



Report of Affordable and Clean Energy

7 AFFORDABLE AND CLEAN ENERGY



SDG 7

The Department of General Services, MAHE

Photos of solar and other renewable sources as well as the MAHE EV fleet.



Energy Efficient transformers



Solar Hot water systems



EV fleet



EV Campus Patrol



Marena Rd, Madhav Nagar, Manipal, Karnataka
576104, India

01 Oct 2021 10:25 am



STRPV

Campus E-taxi

The department of general services headed by the Director is responsible for the supervision of estates, security, and maintenance of all support services like ancillary, civil, electrical, HVAC, telecommunication, transportation fleet, plumbing, and water supply. The various branches of the department maintain approximately 92 lakh sq ft of built area and are adept at driving efficiency, managing risks and crisis to ensure smooth seamless functioning of the institutions and hospitals in multi-locations. Application of state-of-the-art technology with an eye on efficiency, cost-effectiveness, and resource conservation is inbuilt into the team's DNA. This year saw an unprecedented pandemic and the department was at the forefront of delivering essential services during the nationwide lockdown by way of ensuring transportation, sanitization services, and operational planning for the continuation of campus activities. The team facilitated post lockdown reopening of the workplace as per prescribed safety protocols.

Introduction: Civil department focuses on the repair of buildings, replacement of concrete, plaster, masonry, wood, steel structures, painting, flooring work, roofing, and manholes repairs. Ancillary services work on housekeeping, road cleaning, solid waste and garbage management, facade cleaning, pest control, horticulture, landscaping, waste management, and composting. The electrical department maintains 33/11 kV substations and 36 nos.11/0.433 kV substations and performs the critical function of a 24/7 power supply. 100 per cent backup power supply is ensured through DG sets. The inclusion of green energy is one of the priority areas of focus along with fuel efficiency. Water supply and plumbing works act on plumbing complaints, supervise and monitor water supply system, operate, and maintain sewage treatment plants and greywater treatment plants. The air conditioning



department has 17 central chiller plants with 8,000-standalone equipment operating on the campus. The department contributes to effective cost savings by optimizing the use of resources and efficiency improvement. HVAC systems are upgraded phase-wise to the best available energy-efficient technology. The telecommunications department enables MAHE to communicate effectively with its constituent units via intercom and cellular services. Maintenance is pro-actively planned to deliver a high standard of service including system upgradation. The transportation fleet ensures safe and secure mobility of university staff, students, and guests.

Environment management: Environment and Energy Management Systems are well established at the two campuses located at Manipal and Mangalore. The Environment, Energy Policy is the guiding document that enables the university to achieve continual improvement over time. Consistent efforts are made in implementing best practices in the areas of water and waste management, air quality, green cover, energy, and resource management.

Waste management on campus starts with source segregation, especially at residential units, canteens, and health care facilities. Post segregation scientific management is followed for different streams like e-waste, hazardous waste, biomedical waste, metal scrap, food, garden, vegetable, organic wastes, and inerts. This year approximately 60 per cent of waste generated in the Manipal campus was diverted from landfills thus preventing pollution to soil, air, and groundwater and reducing the health affecting the local area. Refer to Fig.1. The thermocol-melting unit installed on campus ensured zero disposal of all types of thermocol into the environment and instead produced approximately 700 kg of reusable byproduct.

Mini Bottling Kiosk is a new introduction on the campus where bottled drinking water is now produced and supplied in-house. The plant produces 200 ml, 500 ml, and 1000 ml of packaged drinking water in reusable glass bottles. The 200 ml bottles have now replaced the conventional PET packaged water at meetings and conferences whereas the 500- and 1000-ml units are used in the hotel. Bulk requirements of 20 litres are also produced based on demand. The above initiative has brought down the PET waste generation close to zero and is a cost-benefit to the university.

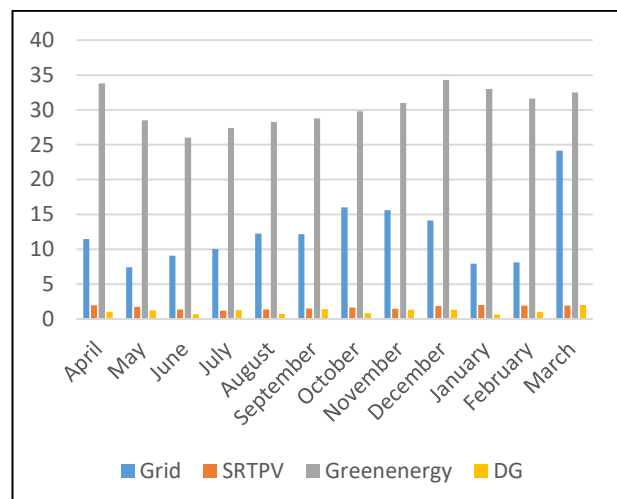
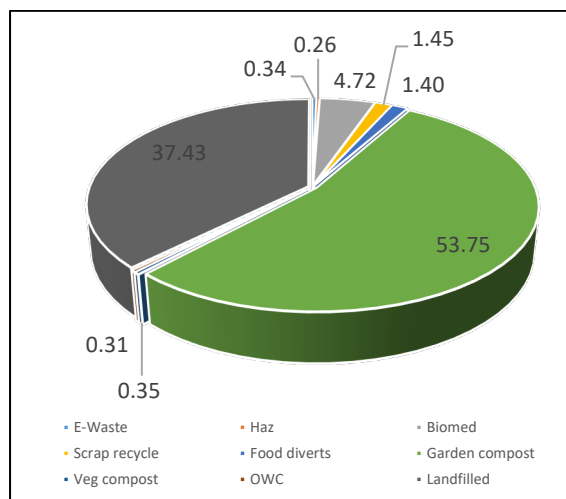




Fig1. Scientific management of waste (%) at Manipal.

