



# ENVIRONMENTAL SUSTAINABILITY *Report* 2022



**ENVIRONMENTAL  
SUSTAINABILITY REPORT  
2022**





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Design and Visual Development by Ts Madeleine Elna Perreau

# Message From **RECTOR**

All praise to the Almighty Allah S.W.T. for His blessing that we are able to complete the Environmental Sustainability Report (ESR) for 2022. This report is a stepping stone for us to be on our way to promote a greener and leaner environment, within the campuses (Samarahan, Samarahan 2 and Mukah) and beyond the boundaries of Universiti Teknologi MARA Branch. It is indeed a cause worthy to be acknowledged as UiTM

Sarawak Branch has always given its full support in any initiatives that support environmental sustainability.

UiTM Sarawak Branch has incorporated SDGs in their sustainability policies, through four strategic pillars namely education, research, operation and governance, and external leadership. This policy aligns with UiTM's aspiration to be a Globally Renowned University (GRU) of Science, Technology, Humanities and Entrepreneurship by 2025. Among the efforts are to integrate the SDGs into academic programmes, students' engagement, research related, governance structure and operational policies, public engagement, and champions in campus. Environmental sustainability should be prioritised as it highlights the conservation of our natural resources and biodiversity to support lives on Earth. Thus, we encourage key ideas and approaches to thrive while we remain realistic in carrying out our next steps.

Notably, I would like to offer my heartiest congratulations to the team who has worked hard to ensure the completion of the Environmental Sustainability Report (ESR) 2022 and conduct effective sustainable green projects. Kudos, team! A special thank you is also given to the contributors and collaborators for giving their full commitment and cooperation in producing this report. The team's many successful achievements in several environmental-related awards have fully expressed their extensive dedication towards any environmental initiatives and synergies in all sustainable activities.



**Professor Dato Dr. Jamil bin Hj. Hamali**  
Rector  
*Universiti Teknologi MARA Sarawak Branch*

**Professor Dato Dr. Haji Jamil bin Haji Hamali**  
Rector  
Universiti Teknologi MARA Sarawak Branch

# MESSAGE FROM THE COORDINATOR OF UiTM SARAWAK GREEN CENTRE & SUSTAINABLE *Campus Committee*

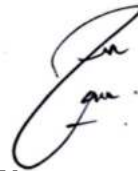
Praise to the Almighty Allah with His permission, UiTM Sarawak Environmental Sustainability Report 2022 is able to be produced for the first time. This report presents the deliverables and milestones achieved by the UiTM Sarawak Green Centre and Sustainable Campus Committee since its inception in January 2022. The main function of this committee is to synergize all sustainable initiatives and programmes planned, and to consolidate data related to sustainability for UiTM Sarawak.

UiTM Sarawak has always practised and promoted sustainability in its governance. The strategic planning for the University, under the Theme 8 (Smart Campus) focuses on conducive ecosystem for students and staff through enforcing convenient infrastructure in its effort in providing a smart, green, and sustainable campus that would lead to the optimisation of assets, resources, and energy consumption with renewable capability for long-term cost-efficiency.

With its recent success in a number of environmental-related awards, UiTMCS has proven its great dedication to environmental stewardship. We won the Gold Award for our first entry in the 10th Premier of Sarawak Environmental Award 2021/2022 and UiTMCS was also ranked third out of all UiTM campuses for Green Sustainable Campus Awards (AKKH) 2022 organised by UiTM Main Campus. We were also the winner for the Times for Higher Education Awards UiTM 2021 in Excellence and Innovation in the Arts. This award was in recognition of UiTM Sarawak's efforts in promoting artwork, using environmental-friendly products which have contributed to the community development of art in Sarawak. I owe all these success to the supportive top management, academic staff, administrative staff, and students of UiTM Sarawak who have contributed their enormous efforts towards this great accomplishment.

Finally, I would like to thank the authors of the Environmental Sustainability Report (ESR), contributors and collaborators for their dedication and commitment in producing this report. Having no doubts, sustainability is our responsibility.

Thank you



**Ts. Dr. Nurzawani Md Sofwan**

Coordinator

UiTM Sarawak Green Centre  
Sustainable Campus Committee



The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This not only helps in tracking expenses but also ensures compliance with tax regulations.

In the second section, the author provides a detailed breakdown of the company's revenue streams. This includes sales from various product lines and services. The analysis shows that while one product line is currently the primary source of income, diversification into new markets is necessary for long-term growth.

The third section addresses the company's financial health and liquidity. It highlights the need to maintain a healthy cash flow and to manage debt effectively. The author suggests several strategies to improve financial stability, such as negotiating better terms with suppliers and optimizing the pricing strategy.

Finally, the document concludes with a series of recommendations for the management team. These include implementing a more robust internal control system, investing in employee training, and exploring new investment opportunities. The author expresses confidence in the company's future success if these recommendations are followed.



# FOREWORD

This is the first environmental sustainability report for Universiti Teknologi MARA Sarawak branch. The report documents and highlights key sustainable initiatives in line with Sustainable Development Goals (SDGs) 2030 through its UiTM Sarawak Green Centre (UGC) and Sustainable Campus Committee.

UiTM Sarawak Branch has taken great initiatives and placed its huge commitment in creating environmental awareness among its staff by conducting a comprehensive study in all three (3) campuses. All relevant documents gathered from the various faculties, divisions, centres and units were examined, analysed and compiled to provide accurate information and strong evidences for the report. Five (5) primary areas featured in the report which are aligned to the Environmental Management Systems (EMS), as presented in the MS ISO 14001, are Commitment and Policy, Planning, Implementing the Environmental Management Plan, Measurements and Evaluation, and Review and Improvement. The first area on Commitment and Policy, focuses on commitment by UiTM Sarawak Branch in practising and establishing the Environmental Policy, emphasising on the need for continuous effort to uphold duties and responsibilities towards protecting and preserving the environment. The second area, Planning, presents the plan to fulfil the environmental obligations declared in the Environmental Policy, by considering the environmental aspects, legal and other requirements, and environmental management programmes.

The third area focuses on implementing the Environmental Management Plan (EMP). This area reports on the implementation of the environmental programmes held by UiTM Sarawak Branch in protecting and preserving the environment for the present and future generations. The Measurements and Evaluation is an area that explains the monitoring processes of the project and measures the effectiveness of the programmes. Finally, the area on Review and Improvement, describes the continuous improvement put forward while ensuring UiTM Sarawak Branch is moving towards more sustainable environmental management.

It is hoped that from the documentation and evidences presented in the report, it will help reveal the seriousness and commitment of UiTM Sarawak Branch in the essence of environmental stewardship.

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# ORGANISATION'S PROFILE



Universiti Teknologi MARA Sarawak branch (UiTM Sarawak) is a public institution of higher learning (PU) in Malaysia, located in the state of Sarawak. UiTM Sarawak is one of the autonomous UiTM branches. UiTM Sarawak has three campuses in the Samarahan and Mukah divisions, known as Samarahan Campus, Samarahan 2 Campus, and Mukah Campus. In terms of the land areas, Samarahan Campus covers 934,824.00 m<sup>2</sup>, Samarahan 2 Campus covers 356,123.00 m<sup>2</sup>, while Mukah campus covers 258,999.00 m<sup>2</sup>. The Samarahan Campus, located

about 20 kilometers from Kuching town and Mukah Campus located about 7.5 kilometers from Mukah town. On population, UiTM Sarawak employs a total of 830 staff, including 434 academicians and 396 non-academicians. At present, UiTM Sarawak can proudly accommodate up to 8,000 students.

Universiti Teknologi MARA (UiTM) aims to provide students with the knowledge, skills, attitudes and values needed to become productive and proactive citizens. UiTM produces the highest





*Locations of UiTM Sarawak Campuses*

percentage of professional human capital for the country and this task requires the unwavering commitment of all institutions to instill our students to grow academically and professionally so that when they graduate, they can catalyze and contribute to the rapid growth of the nation.

Currently, UiTM Sarawak offers 58 courses from 18 faculties, covering program at Pre-Diploma levels to Doctor of Philosophy. In fulfilling era changes in line with the 4th Industrial Revolution (IR4.0), technology change and infrastructure improvements through dynamic learning, major impact studies and high

creativity will create professional workforce capable of competing in the challenges faced.

By the nature of university which is focused on research, innovate teaching and service as well as serving the community, we are willing and responsible to take the lead in creating a more sustainable tomorrow through curriculum, research and services. UiTM Sarawak is committed to achieving the SDG 2030 by preparing the strategic plan initiatives that are aligned with the 17 SDG agendas.

A governance structure that is both effective and dynamic is the engine that powers the delivery of high-quality services to institutions of world-class caliber through the cultivation of qualified human resources.



**Professor Dato Dr. Jamil bin Haji Hamali**  
Rector



**Professor Dr. Firdaus Abdullah**  
Deputy Rector (Academic & International Affairs)



**Associate Professor Dr. Mohammad Isa Mohamadin**  
Deputy Rector (Student Affairs)



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Deputy Rector (Research and Industrial Linkages)



**Associate Professor Dr. Salmi Bujang**  
Penolong Rektor (Mukah Campus)



**Associate Professor Dr. Hasmah binti Mohidin**  
Penolong Rektor (Samarahan 2 Campus)



**Puan Umaira Othman Koya**  
Senior Deputy Registrar



**Encik Mohamad Husaini bin Mohamad Saleh**  
Deputy Bursar



**Encik Hamzah Mohamad**  
Director of Infrastructure & Infostructure Management



**Puan Norhayati Ismail**  
Deputy Chief Librarian

*The Top Management of UiTM Sarawak*

## UiTM Sarawak Green Centre (UGC) and Sustainable Campus Committee

The UiTM Sarawak Green Centre (UGC) and Sustainable Campus Committee was established in January 2022, under the quality management unit. The core function of this committee is to engage and synergize the effort of all the stakeholders towards achieving world class sustainable best practices. This committee also plays an important role in supporting the sustainability agenda at the university, community and further globally. It is also in line with the commitment to support the government's agenda in achieving the SDGs. This committee comprises of 17 fellows, who are both academic and non-academic UiTM Sarawak Branch staffs as shown in Table below. Each member represents a distinct field and area of expertise.



List Of Committee Members For UGC And Sustainable Campus Committee Of UiTM Sarawak

# The Organisation's **CORE VALUES**

## Our Mission

To lead the development of agile, professional Bumiputras through state-of-the-art curricula and impactful research.

## Our Vision

To establish UiTM as a global renowned university of science, technology, humanities, and entrepreneurship.

## Our Values

### **Excellence**

Practicing internal quality standards to fulfill the stakeholders' requirements and expectations.

### **Synergy**

Collaborating seamlessly to maximize productivity that benefits industry and society.

### **Integrity**

Embracing honesty, respect and transparency to achieve the highest ethical standard of professionalism.

# The Organisation's Core Business

The fact that everyone should be able to acquire a solid education reaffirms the belief that education is one of the most potent and proven instruments for long-term progress. Sustainable Development Goals (SDG) 2030 is designed to ensure that all girls and boys are given access to a free primary and secondary education. It also intends to ensure that everyone has equal access to inexpensive vocational training, to eliminate gender and economic disparities, and to ensure that everyone gets a decent higher education. UiTM Sarawak is committed in achieving the SDG by doing all in its power to enhance the quality of education it provides, to undertake research with a substantial impact, to manage effective and efficient operations and governance, and to develop its external leadership. Furthermore, the university emphasises on integrating the Sustainable Development Goals and Education for Sustainable Development (ESD) into all its academic programmes, promoting UiTM and national education policies which promote SDG education, and increasing students' participation in supporting SDG learning as part of their education commitment.

