



SCMS SCHOOL OF ENGINEERING & TECHNOLOGY, KARUKUTTY
2019-20

BEST PRACTICE 1

NURTURING THE CULTURE OF INNOVATION

1. Title of the Practice: Nurturing the culture of innovation

2. Goal

The aim of the practice followed by the SSET is to be recognized as a leader committed to excellence in innovation that meets the aspirations of the global community. Following this comprehensive need, the priority is to develop a culture within SSET faculty and students to address the paradigm shift needed from learning to innovation. As a result, the institution initiated several activities for reinforcing the culture of innovation.

3. The Context

Crafting an organizational culture is impossible without training. Bearing this in mind, a series of workshops/seminars were conducted at SSET to encourage the culture of innovations among students and to apply there for the benefit of society. The SSET formulated a new learning culture from online courses like NPTEL that improved the subject knowledge of the faculty and got acquainted with modern trends and technologies. The annually held global event PPTIA hosted in the institution, various other national-level innovation challenges, and the projects taken up by the college from various external agencies created an opportunity for the students and faculty members to implement these enhanced skills and knowledge.

4. The Practice

The innovation culture at SSET is facilitated through Innovations & Entrepreneurship Development Cell (IEDC), Workshops, Research Projects, Project Competitions, Tie-Up with Kerala Start-Up Mission and Development of Fab Lab. The students are

encouraged to participate in workshops and idea pitching competitions arranged by the IEDC to cater to the research aptitude of the students. The CREATIVO which is an in-house competition open to all the students from the SCMS group of institutions has been conducted annually to identify, promote and celebrate outstanding talents whose innovative ideas can be demonstrated and commercialized. Library resources beyond the basic requirements are made available to the staff and students to support their innovation efforts and bring life to their ideas. The faculty members are awarded by research incentives considering research projects and publications which has enhanced the morale, productivity and innovation culture of faculty at SSET. The college is all set to start an incubation centre, enabling to build a start-up culture among the students.

5. Evidence of Success

The culture of innovation has been in SSET throughout its evolution which became predominant in the last 5 years. Most faculty members and students responded favourably to this culture of innovation although some improvements may still be required. Innovation is a critical component of SSET policy. At SSET quality is considered more important than mere quantity. The award-winning and funded projects like A DE addictive coil for drug addicts, Muscle to Machine Interface for Paralyzed Person (MMIPP), Brain wave nerve excitation for physically disabled, Anon-invasive anti-depression E-M stimulator, Dynamic brake lighting emergency system, A DE addictive coil for drug addicts, Shopping Assistance For Blind, Home management using IoT, Life Detection and Rescue System Using Snake Robot, Vehicle Load Monitoring System, Bionic Haptic Arm, Smart switching toilet system, Strawable Machine, Bug-bot with Mosquito attracter, Smart mop with infrared thermography, International Centre for Free and Open Source software-POSS grant, Brain Signal Project, Wheelchair controlled with Android Device, Eco friendly and energy efficient traffic junctions, Muscles To Machine Interface for Paralyzed, Wearable device for detection and prevention of heart failure etc. are significant shreds of evidence of this culture. There are a minimum of 5 ongoing sponsored projects at any given point of time and the number is going up.

6. Problems Encountered and Resources Required

As expected, there were many struggles amongst the faculty about the innovation culture. Without a doubt, tapping their energies by the busy academic schedule was the

major challenge. Such struggles are eliminated through a series of acts like workload balancing for the faculties. The culture has created a positive attitude and zeal to excel.

BEST PRACTICE 2

ENVIRONMENT CONSCIOUSNESS AND USE OF GREEN ENERGY

1. Title of the Practice: Environment Consciousness and use of green energy

- The solar power plant at SCMS School of Engineering & Technology (SSET) is 50 KWp (Kilo Watt peak) ON-GRID type installed on roof top area of administrative block, SSET purchased from TATA power solar systems limited, Bangalore. After installing the solar power plant and obtaining sanction from KSEB (Kerala State Electricity Board) the solar power plant was tied to KSEB grid and started generation from 14th April 2018 onwards.
- A 100 KLD sewage treatment plant (STP) has been installed at SCMS School of Engineering & Technology (SSET) to treat the waste water from administrative block, two academic blocks, five laboratory blocks, one canteen, two hostels and an auditorium in the campus. Toilets, washbasins and urinals of the two academic blocks, various laboratories, two hostels and the wastewater generated during cooking, dishwashing etc. from the canteen are the major wastewater sources for the STP. Treated waste water is being used for gardening & agricultural purposes within the campus.

2. Goal

- To evolve as a green campus reducing the dependence on electricity generated from fossil fuels by promoting the usage of self- generated electricity from renewable sources.
- To evolve as an environmentally conscious campus by reducing the impact on environment by treating and reusing the waste water produced by the campus activities.