Fig2. Power mix in lakh units at MAHE campuses

Wastewater generated on campus is treated in a sewage treatment plant of capacity 6.5 million litres per day (MLD) at Manipal and 0.3 MLD at Mangalore. Treated water up to the tertiary level is reused in gardens. Greywater plants of capacity 0.3 MLD provide flush water to hostels. Water resource conservation is a continuous process with efficiency improvement by line loss monitoring and harvesting of rainwater to help groundwater recharge.

Energy management system was formally implemented in the year 2016 at the Manipal campus followed by implementation at Mangalore in the year 2019. Key focus areas are maximum load reduction, the introduction of measures to improve the quality of power by replacement with energy-efficient transformers, pumps, detuned filters for capacitor banks, CFL/LED lighting, auto-synchronization panels for load optimization and energy-efficient power equipment as certified by Bureau of Energy Efficiency (BEE). In the HVAC systems, the replacement of dated air-conditioning units with power-efficient units were undertaken phase-wise. Central air conditioning systems incorporating water-cooled screw chillers, and unitary air-conditioner controls with automation systems for buildings with sensors are incorporated. For efficient cooling, automatic switching on and off depending on occupancy or fixed schedule is installed to replace old systems. MAHE continues to fully rely on solar hot water systems for hot water use on campus and has phase-wise introduced heat pumps to further improve efficiency. Solar Rooftop Photovoltaic (SRTPV) installed capacity is 1463 kWp. Around 70 per cent of the electricity used on campuses is from a green source, as depicted in Fig2 above. The energy-monitoring hub (EMH) helps in centralized monitoring of all sub-stations on campus as well as the air conditioning plants on campus. Real-time data availability helps in efficient monitoring and troubleshooting during breakdown incidents. This platform can be further enhanced to integrate remote controls from the EMH.

Ambient air quality (AAQ) is recognized as an important environmental indicator for human health. Six AAQ parameters measured show significantly lower concentrations compared to Central Pollution Control Board (CPCB) standards (STD) for residential zones (Fig3 below) and are much lower than those specified for ecologically sensitive zones which are more stringent.

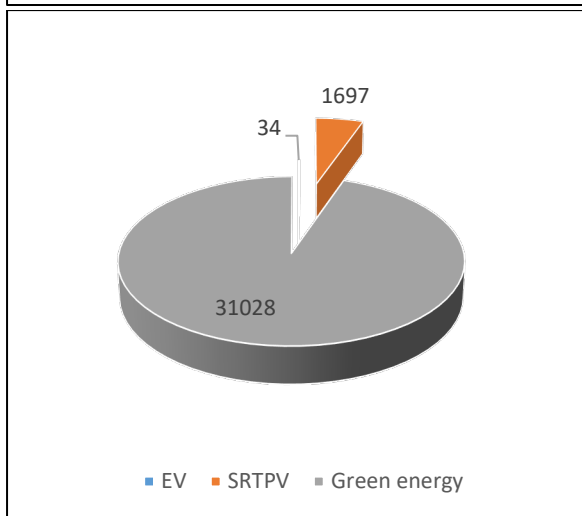
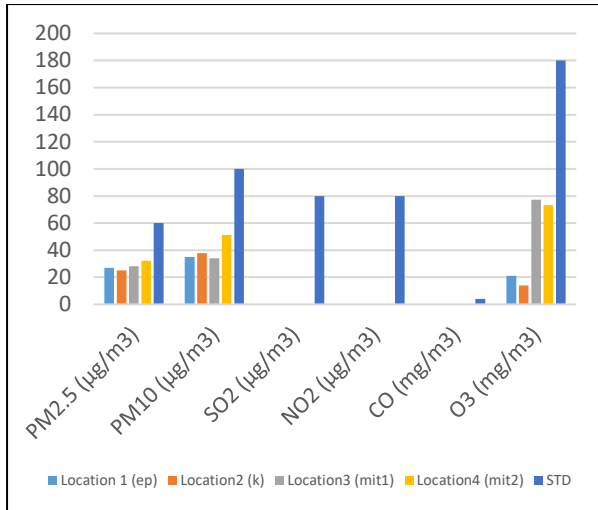


Fig 3. AAQ Vs CPCB Standards at 4 locations

Fig 4. CDE Emission reductions in MT.