The university's involvement in ensuring that the individuals get a decent higher education is mostly dependent on the opportunities provided through student enrolment and the diversity of programmes offered by the university. Currently, the university offers 44 different programmes to potential students. Despite the outbreak of Covid-19, the university has observed an upsurge in the number of students enrolling in the variety of programmes. The number of students enrolled, for example, had increased by 1.42 percent, from 9151 in 2019 to 9283 in 2020. Furthermore, in order to provide more possibilities for individuals to get a decent higher education, the university organised Ekspo Maya Selangkah ke UiTM on the 13th and 14th of June last year for two days. The event was held to replace the Ekspo Selangkah ke UiTM yearly event. The initiative has demonstrated the university's dedication to improve possibilities for decent and quality higher education. In 2021, the number of graduates listed for its 94th and 95th convocation ceremony is 2,827 graduates.





As one of the largest institutions of higher learning in Malaysia, Universiti Teknologi MARA (UiTM) recognizes the environmental impacts of its activities and aims in minimising the impacts by taking initiatives closely aligned to the ISO14001 Environmental Management System in relation to the Sustainable Development Goals (SDG). Various initiatives taken which include sustainable campus practices, green governance, ecosystem, and university-community linkages and partnerships. UiTM is committed in integrating sustainability into strategies and policies across all operations and in promoting a sustainable and environmentally friendly culture among its community.

In response to the initiatives, UiTM has established environmental objectives as listed below:

- 1** To incorporate sustainable practices through teaching, learning and research towards the development of green talent
- 2** To implement green governance that advocates sustainability in managing goal setting, execution and performance management of UiTM
- 3** To commit in protecting and enhancing the green campus ecosystem through carbon management
- 4** To increase university-community linkages and partnerships in achieving sustainable development goals.

UiTM has taken into account the actions needed to respond to the environmental objectives that can be integrated into the SDG and its core business

## Education

- Integrate SDG and Education for Sustainable Development (ESD) into all academic programs.
- Advocate for UiTM and national education policies that support education for SDGs.
- Engage students in supporting learning on SDGs.

## Research

- Support interdisciplinary and transdisciplinary research on SDGs.
- Encourage and support the researchers to engage in global research community efforts to support the SDG.
- Involve actively in government SDG initiatives.

# SUSTAINABLE DEVELOPMENT GOAL POLICY

- Align the university governance structure and operational policies in aiming SDGs.
- Map the university strategic plan with the SDGs.

## Operation & Governance

- Strengthen public engagement and participation in addressing SDGs.

- Initiate and facilitate cross-sectoral SDGs initiatives.
- Promote the Champion in SDG.

## External Leadership

# Energy Management POLICY

UiTM is committed to managing energy in a responsible manner as part of a global environmental strategy as shown in figure below. While maintaining operational goals and providing a good working and learning environment, UiTM has effectively managed the energy use, and it aims to:

**1** Consume energy efficiently, continuously, and comprehensively

**2** Ensure new development projects, renovations, and upgrading are cost-efficient with low energy consumption and maintenance costs.

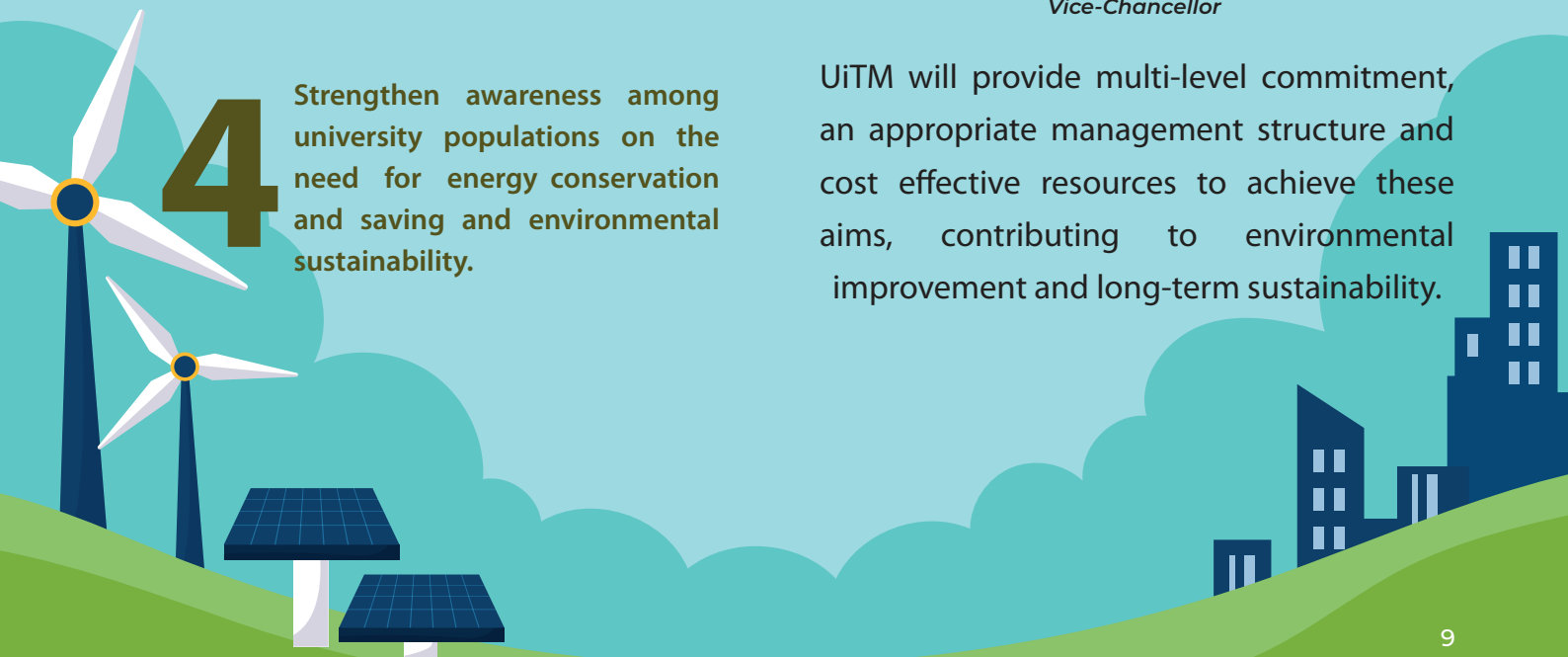
**3** Ensure new development projects, renovations, and upgrading are cost-efficient with low energy consumption and maintenance costs.

**4** Strengthen awareness among university populations on the need for energy conservation and saving and environmental sustainability.



*Energy Management Policy Endorsed By The Vice-Chancellor*

UiTM will provide multi-level commitment, an appropriate management structure and cost effective resources to achieve these aims, contributing to environmental improvement and long-term sustainability.



# Bring-Your-Own Container POLICY

In UiTM Sarawak, Bring Your Own Container (BYOC) is part of the waste reduction initiative to reduce the practice of single-use plastic and packaging. This is a significant step towards transitioning from single-use plastic to reusable plastic. In this response, UiTM aims to:

- 1 Encourage UiTM communities to bring and use reusable containers for takeouts.**
- 2 Impose a minimum charge of 50 cents for single-use plastics.**
- 3 Encourage the use of environmentally friendly food containers.**



Poster Of Bring-Your-Own-Container Policy In The Cafeteria

# DISSEMINATION of Environmental POLICY

UiTM has established, implemented, and maintained the processes needed to disseminate the information for internal communication in relevance to the environmental management system. This includes:

Internally communicate the relevant information to the environmental management system at various levels, including changes made to the system, using emails, circulars, posters, and webinars

UiTM Sarawak's Sustainable Campus Committee has created a website, aims at distributing information on the Sustainable Development Goals, as well as their policy commitments and efforts as shown in Figure 3.3

Ensure the communication processes enable the UiTM community to contribute to continual improvement



Dissemination of SDG Policy Through Website

## Relevancy To Current

# GLOBAL STATUS

## On The Environment

UiTM ensures the relevance of the initiative to the current global focus on the environment, considering the prevention and conservation method according to the ISO14001 Environmental Management System, the SDG and as a response to climate change. UiTM has already taken several actions, such as:

**1** Encourage the campus community to endeavour sustainability principles and best practices towards achieving excellence in sustainability

**2** Integrate green and sustainable elements by incorporating environmental knowledge into curriculum design

**3** Promote and demonstrate sustainability research

**4** Enhance opportunities for capacity building of students and professionals by incorporating best practices and a green lifestyle

**5** Empower the campus community to be sustainability leaders

## Other examples of the initiatives that UiTM Sarawak Campus has conducted are:

### Program to Reduce the Use of Plastic and Paper on Campus

A campaign to use own containers in retail spaces was introduced to reduce reliance on disposable plastics. Plastic and polystyrene beverage dispensers are also not used by vendors in retail spaces. For paper use, if there is a need to print, it should be printed front and back. Distribution of minutes of meeting and meeting calls are also made by emails. Letters and certificates are also provided in digital bumps to reduce paper usage except for

unavoidable instances. Staff are also not encouraged to print notes, tutorials and assignments to students; instead, they are provided in soft copies. The pandemic phase has also resulted in plastics and papers on campus being kept to a minimum as all lectures, assignments, tests and exams are conducted online.

# Generation Of Wastes

The average generation of wastes annually in UiTM Sarawak



**Scheduled Waste**  
**1.0 tonne /Per year**

**Non-Scheduled Waste**  
**92.0 tonne /Per year**



**Recyclable Waste**  
**1.5 tonne /Per year**



**Clinical Waste**  
**0.6 tonne /Per year**

Generation Of Wastes In UiTM Sarawak Types Of Wastes Quantity Of Wastes (Tonne/year)

The average water volume usage in UiTM Sarawak is 157.21 m<sup>3</sup>/person/year. The average electric usage in the campus is 3,472.71 kWh/person/year. The capacity of the wastewater treatment plant according to the location in UiTM Sarawak is shown in Table 1.3. The treatment plants use extended aeration system to treat the wastewater from the campus. During the peak hours, STP in Mukah Campus release 2176.3 m<sup>3</sup>/day of effluent during peak time, compare to 506 m<sup>3</sup>/day on a regular day.

Location	Capacity
Lecturer's Block Samarahan Campus	2000 PE
Kolej Seri Gading Samarahan Campus	2000 PE
Hi-Kleen Block H Samarahan Campus	600 PE
Hi-Kleen Block L Samarahan Campus	400 PE
Mukah Campus	2250 PE

Capacity Of Wastewater Treatment Plant  
In UiTM Sarawak

# Wastes Treatment and Disposal Methods

## Institutional waste

Majlis Perbandaran Kota Samarahan (MPKS) and Majlis Daerah Dalat dan Mukah (MDDM) collect institutional garbage three times per week. There are 144 collecting storages in the Samarahan, Samarahan 2 and Mukah campuses combined. Institutional waste composed of paper, plastics, packaging, cardboard and woods from the operations in the classroom and office. Recyclable items are segregated at source into different bins before being collected by recycling company. Non-recyclable waste is sent to the disposal site managed by MPKS and MDDM respectively.



*Recycling Bins In The Campus*

### Organic waste

Food waste accounts for 50% of all trash in the campus. Organic waste from food and agricultural waste are the most significant components of solid waste. Agricultural waste from landscaping activities, such as twigs and leaves, are sent to the Samarahan Campus Farm Management Unit to be collected and composted and recycled to cultivate the crops around the campus. Meanwhile, Mukah Campus Aqua and Agrotech Centre produces organic

fertilisers where chicken manure is dried and mixed, and these are used for crops and plants on campus. The researchers from UiTM Sarawak Campus have also collaborated with the local authority such as North Kuching City Hall (DBKU) in a project to produce compost from green waste.

