requirements. Environmental audits are generally performed on a routine or periodic basis. More frequent assessments may be appropriate at any facility that has been targeted for more frequent federal, state/province and/or local inspections, and/or been issued a notice of violation, or subject to some form enforcement proceeding since the last assessment.

## 2. Management's Commitment

The Management of the ATME College has shown commitment towards the green auditing during the pre-audit meeting. They are constantly encouraging all the green activities. It was decided that all activities that are environment friendly such as awareness programs on environment, campus farming, planting more trees in the campus etc. shall be promoted after the green auditing. The

management of the college is planning to formulate the necessary policies based on green auditing report

### 2.1 Scope and Goals of Environmental Auditing

A clean and healthy environment aids effective learning and provides a conducive-environment for learning. 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 social and environmental processes. It is necessary to conduct green audit in college campus because it helps the students to be aware of the green audit, its advantages and thereby grow up as good citizens. Thus Green audit becomes necessary at the college level. A simple indigenized system has been devised to monitor the environmental performance of ATMECE, Mysore. 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 examples of environment friendly initiatives for the community, and to educate the young learners.

### 2 .3 Benefits of the Environmental Auditing

- More efficient resource management.
- To provide basis for improved sustainability.
- To create a green campus.
- To enable waste management through reduction of wastegeneration, recyclingof solid-waste and waste water.
- To create plastic free campus and evolve health consciousness among the stakeholders.
- Recognize the cost saving methods through waste minimizing and management.
- Point out the prevailing and forthcoming complications.
- Authenticate conformity with the implemented environmental laws.
- Empower the organizations to frame a better environmental performance.
- Enhance the alertness for environmental guidelines and duties.
- Impart environmental education through systematic environmentalmanagement approach and improving environmental standards Benchmarking for environmental protection initiatives.
- Financial savings through a reduction in resource use.

- Development of ownership, personal and social responsibility for the college and its environment.
- Enhancement of college profile
- Development of environmental ethics and value systems among youngsters.
- Green auditing should be used asa valuable tool in the management and monitoring of environmental and sustainable development programs of the college.

### 2.4 Target Areas of Environmental Auditing

Environmentalaudit forms part of a resource management process. Although they are individual events, the real value of green audits is the fact that they are carried out at pre-defined intervals, and their results can illustrate improvements or at-least, changeswith time. Eco-campus concept mainly focuses on the efficient use of power and water; minimization of waste generation or pollution and also economicalusage of materials for better efficiency. All these indicators are assessed in the process of "Green Auditing of an educational institute". Eco-campus focuses on the reduction of wastes, procurement of a cost effective and secure supply of power, and encouraging in general, the concept of energy conservation. It promotes personal action, reduces the institute's power and water consumption, reduces generation of solid wastes and integrates environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, power, wastes, green campus and carbon footprint. It is expected that this report will provide an accurate insight to the best practices adopted by ATME College of Engineering, Mysore and that it will aid the College in prioritizing positive steps to improve overall sustainability. The institute intendsto revise this document periodically and update it.

## 3. Objectives of the Study

The main objectives of carrying out Green Audit are:

- To introduce an awarenessamong students about the importance and the environmental aspects of green auditing and itssustainability.
- To secure the environment and cut down the threats posed to human healthby analyzing the pattern and extent of resource usagein the campus.
- To establish a baseline data to assess the future sustainability by documenting the interruptions to the environment that are difficult to handle and theircost.
- To bring out a status report on environmental compliance.

## 4. Methodology

In order to perform green audit, the methodology included different tools suchas preparation of questionnaire, physical inspection of the campus, observationand review of the documentation, interviewing key persons and data analysis,measurements and recommendations.

**4.1. Data Collection** – In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements. Following steps were taken for data collection:

- The team visited each of the several departments, the Central Library, the Canteen many other units of the college.
- Data on general information about the environmental practices was collected by general observation as well interviewing the concerned persons.
- The power consumption of appliances was recorded by taking an average value in some cases.