3. The Context

- The idea of green campus, ever increasing electricity bills due to dependence on KSEB supply alone and huge subsidy provided by government for installing of solar projects paved way for solar power plant in the campus.

- If the wastewater produced by the campus is disposed without any treatment, it can contaminate the ground water in the locality and can also increase the risk of water borne diseases among the neighboring community.

4. The Practice

- The solar power plant starts generating from around 6.30 am till 6.15 pm daily except for durations of K.S.E.B power outages and during periodic maintenance/ repairs. The HT trivector Net energy meter installed in the campus calculates daily export / import of power and we need to pay for the net units after deducting exported units from imported units.
- An STP which can treat 100,000 liters of wastewater from various buildings & activities. This wastewater is brought into a centralized STP through a sewerage collection network. Detailed waste water flow diagram is given in fig.1 & scheme of the STP is given in fig.2. The sullage from canteen is passed through an oil trap and is then collected in a collection tank. The sewage from academic block- I, academic block- II, ladies hostel and junior men's hostel is also collected in the collection tank, from where it is sent to the ETP. The wastewater is biologically treated using an anaerobic filter and an aerobic process namely Moving Bed Biofilm Reactor (MBBR). Treated effluent is passed through a filtration unit before being used for agricultural processes.

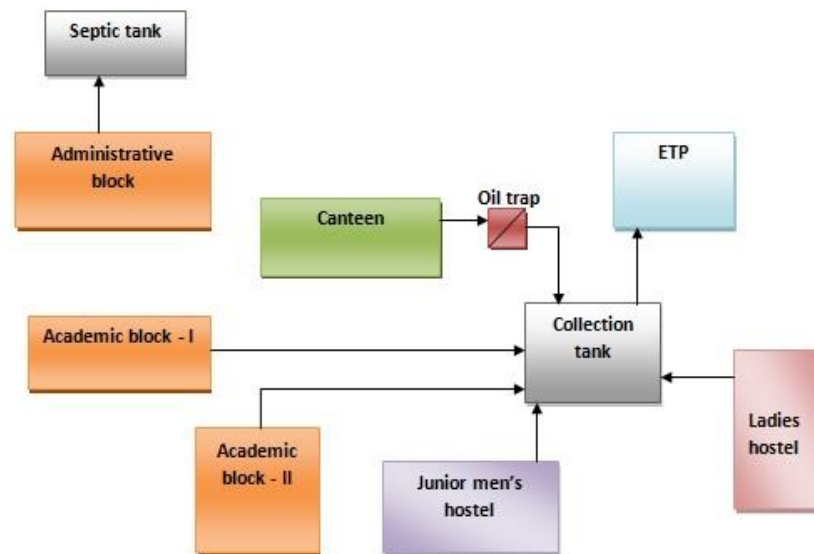


Fig.1 Wastewater flow diagram

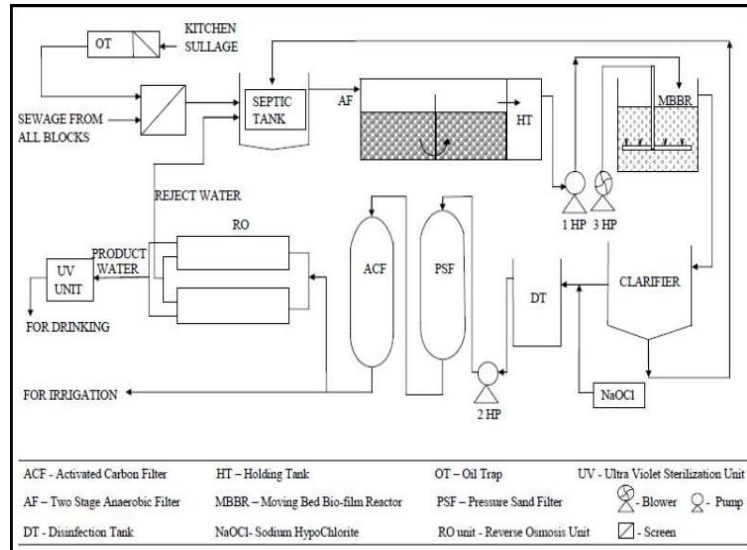


Fig.2 Schematic of wastewater treatment process implemented at SSET

5. Evidence of Success

- An average generation of 250 units is observed during summer and winter months but reduces drastically during rainy season as expected. The total generation from the solar plant as on 22/04/2021 is 174.43 MWh which is equivalent to a total reduction of 124 metric ton in CO₂. With the help of our solar power plant, we have been able to generate clean, safe energy for our usage and also have reduced the monthly KSEB electricity charges.