### Inorganic solid waste

The waste from renovation activities, construction, building maintenance, students' workshops, and research cannot be simply composted. Therefore, the composition of inorganic solid waste, including glass, aluminum, iron, concrete, and wood, is collected, and picked up by the assigned contractor. UiTM Sarawak also resells used computers with expired rental periods by vendors to its staff at low prices. It is one of the efforts to reduce electronic waste disposal and promote the concept of waste reuse. The Infostructure Division also collects used electronic equipment such as computers, cables and printers that are no longer functioning for disposal and returns them to the vendors as shown in Figure 1.4.



*Collection Of Electronic Waste*

## Scheduled waste

Scheduled waste disposal is handled by a contractor registered with the Department of the Environment. The contractor will identify the scheduled waste code following the First Schedule of the Environmental Quality (Scheduled Waste) Regulations 2005. Scheduled waste is stored in durable and suitable containers and can prevent any spillage or leakage that could harm the environment. Science Officers and Laboratory Assistants have also attended courses related to scheduled waste management to ensure the handling of scheduled waste under established procedures. The collection is made three times a week. In the case of clinical trash, Trienekens collects it once every six months from the health care facilities in the campus.



*Scheduled Waste Collection And Disposal*

## Wastewater

The sewage treatment plant at UiTM Sarawak Campus uses the extended aeration method as shown in Figure 1.6. The Facility Unit constantly monitors the quality of wastewater that has been treated from the sewage plant, according to the scheduled period. In addition, three types of research were also conducted at UiTM Sarawak Campus to determine the achievements in the processes and designs of the existing sewage plants. Biological treatments using bacteria are also being studied to improve the existing processes. The research

results found that the treated water from the Environmental Quality (Sewage) Regulations 2009 before being discharged to nearby water sources. Hence, the researchers have also developed a manual on the standard operating processes and procedures of sewage treatment plants at UiTM Sarawak Campus.



*Sewage Treatment Plant*



# Strategies & Planning

To achieve the intended outcomes, as well as enhancing the environmental performance, UiTM has established, implemented, maintained, and continually improved an environmental management system, consisting of the processes needed and their interactions, according to the ISO14001 Environmental Management System of SDG. The list of strategies and planning is in accordance with the environmental policy of UiTM.

Categories	Strategies	Actions
<b>Energy</b>	Energy-efficient appliances for a change	To replace fluorescent bulbs to LED for buildings and streets. To replace the split unit air conditioner with inverter types. To replace the existing chiller with a variable speed drive (VSD) system.
	Energy policy to be used as a guideline	To ensure all UiTM campuses apply the energy policy as a guideline for energy usage.
	Renewable energy to be installed in the campus	To install more renewable energy sources such as solar photovoltaic (PV).
	Smart building implementation Energy management	To install sensors such as photocell sensors. To increase the number of certified energy managers.
<b>Water</b>	Campaign, promotion and education	Introduction of environmental-related subjects for the students in increasing their understanding about protecting nature.
	Water-saving and conservation	Installation of rainwater harvesting system at a suitable location, including buildings and open spaces within the campus.
	Water-efficient appliances usage	Installation of water-efficient appliances such as washing taps and toilet flushing.
	Water recycling program Pipeline replacement	Encouragement of more water recycling programs Improvement of water distribution in UiTM.
<b>Waste</b>	Educate, train, and provide information and instructions in promoting a recycling culture in the campus community	Recycling programmes for university waste. Separation of waste at source programmes. Bring Your Own Container (BYOC) programmes.
	Introduce appropriate and systematic waste management efforts in ensuring the cleanliness and well-being of UiTM	Programmes held to reduce the use of papers and plastics on campus.
	Compost green waste	Organising a composting centre for the green waste. Providing an efficient waste management system.
	Provide adequate human, financial and time resources in ensuring the effectiveness and sustainability of the waste management policy	To install sensors such as photocell sensors.
	Set up collection centres for different waste categories such as toxic waste.	Setting up a waste recycling centre. Setting up a centre for the treatment of organic and inorganic wastes

## Categories

## Strategies

## Actions

### Greenery and water bodies

Develop a green campus setting and infrastructure master plan

Incorporate the requirement for green or vegetation areas in the new development

Conducting tree tagging awareness activities.

Conducting tree replanting programs.

All new development must take into consideration the green environment by maintaining the green areas or vegetation areas of about 10% of the total new development area.

*Strategies And Planning In Accordance To The Environmental Policy*



# ENVIRONMENTAL MANAGEMENT PLAN

## Environmental Aspects

According to ISO 14001, an environmental aspect is an element of activities, products, or services of an organisation that has or may have an impact on the environment. Based on attributed environmental consequences, the organisation's significant environmental aspects are defined according to working areas and work activities. The indicated activities should interact with the environment and, if not effectively controlled, will have negative implications and consequences. Table 3.1 shows the list of environmental aspects according to working areas and related activities. The environmental aspects are identified based on walk-through surveys and interviews with key persons. Since UiTMCS has various services and work activities, the environmental aspects are organised according to working areas.

Office operations, as well as teaching and learning activities, are the main fundamental activities of UiTMCS. These working areas are the largest consumer of electricity. Hence, Facility Management Unit always ensures that the environment of UiTMCS is safe and well-maintained by performing routine maintenance and cleaning services. Regular mending activities that generate construction trash such as cement, glass, and bricks are uncommon. However, the cleaning activities that take place use a substantial amount of detergent and sanitisers to combat the microorganism and pathogen within some areas

of the campus. To add, Facility Management Unit is also in charge of landscaping work such as lawn maintenance and trimming which may lead to green waste. The Agriculture Unit on the other hand, grows a range of crops and carries out agriculture and aquaculture operations like hydroponics and fish farming. Apart from that, each campus of UiTMCS has a clinic that provides health services to students and staff. The clinic acts as the sole source of collecting clinical waste including biological specimens such as blood samples, human tissues and physical hazards such as used syringes and needles.

Presently, UiTMCS offers many science and technology courses which require laboratory experiments in their curriculum. These activities usually generate a moderate amount of chemical waste, the most of which is in low concentration. For the computer and engineering laboratories, the types of waste produced are mostly on materials and electronic parts. Paints, solvents, and art materials such as cardboards, papers, and crafts are commonly utilised in fine arts and architecture work studios. Institutional wastes such as papers and plastic packaging usually come from a variety of sources, including the office, hostels and classrooms. The canteen and dining halls are primarily responsible for the production of food and organic wastes. This source also has the potential for releasing grease and oil to the nearby drain and causing water pollution.

# Potential Environmental Impacts

Working Areas and Associated Environmental Aspects	Natural Resources Depletion	Waste Disposal	Water Pollution	Air Pollution	Noise and Vibration	Land Pollution
<b>Office Operation</b>						
Consumption of electricity	X			X	X	
Usage of paper and stationery	X	X				X
Usage of electronic devices such as printers and photocopiers	X	X		X	X	X
Disposal of institutional waste		X				X
Disposal of electronic waste		X				X
Discharge of wastewater			X			X
<b>Teaching and Research Laboratory</b>						
Usage of chemicals		X	X			X
Consumption of electricity	X			X	X	
Disposal of scheduled waste		X	X			X
Disposal of biological waste		X	X			X
Potential spillage of chemicals		X	X	X		X
<b>Classroom and Lecture Hall</b>						
Consumption of electricity	X			X	X	
Usage of electronic devices such as computers and projectors				X	X	
Disposal of institutional waste		X	X			X
Discharge of wastewater		X	X			
<b>Landscaping</b>						
Application of pesticides	X	X	X	X		X
Application of fertilisers		X	X	X		X
Earthworks	X					X
Disposal of green waste						X
Usage of hand tools and machinery					X	
<b>Transportation</b>						
Mobility of staff's vehicles				X	X	
Mobility of shuttle bus				X	X	
Potential of fuel spillage				X	X	X
<b>Maintenance and Cleaning Work</b>						
Pavement and roofing	X				X	X
Usage of detergents and sanitisers	X			X	X	X
Painting work		X			X	X
Disposal of construction waste				X		X
Usage of hand tools and machinery						X
<b>Health Care Facilities</b>						
Disposal of clinical waste		X	X		X	
Consumption of electricity	X			X		
Discharge of wastewater		X	X		X	
Disposal of biological waste		X			X	
Usage of medicines	X	X			X	

Working Areas and Associated Environmental Aspects	Natural Resources Depletion	Waste Disposal	Water Pollution	Air Pollution	Noise and Vibration	Land Pollution
<b>Cafeteria and Dining Hall</b>						
Usage of food ingredients	X	X	X			
Disposal of institutional waste	X	X				X
Consumption of electricity	X			X	X	
Disposal of organic waste		X	X			X
Discharge of wastewater		X	X			X
Disposal of oil and grease		X	X			X
<b>Fine Art and Architecture Studio</b>						
Usage of paint and water colours		X				X
Disposal of solvent		X	X			X
Potential spillage of paint and water colours		X	X			
Consumption of electricity	X			X	X	
Usage of brush and art materials		X		X		
Usage of hand tools and machinery					X	
<b>Computer Laboratory</b>						
Consumption of electricity	X			X	X	
Disposal of electronic waste		X				
Disposal of institutional waste		X				
<b>Agricultural Activity</b>						
Application of fertilisers		X	X	X		X
Application of pesticides	X	X	X			X
Disposal of green waste		X	X		X	X

*Table 3.2 Potential Environmental Impacts*

# Environmental Impacts

The environmental aspects are mapped with the matrix of potential environmental impacts such as depletion of natural resources, waste disposal, water pollution, air pollution, noise and vibration and land depletion. The majority of working areas, particularly the office, classroom, and laboratory, use a lot of electricity and water. The potential environmental impacts from office and classroom activities are air pollution which is due to carbon dioxide (CO<sub>2</sub>) emission from electrical consumption and



discharge of grey and black water. The CO<sub>2</sub> emission is one of the greenhouse gases (GHG) which contributes to global warming. Due to the current pandemic condition, the use of printers and photocopiers is minimised. In fact, the management has made an effort to mandate double-sided printing and electronic distribution of meeting minutes and other papers. Online distance learning (ODL) practice has resulted in the significant reduction in the usage of papers in which assignments, tests and examinations are conducted and submitted electronically.

In terms of transportation, the mobility of staff's vehicles and UiTMCS-owned vehicles such as the shuttle bus and van has contributed to gaseous emissions such as carbon monoxide (CO), sulphur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) and also in releasing particulate matter (PM). The highest percentage of vehicles in UiTMCS is passenger cars, followed by motorcycles and buses. No public buses are allowed on campus, except for the registered vehicles. The friction and movement of the vehicles on the road can also produce noise and vibration. Furthermore, the continuous noise produced by the machineries and cooling tower at the chiller room can lead to noise pollution, yet no one works in the area except for routine maintenance. Agricultural and landscaping activities, such as pesticides and fertiliser spray, can contribute to not only air pollution but also water pollution through surface runoff, particularly during rainy seasons. Painting activities in fine arts and architecture studios may release volatile organic compounds (VOCs) and fumes which are harmful to health.

Depletion of natural resources occurs when the renewable and non-renewable resources become scarce. The natural resources are consumed by several activities including food preparation, electrical usage, usage of paper and stationery and application of pesticides. Land depletion can result from the disposal of any sort of trash, including institutional waste, effluent, planned waste, and electronic waste if they are not properly managed. Organic waste disposal from the canteen and dining hall can cause an odour problem which can attract rodents, pests and flies. Leachate from waste disposal can pollute the water because it contains high organic matters, heavy metals and dyes. Scheduled waste largely comes from the chemicals used during the teaching and research activities, clinical waste from the health care facilities and biological specimens from laboratory experiments.