**4.2. Data Analysis -** Detailed analysis of data collected includedthe calculation of electrical energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the (CHESCOM). Data related to water usages were also analyzed using appropriate methodology.

**4.3. Environmental / Green Auditing**

On the basis of results of data analysis and other observations, some steps for reducing power and water consumption are recommended. Proper treatment methods for waste are also suggested. Use of fossil fuels has to be reduced for the sake of community health. Importance of making a green campus and the mandatory reduction of carbon footprint to curtail the green-house gas are also included under the recommendations. The target areas such as conservation of water, power, materials, waste management, maintenance of green campus and carbon footprint particular to the college are evaluated through questionnaire by circulating among the students.Environmental / Green Auditing consisted of the following specific areas along with the present status of environment management in the campus:

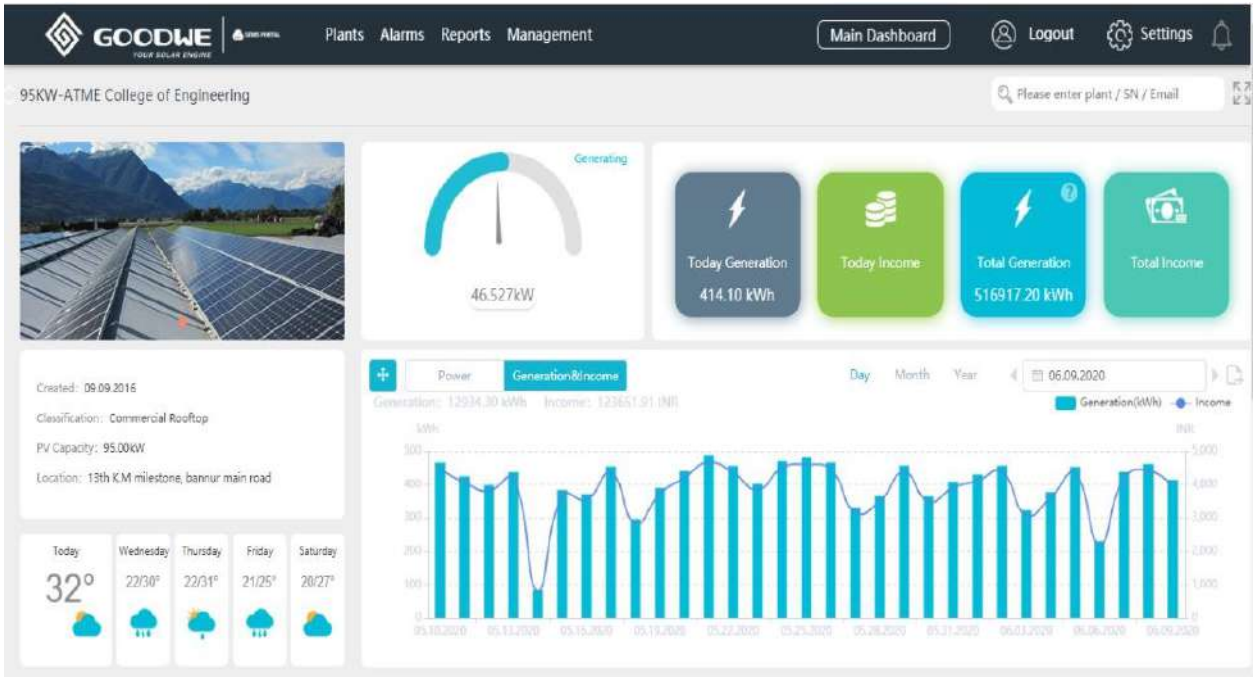
- Renewable Energy Resource
- Water management
- Waste management
- Rainwater harvesting technique
- Sewage Treatment Plant

### 5.1 Renewable Energy Use and Conservation

This indicator addresses energy consumption, energy sources, energymonitoring, lighting, appliance, natural gas and vehicles. Energy use is clearly animportant aspect of campus sustainability and thus requires no explanation forits inclusion in the assessment.