Fig. 3 Monthly generation plot (March 2020) in Tata power solar customer login

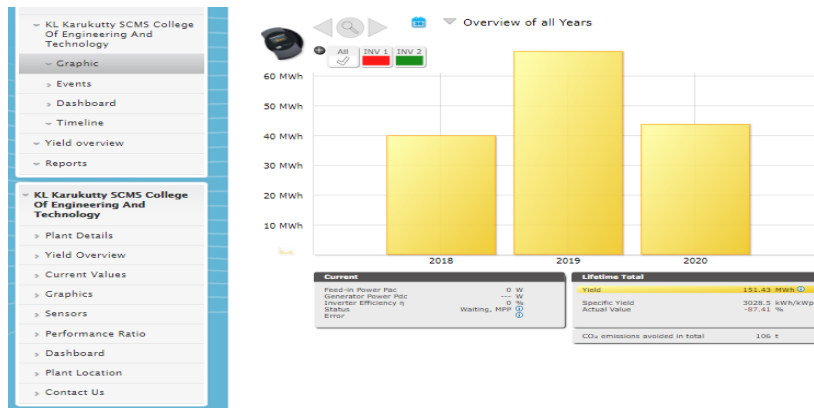


Fig. 4 Annual power generation, total generation in Tata power solar customer login

- The biological treatment system implemented at the SSET STP was found to treat the wastewater effectively as prescribed by the pollution control board. Table 1 shows how the characteristics of the wastewater changes as it undergoes treatment in the STP. These details are also shared with Kerala Pollution Control Board at regular intervals and they have provided SSET with the consent to operate this STP within the campus.

Table. 1 Characteristics of influent and effluent of STP at SSET campus

Parameter	Influent of STP	Outlet of STP	Standard (Environmental Protection) Rules, 1986)
pH	6.6	6.9	5.5 - 9.0
Temperature (°C)	27.7	27.6	NA
TDS (mg/l)	605	404	NA
Suspended Solids (mg/l)	190	20	200
Free Chlorine (mg/l)	0	0.7	NA
Oil & Grease (mg/l)	51.5	0	10
COD (mg/l)	352	70	NA
BOD ₅ at 20°C (mg/l)	205	30	100
Sulphate (mg/l)	12.3	4	NA
Phosphate (mg/l)	33	5.7	NA

6. Problems Encountered and resources required

- The solar power plant at SSET is ON-GRID type installed on roof top area of Administrative block, its prone to lightning surges during rainy seasons even though surge arresters and lightning arrester are installed. Also, since its ON-GRID type K.S.E.B supply is inevitable for the generation. The generation will cease when there is K.S.E.B supply failure. Unlike OFF GRID type there is no battery used and hence the generated power cannot be stored and consumed at night. A 24x7 LAN connection with internet is inevitable for monitoring the solar power plant remotely.



Fig. 5 Solar panels of 50 KWp ON-GRID solar power plant at SSET

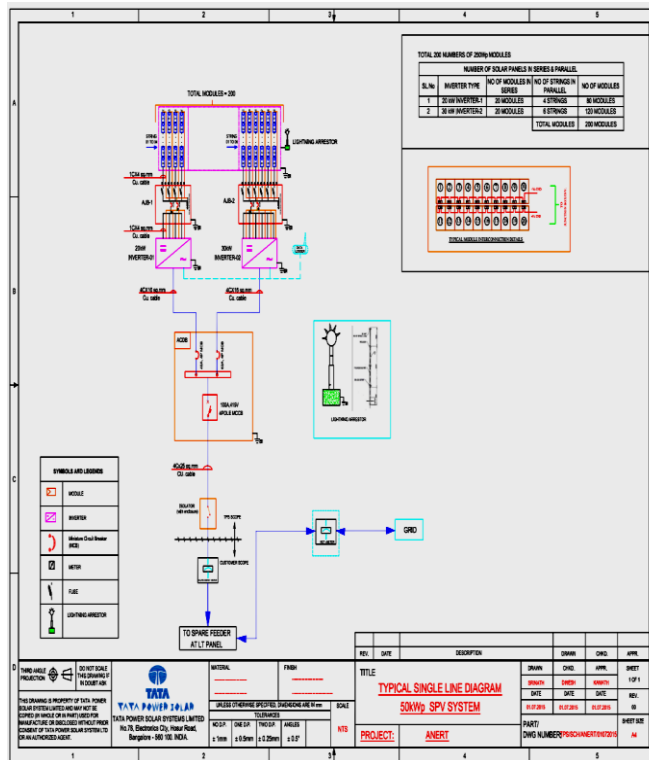


Fig. 6 Line diagram for solar power plant at SSET

- The anaerobic filter is prone to clogging due to increased biofilm growth. The pumps are controlled by the water level controllers which need frequent maintenance. Timer controlled switches are used for blowers to avoid excess heating. A full-time operator adds to the operation expenses and daily backwash with freshwater is needed to avoid clogging of sand and carbon filters. Irrigation line had to be laid all over the campus to dispose the treated wastewater without storing for a long duration. 24x7 power is inevitable for the success of aerobic biological process.



Fig.7Aerobic MBBR tanks at STP