# ENVIRONMENTAL QUALITY STANDARDS

UiTMCS has obligations to adhere to the regulations in relation to environmental aspects. These compliance obligations are taken into account when establishing, implementing, maintaining and continually improving its environmental management system. The environmental quality standards are important to set the concentration thresholds of the pollutants in order to preserve the environment. Environmental Quality Act 1974 is the legislation related to the prevention, abatement, control of pollution and enhancement of the environment in Malaysia. The regulations and orders adhered by the organisation are listed in Table 4.1.

## SCHEDULED WASTE

- Environmental Quality (Scheduled Wastes) Regulations 2005
- Occupational Safety and Health (Use and Standard of Exposure Chemical Hazardous to Health) Regulations 2000

## DOMESTIC WASTE

- Local Authority (Cleanliness) By-Laws 1999
- Local Government Act 1974

## AIR POLLUTION

- Environmental Quality (Clean Air) Regulations 1978

## WATER POLLUTION

- Environmental Quality (Sewage) Regulations 2009
- Environmental Quality Act 1974
- Street, Drainage and Building Act 1974
- Natural Resources and Environmental Ordinance 1994
- Local Government Act 1976

## LAND POLLUTION

- Natural Resources and Environmental Ordinance 1994
- Local Government Act 1976

## NOISE POLLUTION

- Occupational Safety and Health (Noise Exposure) Regulations 2019
- The Planning Guidelines for Environmental Noise Limits and Control 2007

*Table 4.1 List Of Regulations And Orders Related To Environmental Aspects*

UiTMCS is committed to preserve the environment by regularly monitoring the environment, such as effluent discharge from sewage treatment facilities, and to ensure compliance with Malaysian Standard B Environmental Quality (Sewage) Regulations 2009. Sarawak has exclusive jurisdiction for preserving the environment called Natural Resources and Environmental Ordinance 1994.



# ASPECTS PRIORITISATION

The Risk Priority Number (RPN) for each aspect description is determined by the following formula based on EMS ISO 14001. The impact ranking is important in determining the significant environmental impacts and in prioritising the mitigation measures. The rating description for aspects of prioritisation is shown in Table 4.2

**Risk priority number (RPN) = Severity x Magnitude x Occurrence x Control**

Rating	Severity	Severity	Occurrence	Control
1	Insignificant, easily correctable	Minimal quantity	Annually/ seldom	Effective automatic control
2	Mild – small potential of harm	Small quantity	Quarterly	Effective documented procedures
3	Moderate – somewhat harmful	Medium quantity	Monthly	Documented procedures established
4	Serious – significant damages	Large quantity	Weekly to daily	Verbal procedures
5	Severe – Immediate threat, huge damages	Very large quantity	Continuous	No control





Table 4.3 shows the RPN results for environmental aspects identified in UiTMCS. The RPN is ranked from the largest to the smallest value to depict the highest to the lowest risk of aspect description to the environmental repercussions. The highest RPN is 150, which refers to the energy consumption that is used by most of the activities or operations in the university. Carbon emission and climate change are environmental issues directly tied to energy production and consumption. To mitigate the impact, UiTMCS has an energy management policy that focuses on improving the efficiency of the electrical appliances and lowering energy use.

Chemical waste is generated during teaching and learning, as well as research works. The severity of chemical waste exposure is determined by the length and dose or concentration of the exposure. The occupational safety and health committee (JKKP) of UiTM Sarawak has conducted hazards identification, risk assessment and risk control (HIRARC) at the chemical laboratory for determining the risk posed by the usage of chemicals. The magnitude of the chemical waste is in the medium quantity and the disposal is managed by a competent staff. Institutional waste is generated mostly as a result of daily operations, but the severity is minimal because it is carefully managed.

Aspect Description	Aspect Category	Severity	Magnitude	Occurrence	Control	RPN
Energy Consumption	Air Emission	3	5	5	2	150
Chemical Waste	Scheduled Waste	5	3	3	3	135
Institutional Waste	Solid Waste	2	4	5	3	120
Pesticide	Scheduled Waste	4	3	4	2	96
Wastewater	Liquid Waste	3	5	5	1	75
Clinical Waste	Scheduled Waste	4	3	3	3	72
Ambient Noise	Noise And Vibration	1	3	5	4	60
Green Waste	Solid Waste	2	3	5	2	60
Oil And Grease	Water Pollution	2	3	5	2	60
Food Ingredients	Material Use	1	5	4	3	60
Biological Waste	Scheduled Waste	3	2	3	3	54
Organic Waste	Solid Waste	2	3	3	3	54
Medicines	Material Use	2	3	3	3	54
Exhaust Gas And Particles	Air Emission	2	2	4	3	48
Diesel And Gasoline	Air Emission	2	2	4	3	48
Used Lubricants	Water Pollution	2	2	4	3	48
Paper And Stationery	Material Use	1	3	4	3	36
Hand Tools And Machinery	Noise And Vibration	3	3	3	1	27
Paint And Water Colour	Liquid Waste	3	2	1	3	18
Dust	Air Emission	2	2	1	3	12
Chemical Spillage	Unplanned Release	5	1	1	2	10
Electronic Waste	Solid Waste	5	1	1	2	10
Fuel Spillage	Unplanned Release	1	1	1	3	3

Table 4.3 Risk Priority Number For Each Environmental Aspect



# ENVIRONMENTAL OBJECTIVES & TARGETS

UiTMCS has set a number of environmental goals and targets to improve the organisation's environmental performance and support the university's environmental sustainability agenda. The priority of environmental aspects highlighted on campus are given special attention. Table 4.4 summarizes the environmental objectives and its respective targets.

01

## To Reduce Energy Usage And Carbon Footprint

- 10% reduction in building energy use of by 2025 from baseline year 2025
- 5% increase the use of renewable energy sources by 2025
- Replace 10% energy efficient devices by 2024

02

## To Reduce Waste Generation And Waste Disposal To The Landfill

- Recycle 25% of the institutional waste by 2023
- Compost 20% of organic waste generated from the canteen and dining hall by 2023
- Implementation of Bring-Your-Own-Container (BYOC) Policy by 2023

03

## To Improve Staff Awareness On Environmental Issues

- Organize yearly awareness talk to the staff
- Provide hands-on training on the composting method to the staff in 2022
- Empower sustainable research and innovation

04

## To Improve Compliance With Wastewater Discharge Limits

- Recycle 80% of used cooking oil from canteen and dining hall by 2023
- Install oil and grease trap in the canteen and dining hall by 2023

05

## To Increase Efficient Use Of Water

- Use rainwater harvesting method for watering plant in 2022.
- Reduce water consumption by installing flowmeter in 2022.

06

## To Increase Planted Vegetation Area In Campus

- Plant more vegetation and ornamental plants in the campus area by 2023
- Green space preservation



Table 4.4 Environmental Objectives And Targets

# Environmental PROJECTS & PROGRAMMES

UiTM Sarawak executes a number of environmental projects and programmes to implement the policy frameworks, promote environmental consciousness and present an opportunity in contributing to low environmental impacts. The lists of the environmental projects and programmes that have been implemented in recent years are presented in Table 4.5.

## Energy Conservation



### Energy Management Policy

Facility Management Unit

To reduce the use of electric consumption in the operation

### Energy Efficient Street Lamp

Facility Management Unit

To use the electricity efficiently for lighting the street

### Green Design

Facility Management Unit

To increase the use of natural lighting and ventilation in some of the buildings

### Traffic Blanker Light

Facility Management Unit

To use renewable energy for giving signal at the junction

### Industrialized Building System (IBS)

Facility Management Unit

Use of Industrialized Building System (IBS) in the building of hostel

## Waste Management

### Recycle Center

Facility Management Unit

To collect recyclable items from institutional waste and reduce the volume of waste send to landfill

### Green waste composting

Facility Management Unit & Farm Management Unit

To compost landscape waste and use it as a fertilizer for vegetation

### Aftermath Thinker

Mohd Razif Mohd Rathi  
Clement Anak Jimel  
Zaidi bin Wasli

Exploring the culture of recycling through art appreciation

### Bring-Your-Own Container Policy

Facility Management Unit

To avoid the use of plastic food container in the campus

### Chicken Dung Fertilizer

En. Muhamad Syukrie bin Hj. Abu Talip En. Muhamad Nasarudin bin Sulaiman En. Mohamad Indera Indi

To produce organic fertilizer from chicken dung produced in the poultry breeding project

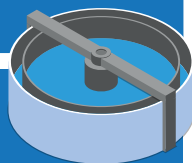
Table 4.5 Implementation Of Environmental Projects And Programmes In Uitm Sarawak Branch

# Water Management

## Water Conservation

Facility Management Unit

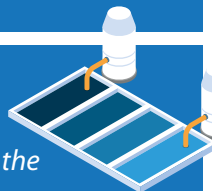
To conserve biotic and abiotic species in the artificial pond



## Rainwater Harvesting

Facility Management Unit

To collect rainwater from rooftops and use it for watering farms.



## Water Recycles

Facility Management Unit

Use of rainwater for artificial pond in the student lounge

## Drinking Water Treatment Project

Assoc. Prof. Dr. Juferi Idris

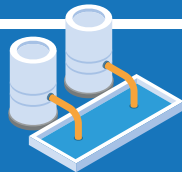
To treat pond water using portable and lowcost water treatment system to meet the drinking water quality standard.

Project Value  
**RM 10k**

## Dual Flush Toilet

Facility Management Unit

To save the use of water for flushing



## Gotong-royong Perdana

Kelab Kakitangan UiTM Sarawak

To encourage all employees and students to take responsibility for keeping the campus clean

## Efficient Energy Consumption Signage

Facility Management Unit

To educate the consumer to use energy wisely.

## Udang Galah Breeding Webinar

Yahutazi Chik

To teach technique on udang galah breeding to the community.

## Recycle Innovation Competition

Ts. Nurzawani Md Sofwan

To encourage students to produce innovative product from recycle items.

Project Value  
**RM 500**

# Plant, Animal & Food Resources Conservation

## Affordable Automated Smart Agriculture System (AASAS)

Assoc. Prof. Dr Hasmah Mohidin  
Mohd Yazid Mohd Anas Khan

To develop smart farming fertigation system based on internet-of-things (IoT).

## Herbarium

Yahutazi Chik

To preserve plant specimens and associated data used for scientific study.

## Insectarium

Yahutazi Chik

To preserve insect specimens and associated data used for scientific study

## Poultry Breeding

En. Muhamad Syukrie bin Hj. Abu Talip  
En. Muhamad Nasarudin bin Sulaiman  
En. Mohamad Indera Indi

To breed poultry for generating income, research purpose and produce organic fertilizer from chicken dung.

Project Value  
**RM 4,810**

## Salad And Herbs Garden

Farm Management Unit

Breeding salad, herbs and ornamental plants

## Bamboo Garden

Farm Management Unit

As a bank genetic for variety species of indigenous bamboo in Borneo Island.

## Farming Fertigation

En. Muhamad Syukrie bin Hj. Abu Talip  
Dr. Iskanda Openg

To grow higher yield of chillies and watermelons through a frequent supply of nutrients.

## Tilapia Fish Breeding

Aqua and Agrotech Center UiTM Mukah

To improve fish growth and production of tilapia.

# Education and Awareness

# ENVIRONMENTAL PROGRAM, MONITORING, IMPLEMENTATION & PERFORMANCE APPRAISAL

UiTM Sarawak has implemented several programmes related to environmental initiatives and SDG. The programme has direct contribution to the campus overall key performance indicators. The commencement of these projects was substantial in ensuring continuous quality improvement for the campus.