1. A 95KWP ( Solar Roof Top Photo Voltaic – Grid Tied System)
    - SERAPHIM 315 Wp Solar panels for 95 Kwp
    - Inverters of 25KW capacity - 4 No's
    - Safetymeasues – installedlightening arresters, metal boards and inverter earthings.
    - Modules are mounted on MS skillion trusstypestructure with 35° inclination towards under space.
    - Contract period with Electricity board for 25 years with Rs. 9.56 per unit.

| | |
|---|---|
| **Assured units Generation 1500 units Annually/ kW**<br>➢ On an Average,considering 1 hour power failure per day.<br>➢ Average generation will be 5 Units /kW.<br>➢ Average Sunny days will be 310 days in Mysore. | 4,65,000 Units/ Year |
| **Savings in $CO_2$emission – which is equal to planting 402 trees yearly of 14 years age grown to neutralize $CO_2$ in nature** | 58 tons annually |



**a) Observations**

1. **1,39,800 units yearly** (Average 11,570 to 12678 Units per month)- 2018 - 2019

**Energy Saving options adopted:**

1. **Solar 95 kva Plant – Grid tied system -**
    a. 590794.10 kWh from Sept 2016 units generated till date
    b. Self-sufficient
    c. 418 Metric Tons of Carbon emission is avoided

**b) 96 % of light Fixtures are LED.**
**c) 85% of the fans are replaced with energy efficient fans.**
**d) All Air-conditions are used in the power saving mode.**
**e) All UPS are turned to float mode and disconnected from charging.**

**In campus, totally 114 Tri-vector metersare installed - Individual Meter readings are recorded twice in everyday in college working hours and non-working hours.**

1. **80 – 1Ø meter**
2. **34 –3Ø meter**

**Yes – Bench mark is set to utilise the power within the range of 11,000 to 12,000 Units / Month .**

**b) Recommendations**

- Support renewable and carbon-neutral electricity options on any energypurchasingconsortium, with the aim of supplying all college appliances withelectricity that can be attributed to renewable and carbon-neutral sources.
- Preferred to purchase electricity from a company thatinvests in new sources of renewable and carbon-neutral electricity.
- Installation of LED lamps instead of CFL.

### 5.2 Water Management

The purpose of a water audit report is to provide an assessment of current water usage practices, and provide a roadmap towards decreasing water usage in the future. Water audit is an assessment of how much water is used and how much water can be saved in the college. Conducting a water audit involves calculating water use and identifying simple ways for saving water in the college. There is an increasing awareness around the globe of the centrality of water to our lives. This awareness crosses political and social boundaries. In many places people have difficult access to drinking water. Often it is polluted. Water auditing is a mechanism for conserving water, which will grow in significance in the future as demand for water increases. There is a strong emphasis on principles, and on the relationship of water auditing with associated activities like environmental auditing, environmental management systems, resource conservation, flow measurement, water quality and legal frameworks.

Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices. Reducing your water use can save you money on your water use, wastewater management and energy bills and reduce on-site treatment costs.

Water audits provide a way to catalog all water uses in a facility and identify ways to increase water use efficiency. The results can help to prioritize steps to implement cost-effective water-saving measures. It is possible to cut the water usage by as much as 30 percent by implementing simple conservation measures and without drastically modifying the lifestyle.

Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water.

**Demand of Water for ATME Campus**

1. Consumption by Staff and students – **20 $m^3$**
2. Canteen – **8 $m^3$**
3. Laboratories – **5 $m^3$**

**TotalWater Demand – 33 $m^3$ rounded off to 35$m^3$**

The institute has housed a compact treatment plant for the drinking purpose to all the students and staff of the institute which is shown in the photo below:.