The pleasant ambience of the campus is maintained and developed through a plantation of saplings during various occasions, one of them being the world environment day on 5 June as well as on a continuous basis. MAHE recognizes that vehicular emissions significantly affect the air and hence utilizes four fully electric vehicles (EVs) for airport transfer of students, staff, and guests. This year 70 per cent of the airport trips were catered to by EVs, two security patrol vehicles are now EVs, and this has helped to offset 100 per cent carbon emissions that would have otherwise occurred due to conventional patrol vehicles. In addition, one electric three-wheeler load carrier has offset carbon emissions up to one metric ton.



Carbon emission reduction: Strategies adopted like the use of exam pads, an electronic device for examinations replacing conventional answer scripts, have saved 113 trees from being felled. Green energy use on campuses accounts for 70 per cent of total consumption thus reducing 31,028 MT of CDE emissions and self-generated solar power prevented 1,697 MT of CDE emissions into the atmosphere. Total CDE emission reductions including electric vehicles (EV) are projected in Fig4 above. This year the UI Green Metric Ranking Agency ranked MAHE as the greenest suburban campus in India, 137th in the overall category and 47th in the suburban category.



MSAP

Details of Guest Visit (lectures, collaboration, visitors on campus)

Guest Lectures:


Sl. No.	Visitor	Name of the Organization	Purpose of Visit	Date of Visit
18	Mr Prasad Vaidya  AFFORDABLE AND CLEAN ENERGY	Director Solar Decathlon India, Energy Efficiency Head for IIHS, and eminent professional in India and US.	Expert lecture by Mr Prasad Vaidya and Mr Amanda Thounaojam—expert lecture on the topic Building Energy Efficiency and best practices for high-performance buildings for MDes Sustainable Design second-year students in online mode. Professor Vaidya detailed the opportunities for Architects to use low-embodied energy materials for the construction, design, and operation of net-zero buildings. Ms Amanda has introduced the state-of-art image processing technique to map and assess the glare in a built environment. Outcomes of the program were Motivation for BArch and MDes (SD) students for Vertical Design studio working on Energy Efficient Building Design, the BHAVAN scholarship program jointly offered by Indo-US partnership, Introduction to the concept of Glare, and the state-of-art processing and evaluation techniques. Approximately five faculties and 93 students participated.	13 September 2021
19	Mr Amanda Thounaojam  AFFORDABLE AND CLEAN ENERGY	An Architect and Building Energy Analyst, Sustainable Energy Lab, IIHS, Bangalore	Expert lecture by Mr Prasad Vaidya and Mr Amanda Thounaojam—expert lecture on the topic Building Energy Efficiency and best practices for high-performance buildings for MDes Sustainable Design second-year students in online mode. Professor Vaidya detailed the opportunities for Architects to use low-embodied energy materials for the construction, design, and operation of net-zero buildings. Ms Amanda has introduced the state-of-art image processing technique to map and assess the glare in a built environment. Outcomes of the program were Motivation for BArch and MDes (SD) students for Vertical Design studio working on Energy Efficient Building Design, the BHAVAN scholarship program jointly offered by Indo-US partnership, Introduction to the concept of Glare and the state-of-art processing and evaluation techniques. Approximately five faculties and 93 students participated.	13 September 2021




DOD

Institutional Activities/Curricular Activities

All other activities in the department relating to the program/course:

Sl. No.	Activity	Particulars	Date(s)
3	Guest lecture- BDes (FD) and MA (FM) 	<p>The purpose of the guest lecture is to introduce sustainable concepts through zero-waste design. The speaker, Designer Uma Lakshmi Rachakonda emphasized the need for sustainable approaches in the fashion industry. The fashion industry contributes to approximately 20 per cent of global waste and 10 per cent of global carbon emissions making it the biggest polluter in the world only next to the oil industry (UNEP 2018). The following outcomes are achieved through the guest lecture: 1. Sensitizing students to think of different strategies such as zero-waste fashion, upcycling, design for disassembly etc, would help in moving towards green fashion.</p> <p>2. Understand the application of zero-waste fashion through designing, planning for garment construction, layout for zero-waste and construction of zero-waste garments.</p> <p>3. Address the Sustainable Development Goal -SDG12 of sustainable consumption and production.</p>	11 September 2021

New Initiatives:

Particulars	Date
BTech in Electronics and Communication Engineering	
In connection with the National Energy Conservation Day on 14 December 2021, the Social Media and Society Connect Committee of MIT Bengaluru organized an online debate competition for MIT Bengaluru students. The debate competition was on the thrust area "Retrofitting Old Vehicles". All the mentors were requested to circulate the same among their respective mentees. Mr Hrishit Dhoka, Mr Soham Chakrabarti, Mr Sahithya, Mr Sarthak Jaryal, Mr Achyut Aryan, and Ms Arraddhaya Khare were the interested students who were split into two groups as per their inclination toward For or Against the topic. The debate competition would be conducted on 22 January 2022 after the segregation of teams during mentor-mentee meetings. The best team was awarded.	14 December 2021 
National Pollution Prevention Day: Online Poster, Anime, and Drawing Competition for MIT Bengaluru students. Theme: Preventing and Reducing Air Pollution.	2 December 2021 