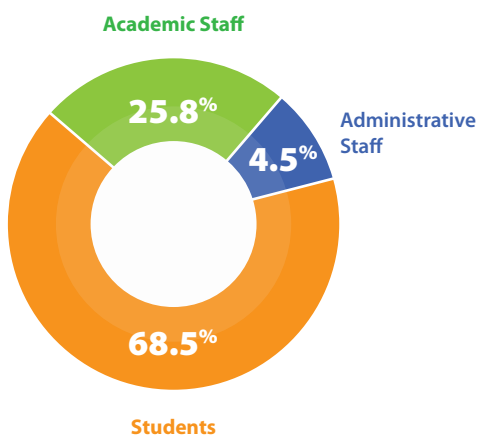
# Green Initiatives Survey

**A** Green Campus is a campus where environmentally friendly actions and education work together to promote sustainable and eco-friendly activities. The green campus idea allows campuses to take the lead in reinventing its environmental environmental culture and forging new standards by finding sustainable solutions to the world's

environmental, social, and economic requirements. In advancing towards achieving the 17 Sustainable Development Goals by 2030, UiTM Sarawak has been pro-actively seeking input to improve its sustainable development practices on campus. One of the recent efforts includes conducting a Sustainable Campus Survey in April 2022. The survey assesses the respondents' enthusiasm, knowledge, and views to prioritise the campus sustainability activities in four areas; namely energy management, waste and water management, sustainable transportation, and greening initiatives. The respondents' profiles are tabulated in Table 5.1.

## Demographic Profile of Respondents

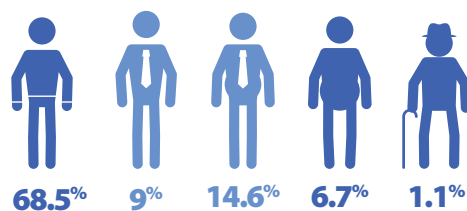
### 1 Category



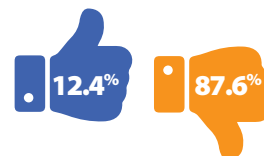
### 2 Gender



### 3 Age group



### 4 Level of awareness on SDGs 2030



### 5 Is our campus a sustainable campus?



Table 5.1 Demographic Profile Of Respondents

The survey has received 80 responses. Of the 89 people who took part in the survey, 69.7 percent were students, 25.8 percent were academics, and 4.5 percent were members of the administrative staff. Sixty-eight percent of the survey's participants are women, and most of them are between the ages of 18 and 25. The survey results show

that 87.6 percent of those surveyed are aware of the Sustainable Development Goals for the year 2030. In addition, 92.2 percent of respondents felt that UiTM Sarawak is a sustainable campus, indicating a good attitude towards making the campus sustainable

## Energy Management

As part of the energy management efforts, there are a total of 7 proposed initiatives (Table 5.2) that can be implemented on campus. The initiatives that are recommended include installing solar lights and converting one existing building into a green building in which received the greatest amount of support, with 85.4 percent of the respondents supporting the adoption of both for improved energy management (Figure 5.2). The questions for energy management initiatives are as listed in the Table 5.2 below.

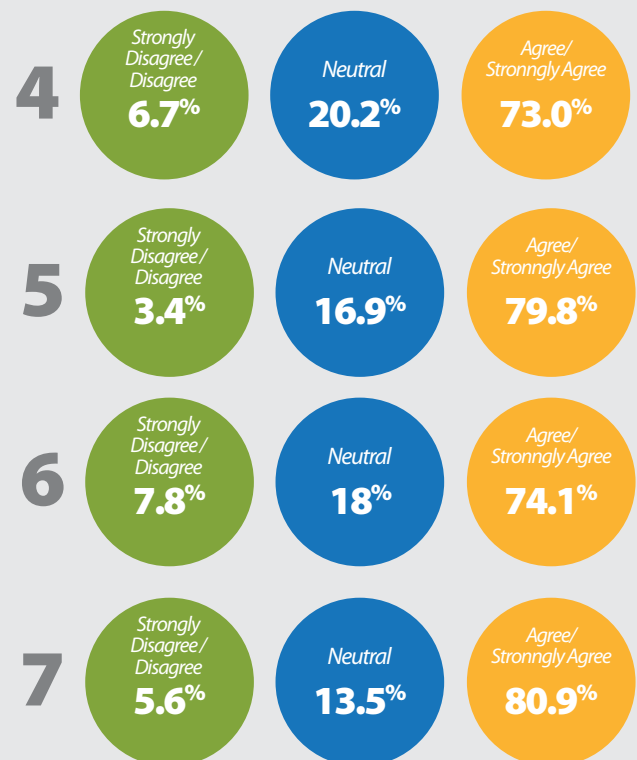
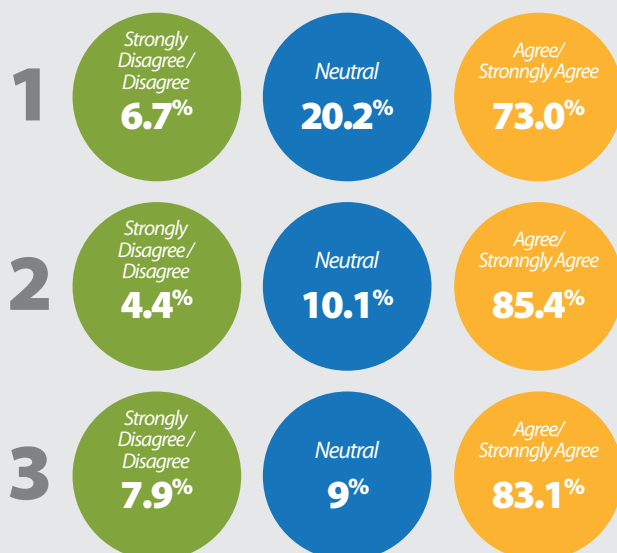


Figure 5.2 Proposed initiatives on energy management

- 1 Installation of LED lighting
- 2 Installation of solar street lights
- 3 Installation of solar motion sensor lighting at the walkways
- 4 Conversion of one existing building into green building
- 5 Use of passive cooling system in the campus building
- 6 Mounting solar panels on the parking roofs
- 7 Build an open or outdoor gym

Table 5.2 List of questions on energy management

# Waste and Water Management

A total of eight questions as listed in Table 5.3 giving recommendations for waste and water management. Five of the eight proposed initiatives received scores of more than 85 percent, indicating high support for their implementation on campus as shown in Figure 5.3 . These initiatives include the collection of recyclable materials and electronic waste (85.4%), rainwater harvesting for watering plants and washing vehicles (87.6%), using a dual flush system at the toilet (86.5%), composting food waste from cafeterias and dining halls (85.4%) and safe disposal of chemical waste from laboratory (85.7%). Energy management, as well as waste and water management, are components of SDG 12, which promote responsible consumption and focus primarily on water, energy, and food.

● Strongly Disagree/Disagree ● Neutral ● Agree/Strongly Agree

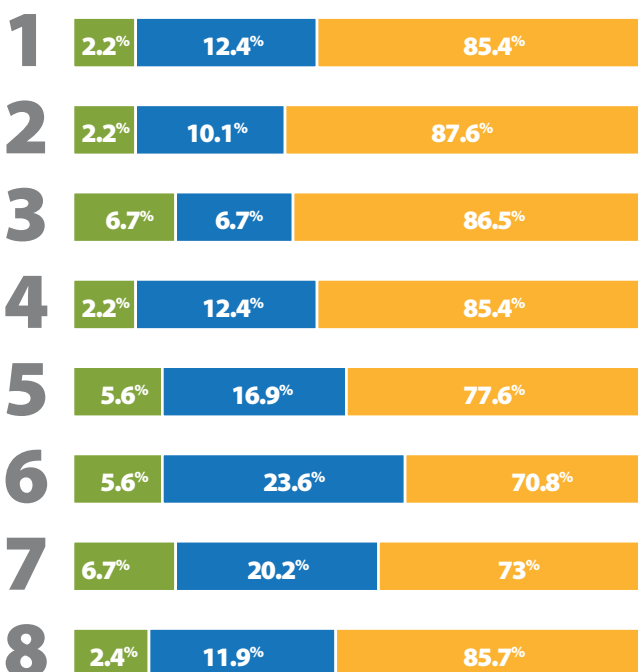


Figure 5.3 Proposed Initiatives For Water And Waste Management

- 1 Collection of recyclable materials and electronic waste
- 2 Rainwater harvesting for watering plants and washing vehicles
- 3 Using a dual flush system at the toilet
- 4 Composting food waste from cafeterias and dining halls
- 5 Cafeteria operators are encouraged to use the e-wallet method
- 6 Bring Your Own Container (BYOC) Policy
- 7 Collection of used cooking oil from cafeterias and dining halls
- 8 Safe disposal of chemical waste from laboratory

Table 5.3 List of questions on waste and water management

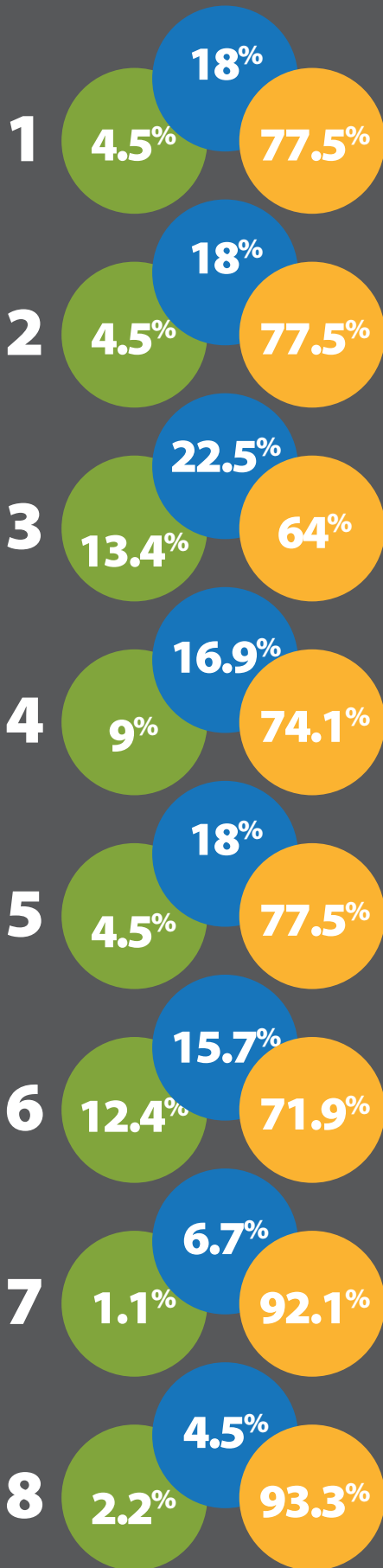


## Sustainable Transportation

Another effort that reflects SDG 13 on climate action is sustainable transportation. UiTM Sarawak has offered eight initiatives as listed in Table 5.4 that may be adopted. According to Figure 5.4, respondents selected initiative number seven on campus shuttle bus service (92.1%) and initiative number nine on linked pedestrian walk (93.3%) for sustainable mobility on campus. With the effort to implement both solutions on campus, it is hoped that it would assist to accomplish one of the SDG 13 objectives, namely mitigating climate change and decreasing the effects of climate change.



● Strongly Disagree/Disagree ● Neutral ● Agree/Strongly Agree



- 1** Creating low emission zones (LEZ) in the campus
- 2** Monthly bicycle rental program for students
- 3** Auxiliary police use electric scooters to patrol the campus
- 4** Plate recognition system to trace the vehicles entering campus
- 5** Create bike-friendly spaces in the campus
- 6** Organizing car-free day each month
- 7** Campus shuttle bus service
- 8** Connected pedestrian walks

Table 5.4 List of questions on sustainable transportation



Figure 5.4 Proposed Initiatives For Sustainable Transportation

## Greening Initiatives

With regards to the greening initiatives proposed in the survey, there are five initiatives proposed in the survey (Table 5.5). The survey result (Figure 5.5) shows that, initiative number 4 that is planting more shade trees in the campus is the most preferred greening initiative with 94.4 percent of the respondents choosing this initiative. The Greening initiatives is part of the campus effort towards reducing the impact of climate change.