### 5.3 Waste Management

The various types of wastes generated at the institute along with their disposal mechanism are indicated in the following table:

| Types of waste | Particulars | Disposal method |
|---|---|---|
| Solid wastes | Damaged furniture, paper waste,paper plates, food wastes etc. | Reuse after maintenance energy conversion |
| Plastic waste | Pens, Refills, Plastic water bottles andother plastic containers, wrappers etc. | Direct selling |
| E-Waste | Computers, electrical and electronicparts | Direct selling |
| Waste water | Floor Washings, Toilets | Soak pits |
| Glass waste | Broken glass wares from the labs | Direct selling |

The total solid waste collected in the campus is **31.6kg/day**. Waste generationfrom tree droppings and lawn management is a major solid waste generated inthe campus. The waste is segregated at source by providing separate dustbinsfor Bio-degradable and Plastic waste. Segregation of chemical waste generatedin chemistry and environmental laboratories is also practiced. Single-sided, used papers are reused for writing and printing in all departments. Important and confidentialreports/ papers are sent for pulping and recycling after completion of theirpreservation period.

Very less plastic waste (0.1Kg/day) is generated by somedepartments, office, garden etc., which is neither categorized at point source norsent for recycling. Metal waste and wooden waste is stored and given toauthorized scrap agents for further processing. Few glass bottles are reused inthe laboratories. The food waste from main canteen and mess is sent forcomposting in the institute shown in the following photos.

The institute has adopted composting in culture house on a 300 sqftland area. The main purpose of this is to reduce disposable waste in the collegecampus. After complete process of composting, it is used as manure for thegardens and lawns. Awareness programsare also conducted for the benefit of farmers in thevillage nearby.

Reduce the absolute amount of waste that it produces from college staff and offices.

- Make full use of all recycling facilities provided by City Municipality andprivate suppliers, including glass, cans, white, coloured and brown paper,plastic bottles, batteries, print cartridges, cardboard and furniture.
- Provide sufficient, accessible and well-publicized collection points forrecyclable waste, with responsibility for recycling clearly allocated.
- Single sided papers to be used for writing and photocopy
- Important and confidential papers after their validity to be sent for pulping.

**Solid waste management and Disposal**

Dead leaves are sent to the bio composting yard instead of burning and food wastes of about 100 kgs are digested in biogas plant. It produces bio-compost from the plant leaves and Canteen kitchenvegetable wastes are collected in the campus. Once in three months**,** about **0.1 ton** of bio-manures areprepared and used for the cultivation of green plants.

Summary of Solid Waste Generation and Disposal

There are different types of solid waste generated on campus the details of which are as summarised in the Solid Waste Generation Data Table -1.

All waste collection is carried out by segregation at source using Separate Bins at various points throughout the campus as shown:

**Waste Collection by segregation at Source**




## Dry Waste from Foundry and Forge

For Disposal of Wet Waste from the Canteen, Composting pits are used. Manure is collected from Composting for usage in the Gardens and Green cover improvement throughout the campus.


**Composting Pits**

**Table 1 - Solid Waste Generation Data**

| Sl. No. | Department/ Area of source of waste (Everypoint of waste generation within the campus should be identified and listed – cross | Types of waste generated in each of the point source (for each type of waste, use separate row) | Wet (in kgs/day) | Dry (in kgs/day) | Toxic (in kgs/ month) | Treatment or Disposal method | In-campus |
|---|---|---|---|---|---|---|---|
| 1 | Civil Department | | | 0.2 | | Pit Method | yes |
| 2 | Electrical Department | ** | | 0.2 | 0.3 | Pit Method | yes |
| 3 | Mechanical Department | Iron Waste | | 20 | | Recycling Method | yes |
| 4 | Admin Block | | | 0.2 | | | yes |
| 5 | Canteen | Organic Waste | 10 Kgs | | | Pit Method | yes |
| 6 | Computer Science Department | | | 0.5 | | Pit Method | yes |
| 7 | Electronics Department | ** | | 0.5 | 0.3 | Pit Method | yes |