● Strongly Disagree/Disagree ● Neutral ● Agree/Strongly Agree

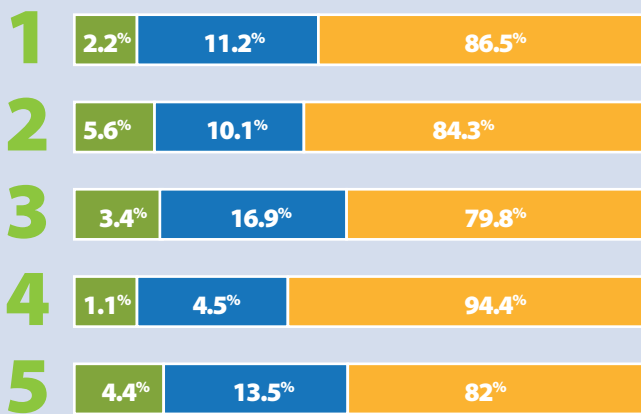


Figure 5.5 Proposed Greening Initiatives

- 1 Grow herb garden in the campus.
- 2 Construct garden green roof walkways
- 3 Supply campus-grown vegetables to the cafeterias and dining hall
- 4 Planting more shade trees in the campus.
- 5 Create outdoor learning spaces

Table 5.5 List of Greening Initiatives

In conclusion, the survey itself incorporates the campus community in its critical choice in moving towards a sustainable campus, and this is the first essential step in instilling a good attitude towards any sustainable practices that can be adopted at UiTM Sarawak.



# Affordable Automated Smart Agriculture System (AASAS)

AASAS is the acronym for Affordable Automated Smart Agriculture System, developed by the IoT committee of the Natural Product Research and Development Center UiTM Sarawak Campus. The system is responsible for the maintenance, monitoring, and performing corrective measures towards the condition of the soil. This technology is built upon the foundation of the Internet-of-Things, to be in line with the Sarawak state government's vision of digitalising modern farming technology.

The project is headed by the IoT steering committee of the Natural Product Research and Development Center (NPRDC) UiTM Sarawak Campus. The person who is responsible for this project is an Electrical Engineering lecturer, En. Mohd Yazid Bin Mohd Anas Khan. The project came into reality after the idea of having a smart monitoring system to be deployed at the pineapple crop areas was discussed among the NPRDC members.

AASAS has been developed to further strengthen UiTM Sarawak's vision of becoming the go-to Center of Excellence for modern agriculture. Researchers from various disciplines have gathered and contributed to the development of AASAS, as one of UiTM Sarawak's in-house developed products. In comparison to some currently comparable products out there, AASAS is going to be in a league of its own due to the affordability and expandability of this system. AASAS is essentially a direct competitor to the existing

established system by the company named Wondernica, originating from Penang. The name of the system is Agromon which stands for Agro-Monitoring. Nevertheless, Agromon costs more, 3-4 folds in comparison to AASAS which would not be suitable for the B40 agricultural practitioners. AASAS basically runs 24-hour on a 12V 5000mAH gel battery connected to a 10W solar panel. This will definitely save a considerable amount of mainline energy usage as compared to if they were connected to the grid considering as there are multiple AASAS nodes spread throughout the farm plot which will eventually accumulating to a large degree of power distribution.

Applications of IoT that are fully embedded with AI techniques and deep learning approaches, are developed through practical and innovative solutions to minimize climate change effects on agricultural practices through soil and crop nutrient content monitoring. Numerous innovation potentials in the form of sensors detecting different crops, with diverse crop nutritional conditions, could be developed to strengthen the agricultural practices. An integrated sensor that combines the detection of water scarcity and soil-crop nutrient status will ensure optimum productivity of agricultural produce, improve product quality, and protect the environment. Agricultural data repository resulting from the acquisition,

crops, with diverse crop nutritional conditions, could be developed to strengthen the agricultural practices. An integrated sensor that combines the detection of water scarcity and soil-crop nutrient status will ensure optimum productivity of agricultural produce, improve product quality, and protect the

environment. Agricultural data repository resulting from the acquisition, processing, storage, visualisation, and analysis of agricultural big data will become the main resource for developing fertiliser monitoring and fertiliser recommendation mobile apps as shown in Figure 5.5.

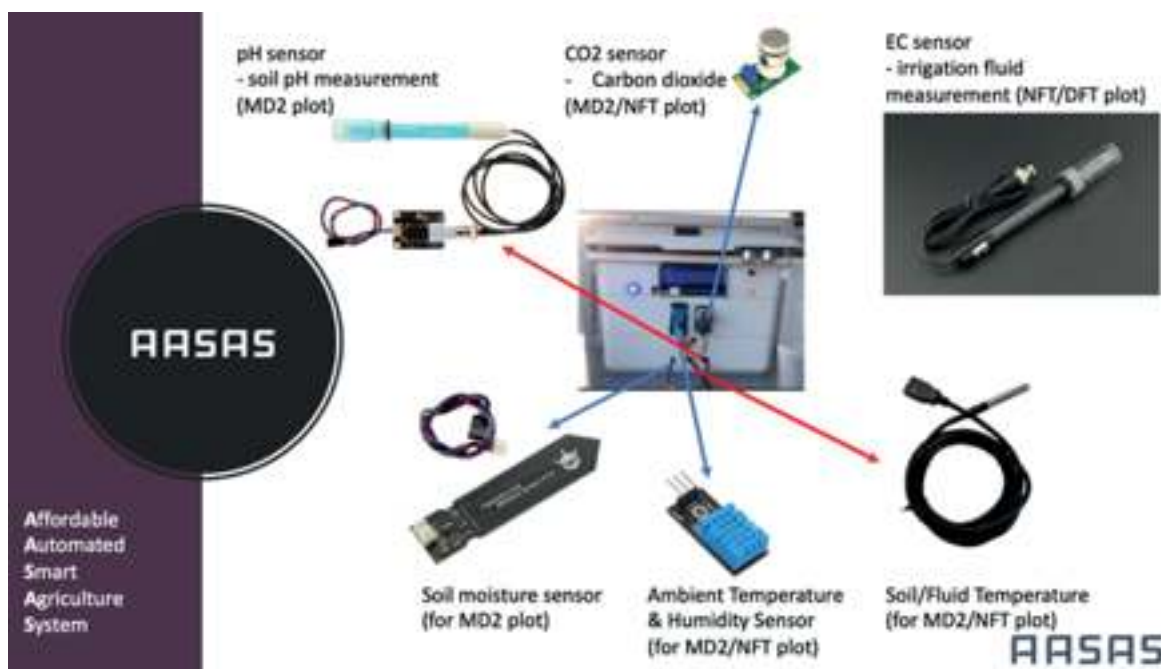


Figure 5.5 AASAS Detailed Input/output With 10 Watts Solar Panel

The system has been field-tested for various crop types available within the campus. Among them are the Chili/Ginger fertigation, Multitier fertigation, Nutrient Film Technique (NFT), Deep Flow Technique (DFT), Hydroponic and last but not least, the MD2 Pineapple plantation as depicted in Figure 5.6. With this system, the researchers and consumers will gain the ability to systematically monitor the crop growth via the collected data which are accessible through both smartphones and computers. Smart Agriculture management is of utmost importance in the modern agricultural practice to produce high-quality yields.

This system also allows involvement among students, graduates, and alumni who wish to pursue this particular field. Indirectly, they are giving back to the community. It is expected that this system will assist the community who are very much affected by the Covid-19 pandemic that has impacted most of their conventional farming practices. Therefore, there will be an increase in the level of sub-urban socio-economic development, especially in the B40 group of people whose lives are so much dependent on agriculture. Other than that,

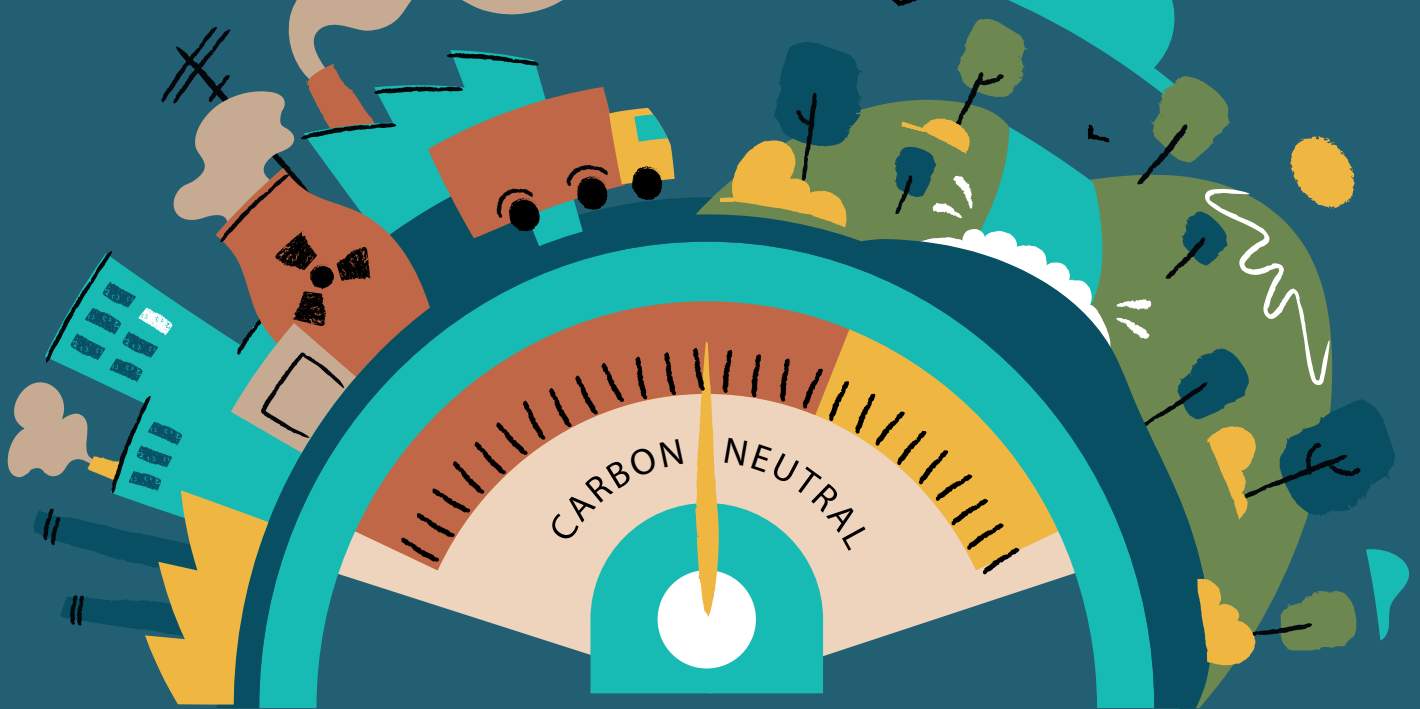


*Figure 5.6 Application Of AASAS For Monitoring Soil Nutrient In The MD2 Pineapple Plantation*

The other variation of AASAS that is also currently being developed for another specific purpose is given the name of AFS which stands for Automated Fertigation System. This system unlike AASAS is mainly dedicated to generate the required energy to operate a single unit 1hp (horse power) equivalent to 750W water pump for fertigation process. This can easily be achieved by having a 360W solar panel and a rated peak power output of 3000W inverter in the system. There are currently 2 units of AFS running in UiTM Sarawak. The usage of solar energy to operate the fertigation system contributes to the reduction of mainline electricity usage by UiTM Sarawak. The system operates by turning on the pump 3 times a day for the duration of 5 minutes at each activation. As the system keeps on running every day, the standalone power generation is a step forward in realising green technology in this practice (Figure 5.7).