NOTE:

** - E WASTE 0.1 % of this quantity considering the average waste over an entire year. The disposal of which is carried out as per stated method as e-waste generated is of category - non-toxic

## 2. Liquid waste management

### Sewage treatment plant

The treated wastewater developed in college campus is treated in campus and is used for watering of garden. The institute is having Sewage Treatment Plant (STP) with the capacity of **16686**liters capacity per day. The quantity of wastewater generated in the campus is assessed as per IS standards (**IS 9868/1981**)are given below:

**Demand of Water for ATME Campus**

Consumption by Staff and students – **20 $m^3$**

Canteen –**8 $m^3$**

Laboratories – **5 $m^3$**

**Total Water Demand – 33 $m^3$ rounded off to 35$m^3$**

Wastewater treatment is the process of converting wastewater into bilge water so that it can be discharged into the water bodies so that it can be mixed and gets reused due to the natural filtration process. Wastewater usually contains toxic chemicals, bacteria, and other harmful resins. The treatment unit aims at reducing the contaminants to acceptable levels so that it can be discharged back into environment.

**Design Parameters:**

The overall design of the wastewater treatment plant consists of 2 stages

i) Primary treatment which consists of screening, grit removal and sedimentation
ii) Secondary treatment consists of a bioreactor.

| | | |
|---|---|---|
| Waste water treatment facility & Mode of disposal | : | The proponent has proposed Sewage Treatment Plant (STP) of capacity 3litres.<br>Raw Sewage Screening, Oil / Grit Removal, Equalization Tank, Fluidized Bio Reactor, Tube Settler, Pre-filtration tank, ACF, PCF, Final Treated holding tank .<br>The treated wastewater is proposed to be recycled for toilet flushing's and gardening purpose |

Waste water Treatment plant located in ATME campus

Sewage from toilets are collected separately and sent to sewage treatment plant.The Plant has been functioning since 2016.

Sewage Treatment Plant (STP) with a capacity of **33 $m^3$/day**to treat the waste water has been installed. The water from the college is treated and pumped back. This water is used for theirrigation and gardening purposes.

**E-waste management**

**Generation**

E-waste can be described as consumer and business electronic equipment that are near or at the end of their useful life. This comes to about 5% of the municipalsolid waste world-wide and is much more hazardous than other wastes because these electronic components contain cadmium, lead, mercury, and Polychlorinatedbiphenyls (PCBs) that canaffect human health and the environment.

E-waste generated in the campus is very less in quantity. The cartridges of laserprinters are refilled outside the college campus. Administration conducts theawareness programmes regarding E-waste Management with the help of variousdepartments. The E- waste and defective item from computer laboratory is beingstored properly. The institution has decided to contact approved E-wastemanagement and disposal facility in order to dispose E-waste in scientificmanner.

- To recycle or safely dispose of white goods, computers and electrical appliances.
- To use reusable resources and containers and avoid unnecessary packagingwherever possible.
- To always purchase recycled resources where these are both suitable andavailable.

Test and Repair Centre (TRC) functioning in the college collects the e-waste from all the departments once a year and outsource the unused components (Computers, UPS and Printing systems) to externalagency. Reusable components will be repaired and upgraded by the TRC and returned to the departments.

**Rain water harvesting structures and utilization in the campus**

Rainwater harvesting (RWH) is a simple method by which rainfall is collected for future usage. The collected rainwater may be stored, utilised in different ways or directly used for recharge purposes.

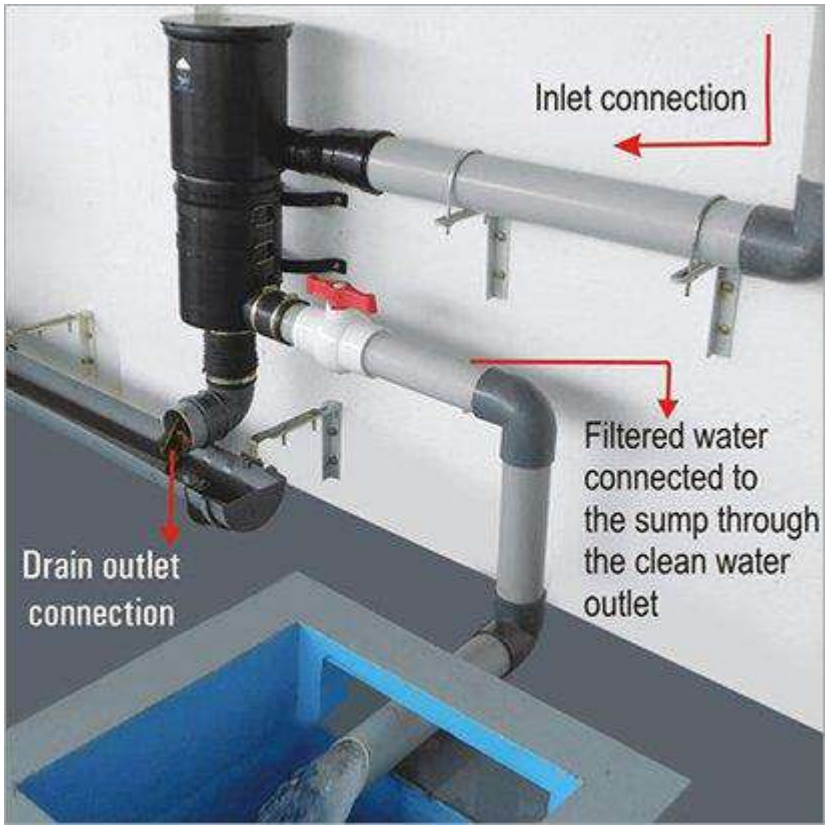
ATME College of Engineering, in order to achieve sustainability has implemented the rain water harvesting system in the campus. The system adopted is roof - top rain water harvesting. The quantity details of the installation for harvesting are given below:

**Table: The details of roof top area and the harvesting potential**

| Sl. No. | Block | Roof Top Area ($m^2$ ) | Average Rainfall per annum in mm | Volume of water collected ($m^3$) |
|---|---|---|---|---|
| 1 | Civil | 1664.02 | 770 | 1281 |
| 2 | Electrical | 1306.3 | | 1006 |
| 3 | Mechanical | 2264.82 | | 1744 |
| **Total** | | | | **4031** |

An underground sump with a capacity of about 92,000 litres is constructed to store the harvested rain water.

The surplus rain water from the roofs which is in the form of surface run off is redirected to the recharge wells located at various locations as shown:




### 3. Other Green Practices in the campus:

**a) Landscaping with trees and plants**

The college campus is having many trees. In front of the college, there is a well-maintained garden withnumerous big trees along with medium shrubs. There are several potted plants in the college campus. There is a medicinalgarden in our college campus. The college has a Clean Technology club, Energy Conservation Club,Enviro Club and Green Energy Clubs with assigned staff and interested students to maintain thegreenery in the campus. Our Institution won AICTE National Level Clean and Smart CampusAwards-2019 for the best practices followed in our Institution.

College campus has 10,266 no. of trees out of which 5350 no. of trees are planted with a spacing of 8 to12 feet distance in 11,018 sqmt and shrubs of 260 no. of varieties. Landscaping with lawn maintenance is in practice and a free space of 10,000 sqmt is spared for good green campus**.**The college has an appointed staff tomaintain the gardens in the campus who regularly maintain the tress, plants and greenery.

College organizes programmes through GREEN ECO club every year to inculcate awareness on greenenvironment. Environmental awareness given to students and other stakeholders. Geo Club and EnviroClub take care of environmental consciousness and distribute booklets to the students. Awarenessprogrammes are organized time to time to sensitize NSS students .