*Figure 5.7 Variation of AASAS known As SSStormQMS For Stormwater Quality Monitoring*



# Carbon Footprint Monitoring

Carbon footprint is a measurement of environmental impact which measures the amount of greenhouse gas emissions from activities in UiTM Sarawak that involve the use of electricity as well as vehicle smoke emissions from motor vehicles. Carbon emissions were contributed by electricity consumption of 73.58%, followed by car smoke emissions

(13.64%), shuttle buses (9.38%) and motorcycles (3.40%) as shown in Figure 5.9. tons of carbon is emitted by one person in a year. Electricity consumption for UiTM Sarawak for the last 12 months from October 2020 to September 2021 was 7,980,081 kWh. The electricity consumption for recent year is shown in Figure 5.9.

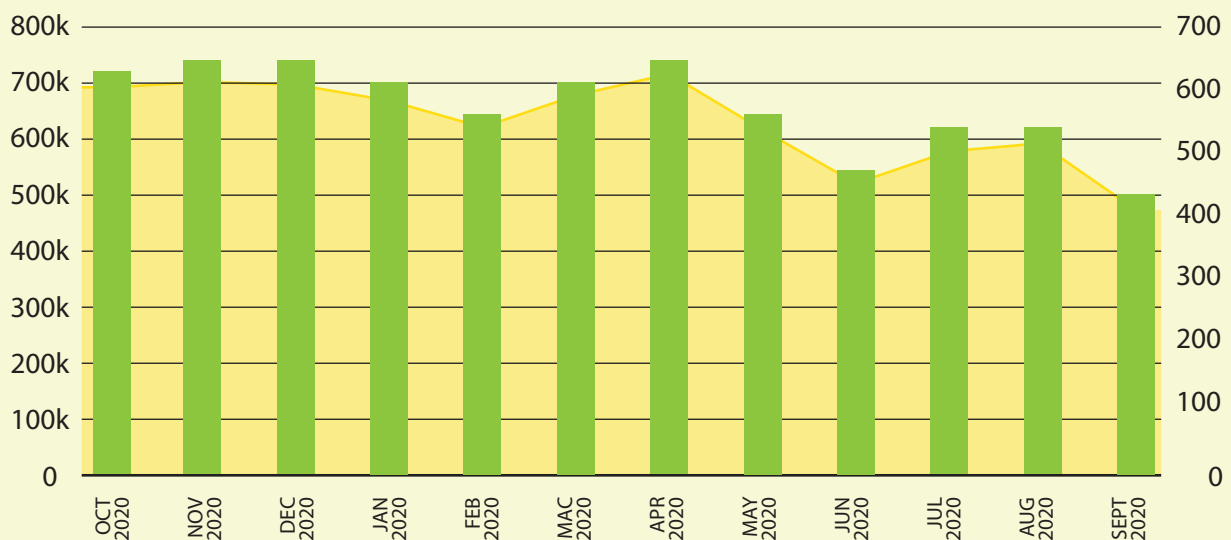
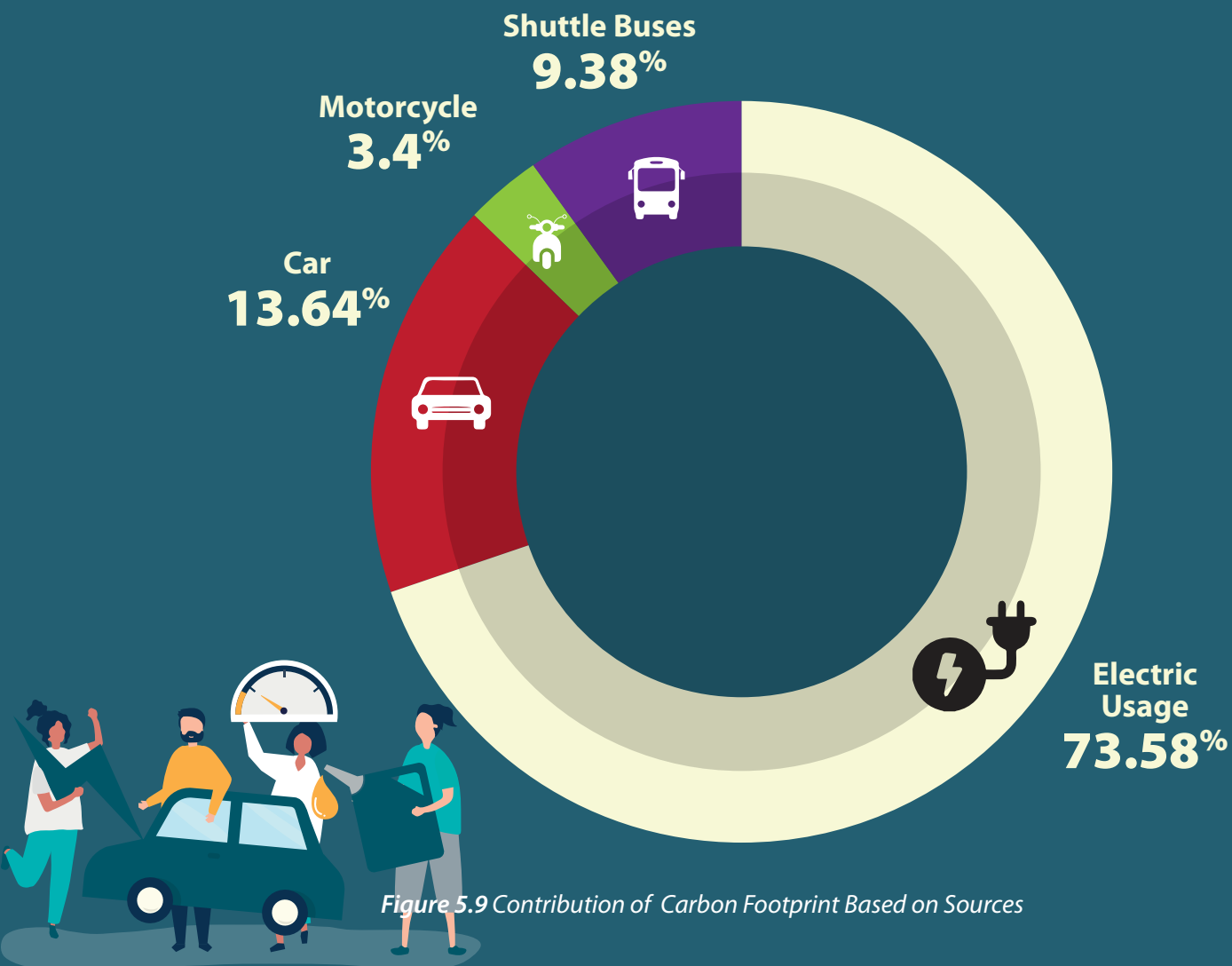


Figure 5.8 Electricity Consumption And Carbon Emission in UiTM Sarawak



**Based on the UiTM Sarawak Branch Electricity Saving Method Guidelines No. 03 of 2017, all UiTM Sarawak staff must comply with the electricity saving guidelines as follows:**

- Turn off air conditioners, lights or electrical appliances that are rarely used
- Only turn on the lights in areas where there are users, except for safety reasons
- Ensure the appropriate operating time of the lighting system during the day
- All offices are not allowed to operate after 6.00 pm unless approved by the Head of Division/Unit
- All central air conditioners must be switched off at 4.30 pm while for buildings or academic spaces it is switched off at 5.30 pm
- All air conditioners of the 'split unit' type must be turned off if leaving the office for more than 2 hours and turned off 30 minutes before the end of working hours
- All air conditioner temperatures are adjusted at 24-26°C

Apart from that, the Facilities Management Division has also shared several ways to save the electricity and to use electrical equipment efficiently for all the sources of electrical equipment. It aims to create awareness among UiTM Sarawak residents on saving electricity.

# Portable Water Treatment Plant Project

Construction of a conventional water treatment plant is costly and requires high maintenance; therefore, developing a portable and simple treated and water treatment for the community is crucial. The project aims to produce and provide an alternative portable treated water pond treatment plant, where the quality is as good as the conventional method. The project was led by Associate Professor Dr. Juferi Idris from the Chemical Engineering Department in UiTM Cawangan Sarawak. The pilot plant was built at a pond in

UiTM Cawangan Sarawak, Samarahan campus. The treatment plant consists of a coagulation tank, mixing chamber, two clarifier tanks, aeration tank, sand filter, activated carbon and chlorination treatment and this ran for 24 hours continuously. The three main parameters were monitored for 7 days, measuring the water pH, turbidity, and Chemical Oxygen Demand (COD). The pilot plant was successfully carried out with less cost involved, easy to assemble and dismantle, making it a portable simple water treatment.



*Figure 5.10 Water Treatment Pilot Plant At The Pond In Samarahan Campus*



*Figure 5.11 Water Quality Test In Laboratory*



# BIOLOGICAL TREATMENT FOR POLLUTED WATER

Water treatment is defined as any process that improves water quality to make it safer to be discharged back into the environment. One of the processes of water treatment is the coagulation process. Traditionally, chemical coagulation such as aluminium and iron coagulants are used in the water treatment process. The study was conducted by researchers from UiTM Sarawak, led by Dr. Rafidah Husen, who has identified a biological coagulation process using a low dosage of plant-based coagulant to remove high chemical oxygen demand (COD) and turbidity.

The research conducted used plant-based pineapple leaf coagulant to achieve high COD and turbidity removal. The coagulation was performed using a jar test experiment of pond water at different pH followed by different dosages of pineapple leaf coagulant. It was found that the final COD and turbidity values are lower compared with results from other studies that used high dosage coagulants. Moreover, the final pH, COD, turbidity, dissolved oxygen (DO), and total suspended solids (TSS) values of the treated pond water were below the standard limits set by the National Water Quality Standards for Malaysia (NWQSM) class IIB, which represents water bodies suitable for recreational use with body contact (DOE, 2016).

Therefore, it is expected that the newly-formulated waste utilisation of pineapple leaf coagulants can reduce the usage of chemical coagulants and can further be used for different types of water. The research was published in the *Journal of Asian Scientific Research*, indexed by Excellence in Research for Australia (ERA).

## Establishing MEMORANDUM of Understanding with Industry Expert

Another initiative by UiTM Sarawak is by inviting industry experts as research partners in water treatment. A Memorandum of Understanding (MOU) was signed between UiTM and GA Consortium Sdn. Bhd. Besides joint research on water treatment, the MOU also enables technical knowledge transfer from experts in GA Consortium Sdn. Bhd. to the students and staff of Diploma in Chemical Engineering.



*Figure 5.12 Signing MOU between UiTM Sarawak And GA Consortium Sdn. Bhd*



*Figure 5.13 Sharing Session from Expert in GA Consortium Sdn. Bhd*

# Research on SEWERAGE TREATMENT Plant

A sewerage treatment plant (STP) is a process of removing contaminants from wastewater through physical, chemical and biological processes to remove contaminants known as effluent. For the system to be effective, the system requires both oxygen and food for the bacteria and protozoa to consume in the biodegradable solution of organic contaminants and the binding of the much less soluble fractions into sludge where it settles to the bottom of the tank. The research was done to evaluate and identify the condition and problem of all STPs in UiTM Sarawak, to conduct research on STP with the best method and approach to produce a system to maintain industry standards, and to come out with a guideline for the operation of the STP. The research was completed, and the findings were published in three different publications, two



*Figure 5.14 Site Visit To Sewerage Treatment Plant At UiTM Sarawak*

indexed journals, specifically in the Journal of Asian Scientific Research and one in the International Journal of Environment and Waste Management indexed by Scopus.