This includes the plants, greenery and sustainability of the campus to ensurethat the buildings conform to green standards This also helps in ensuring that10$^{th}$Environmental Policy is enacted, enforced and reviewed using variousenvironmental awareness programmes.

Campus is located in the vicinity of approximately 82 types (species) trees.

Various tree plantation programs are being organized during the month of Julyand August at college campus and surrounding villages through NSS unit. Thisprogram helps in encouraging eco-friendly environment which provides pureoxygen within the institute and awareness among villagers. The plantationprogram includes various type of indigenous species of ornamental and

1. medicinal wild plant species.**Green Campus Management**

Since the beginning, trees have furnished us with two of life's essentials, food and oxygen. As we evolved, they provided additional necessities such as shelter, medicine, and tools. Today, their value continues to increase and more benefits of trees are being discovered as their role expands to satisfy the needs created by our modern lifestyles. Trees are an important part of every community. Our streets, parks, playgrounds and backyards are lined with trees that create a peaceful and aesthetically pleasing environment. Trees increase our quality of life by bringing natural elements and wildlife habitats into urban settings. We gather under the cool shade they provide during outdoor activities with family and friends. Using trees in cities to deflect the sunlight reduces the heat island effect caused by pavement and commercial buildings. During the process of photosynthesis, trees take in carbon dioxide and produce the oxygen we breathe. According to the U.S. Department of Agriculture, "One acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. This is enough to meet the annual needs of 18 people." Trees, shrubs and turf also filter air by removing dust and absorbing other pollutants like carbon monoxide, sulfur dioxide and nitrogen dioxide. Trees control climate by moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool in summer. Trees also preserve warmth by providing a screen from harsh wind. Trees also lower the air temperature and reduce the heat intensity of the greenhouse effect by maintaining low levels of carbon dioxide. So while we are busy studying and working on earning those good

academic grades, all the trees on campus are also working hard to make the air cleaner for us. Trees on our campus impact our mental health as well; studies have shown that trees greatly reduce stress, which is a huge deal considering that many students are under some kind of stress.

**Green Campus**

- Reviews periodically the list of trees planted in the garden, allot numbers tothe trees and keep records. Give scientific names to the trees.
- Promote environmental awareness as a part of course work in variouscurricular areas, independent research projects, and community service.
- Create awareness of environmental sustainability and take actions to ensureenvironmental sustainability.
- Establish a College Environmental Committee that will hold responsibility forthe enactment, enforcement and review of the Environmental Policy. TheEnvironmental Committee shall be the source of advice and guidance to staffand students on how to implement this Policy.
- Ensure that an audit is conducted annually and action is taken on the basis ofaudit report, recommendation and findings.

Celebrate every year 5th June as 'Environment Day' and plant trees on thisday to make the campus more Green.

**a) Students and Staff using college bus facility**

Students and Staff members are being made aware of the pollution caused by use of vehicles.Awareness programsare conducted at individual as well as social levelson the carbon consumption and emission, air and noise pollution due to vehicles and such other useful topics.

Many students utilize the college buses plying to various parts of Mysore regularly there by reducing the use of vehicles in turn reducing vehicular pollution. The staff are also advised to follow the pooling system, using the own vehicles by turns, which some are practicing.

**b) Paperless Office**

Departments, staffs and students use ATME-CERP management software to view and maintain thedocuments in electronic form. Submission of lesson, studentattendance, faculty attendance, issuing circulars and posting necessary information are carried out electronically thereby avoiding the use of papers inside the campus.Printouts are taken only on essential situations.

Considering the fact that the institution is predominantly an undergraduatecollege, there is significant environmental research both by faculty and students.

The environmental awareness initiatives are substantial. The installation of solarpanels, paperless work system and vermin composting practices are noteworthy.Besides, environmental awareness programs initiated by the administrationShows how the campus is going green. Few recommendations are added to curbthe menace of waste management using ecofriendly and scientific techniques.

This may lead to the prosperous future in context of Green Campus & thussustainable environment and community development.

As part of green audit of campus, we carried out the environmental monitoringof campus, which included Illumination, Noise leveland Ventilation and Indoor Air quality ofthe class room. It was observed that Illumination and Ventilation is adequateconsidering natural light and air velocity present. Noise level in the campus is wellwithin the limit i.e. below 50 dB at day time.

**c) Renewable energy resource**

**Energy management**

The energy audit recommend to avoid the use of more energy consuming electrical appliancesand to replace with more environment friendly and energy efficient appliances (for example five starrated Air conditioner) in the college. The potential of renewable energy sources have to be explored. Asthe college has a very large roof area for installing solar panels so that it can be effectively used forgenerating power. The college has started steps in installing the solar panels for office.It is recommended to install the following solar powered appliances in the campus;Solar powered water heater and cooker in the college canteen. Solar powered street lights and LED display board.

**d) Atme Campus declared as Plastic Free Zone**

As per the direction of principal, committee visited to the all departments and created awareness to the student about plastic usage and disadvantages of plastic. The fallowing point wre covered in awareness talk

- One of the main disadvantages of plastic bags is that they are not renewable. The reason behind this is that they are made of petrochemicals, a non-renewable source of energy. They can be recycled, but not as easily as paper bags.
- Plastic bags can last for as much as hundreds of years. In other words, long after you are no more, the plastic bag used by you will be in existence.
- Many country banned plastic bags example legal aspect of banning plastic bags worldwide

In this contextATME college of Engineering hasbanneduse of plastic in form of plastic bag, polybag, or pouch, flexible, plastic film, nonwoven fabric, or plastic textile. Plastic bags were being use for containing and transporting goods such as foods and other waste with in the campus

**Students taking Oath on Plastic Free Zone**


**Green and Plastic Free campus**

Our college had taken initiative for Plastic Free Zone campus. In this regard, the students were addressed about Plastic free zone and took Oath from students. The students were addressed to create awareness about usage of plastics.

Fig.Awareness Programme being is conducted in Department of computer science Engineering

## 12.Auditing for Carbon Footprint

Colleges are helping the cities reduce greenhouse gas emissions and save energy by reorganizing campus operations. They are leading research on clean technology and electric cars, alternative fuels, and the next generation of batteries. By renovating and retrofitting old buildings, they are reducing energy use and lowering carbon emissions. New low-carbon buildings will minimize our footprint for generations to come. These campus plans will reinforce College management's commitment to a sustainable future, including reducing energy use and emissions, and helping city to meet climate change targets. Carbon footprint is produced via direct emissions of greenhouse gases associated with combustion of fossil fuels for heating and transportation, indirect emissions associated with electricity purchase and finally other emissions related to solid waste, refrigerants, land use management, air travel, etc. Commutation of stakeholders has an impact on the environment through the emission of greenhouse gases into the atmosphere consequent to burning of fossil fuels (such as petrol). The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. An important aspect of doing an audit is to be able to measure the impact so that we can determine better ways to manage the impact. In addition to the water, waste, energy and biodiversity audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created. One aspect is to consider the distance and method travelled 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. To become carbon neutral, Colleges are trying to reduce their emissions of greenhouse gases, cut their use of energy, use more renewable energy, and emphasize the importance of sustainable energy sources.

IGBC

Confederation of Indian Industry

Indian Green Building Council (IGBC) appreciates

ATME College of Engineering
Mysuru

for launching IGBC Students' Chapter at their Campus on 5th April 2019

to inspire, instill and imbibe 'Green' approach for a sustainable tomorrow.

V Suresh
Chairman
Indian Green Building Council

K S Venkatagiri
Executive Director, CII-Godrej GBC

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**Environment Audit Team**

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