## Establishing LOCAL FERTILIZER from Poultry Project

SDG 12 recognises that long-term development and economic growth depend on changing how we produce and consume goods. It demands more efficient and environmentally friendly management of materials across the lifecycle, through production, consumption, and disposal. The food supply chain is the pathway by which food moves from farms to our plates. Food is produced, stored, processed, and distributed before being sold by retailers to consumers

In conjunction with this goal, UiTM Sarawak has started the Program Tunas Mekar: Projek Ternakan Ayam Daging UiTM Kampus Mukah since 2021 to support the local demand for fresh chicken in Mukah area (Figure 5.15 and 5.16). The staff responsible for this project are



*Figure 5.15 A Visit From Top Management During The Commencement Of Project*

En. Muhamad Nasarudin bin Sulaiman and En. Mohamad Indera Indi, assisted by 2 students; Mohd Hishammudin Bin Mohd Denial and Petrus Emang. The project was supervised by Head of Department for Centre of Science, Plantation and Agrotechnology, En. Muhamad Syukrie bin Hj. Abu Talip.

In Mukah, the supply of fresh and organic chicken is rarely available in the wet market. The survey which was conducted before pandemic has shown that there is a demand for fresh market (halal) and organic from local people. Therefore, UiTM Mukah Campus has taken an effort to support this effort by establishing the short-term project of producing chicken. In this project, the chicken feed was supplied from organic waste and nutrient to ensure the optimal growth of chicken. The growth of chicken in terms of their sizes and health were monitored and reported to the supervisor by the assistant.

This ensures that the quality of products meets the requirements highlighted by Department of Agriculture, in terms of size and weight. The waste from the chicken is used as manure to fertilise the plants in Farm Unit such as local vegetable and corn as shown in Figure 5.17. This

effort was taken to ensure that the recycling of manure can be managed properly and contributed to the organic farm production. In addition, the usage of manure in farm production helps in reducing the emission of green house and costs. The percentage of cost to purchase the fertiliser was reduced by half after the utilisation of compose from the waste.

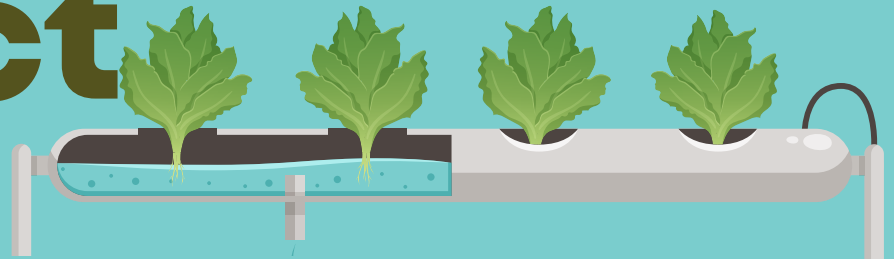


*Figure 5.16 Poultry in UiTM Sarawak Mukah Campus*



*Figure 5.17 Fertiliser Making From Chicken Manure*

# Aquaponic Project



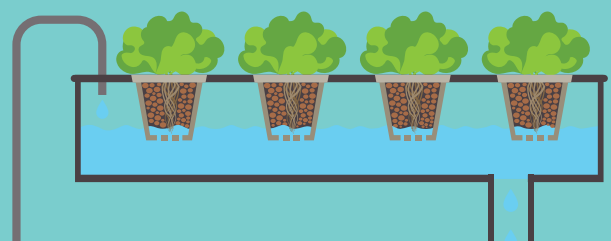
In relation to supporting the environmentally friendly effort and responsible consumption, UiTM Sarawak has launched an eco-friendly farm project in the Farm Unit, UiTM Mukah Campus as shown in Figure 8.18. The project was conducted to support the aspiration of UiTM Sarawak in implementing SDG in their practices by promoting relevant goals associated with the activities. For eco-friendly hydroponic projects, UiTM Mukah Campus has established a hydroponic farm for chillies and local salads. The project was supervised by Mr. Abg. Shawn Fendi Abg. Keprawi, Assistant Farm Officer with the aid and participation of Farm Unit's staff.

Tilapia fishes are kept in tanks in an aquaponic system, and their waste is pumped to plants in gravel-filled grow beds as shown in Figure 5.18. The principal advantages of hydroponic controlled environment agriculture (CEA) include high-density maximum crop yield, and crop production where no suitable soil exists, a virtual indifference to ambient temperature and seasonality, more efficient use of water and fertilisers, minimal use of land area, and suitability for mechanisation, disease, and pest control. Hence, an effort to reduce the pollution impact from the plantation activity is carried out by promoting hydroponic activities. The project is conducted in 3 cycles with the duration of 30-40

days for each cycle. Every cycle of the project has produced around 20-25 kg of production from local vegetables and salads, and chillies.

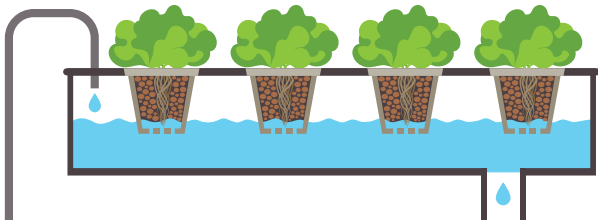
The hydroponic system was built in a greenhouse, located at the Farm Unit in UiTM Mukah Campus and it consists of 2 units of hydroponic system with 108 pots to plant the vegetables. The hydroponic system includes the rotation unit for water usage to be used in the pots. This hydroponic system reduces the emission of greenhouse gases by eliminating the usage of chemical and organic compounds in the production. In addition, the local production of vegetables by UiTM Mukah Campus was marketed to the public to promote the organic consumption of local products.

As one of the agendas in supporting SDG UN, UiTM Sarawak has fully utilised its strength of mass land to promote responsible consumption by commissioning local production activities. The hydroponic project is expected to last for 40-50 days for every cycle and is continuously run by the respective unit. At present, UiTM Mukah has completed around 5 cycles of hydroponics since it was first initiated in 2018.





*Figure 5.18 Aquaponic System Between Plant And Fish*



# Bamboo Garden

Bamboo Garden as shown in Figure 5.19 at UiTM Sarawak Samarahan Campus was initiated for the following purposes

- 1** As a Model Example of Informative Bamboo Garden and Reference Center 'Bamboo Resource Center' for the partnership of campus residents and the general public in fostering education and awareness on the roles and importance of bamboo plants to the community
- 2** As a research material, in which a genetic bank diversity of local/indigenous and exotic bamboo species found in the Borneo Islands was collected
- 3** As an improvement of decoration and landscaping on campus
- 4** As a benchmark for research on its potential of use in terms of science, engineering and technology



*Figure 5.19 Bamboo Garden In UiTM Sarawak Samarahan Campus*

# TRAINER FOR GREEN PROJECTS FOR SUPPLIERS AND CONTRACTORS IN SARAWAK



*Physical Training Conducted*

A group of lecturers from the College of Built Environment have been appointed by the Contractor and Supplier Development Unit (UPKP) under the Sarawak state government to train the local supplier and contractors pertaining the green building. This course is conducted face-to-face in the district in Sarawak and also online through the zoom application. The lecturers involved are lecturers with expertise in fields related to sustainable and green. The purpose of the lecturer's involvement as a trainer is to provide basic knowledge regarding green requirements in carrying out daily activities as a supplier and contractor. This activity to some extent

has opened space for the lecturers to understand and listen to the opinions of the industry practitioners themselves regarding the implementation of the green concept. This partnership leads many opportunities for research and collaboration to help the industry and the state government to build capacity building in the implementation of this green project.





*Online Training Session*

## **Keynote speaker at “CE and SCP for the sustainable construction materials” at the 16th Asia Pacific Roundtable on Sustainable Consumption and Production (16th APRSCP 2022: Carbon Neutral Event)**

Sr Dr Asmah Alia Mohamad Bohari has been invited as keynote speaker at the 16th APSCP conference to discuss how far we have progressed regarding Sustainable Consumption and Production (SCP) up-scaling, in particular e-market for the green product in Malaysia. The event was held at Pathumwan Princess Hotel, Bangkok, Thailand on 21-23 November 2022. The conference was organized by the APSCP and The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (Thailand). The back-to-back roundtable discussion

with the experts and practitioners from Thailand and beyond has been conducted for over 3 hours. The session was moderated by Kai Hoffman & Mrs Pimpilas from GIZ Germany alongside two other keynote speakers Mr Tobias Schleicher from Oeko Institute Germany & Assoc Prof Dr Natasha Khalil from Universiti Teknologi MARA Cawangan Perak. The session was attended by various government and private company representatives from Asia Pacific, namely Japan, Thailand, India, Indonesia, Vietnam and Singapore.



*The Hybrid Back-to-back Roundtable Discussion*



# ENVIRONMENTAL REVIEW & CONTINUAL IMPROVEMENT

Continuous improvement is a continuous endeavor to improve the operation of the organisation. The top management and members of the projects will review the performance of each environmental programme. The management's and committee's recommendations on each of the environmental programmes/projects will reflect the organisation's progress towards a more environmentally sustainable management.

## Research on Internet of Things (IoT)

The research for AASAS and AFS are still ongoing to date. The most important part of AASAS that needs to be further investigated is the soil NPK sensor as there is not much documentation out there to prove the reliability of the data produced. As for the rest of the sensors onboard, the IoT steering committee has already found the most optimal way of operating those devices which will contribute to a better sensor readout. On the other hand, the AFS requires more intensive reliability tests for the power inverter and solar charge controller in various weather conditions in order to help design more accurate operating procedures for the automated fertigation routine. Both systems are expected to get re-deployed fully in the 3<sup>rd</sup> quarter of the year 2022.

### Soil nutrient sensors calibration (Soil NPK)

- Ongoing Prototype Development (AASAS V2) (Figure 6.1)
- Ongoing Prototype Development (AFS V2) (Figure 6.2)
- Soil nutrient sensors calibration (Soil NPK)

### Current Milestones:

- Automated Affordable Smart Agriculture System (AASAS) prototype development
- Early data collection – NFT/DFT hydroponic irrigation tank
- Power supply issue – solar panel was not able to maintain optimal battery charge level due to unpredictable weather (inconsistent solar charging routine)
- The solution to the power supply issue: increase the number of panels per device from one to two



**Figure 6.1** Soil NPK Sensor Calibration Process For AASAS





Figure 6.2 AASAS Dashboard Viewed From Initial State Platform

Based on the well recognised NASA’s Technology Readiness Level (TRL), the current state of the prototype is at scale number 6 which is Technology Demonstration. This state of TRL is roughly estimated through the assessment of technical readiness and output data reliability by the IoT steering committee. The TRL is expected to increase by the end of June 2022 after the completion of sensors calibration.

■ **Frequency of Monitoring (Annually, Bi-annually, Quarterly)**

Every month during Majlis Pengurusan Eksekutif (MPE) throughout 2019-2021

■ **Monitoring Group, Either Internal or External**

Majlis Pengurusan Eksekutif (MPE) UiTM Cawangan Sarawak (Internal) and NPRDC committee (Internal)

■ **List of Relevant Parameters (Water, Land, Air, Waste)**

Solar energy monitoring/Soil nutrient monitoring/Crop health monitoring

■ **Solar Energy Monitoring/ Soil Nutrient Monitoring/ Crop Health Monitoring**

UiTM Sarawak Branch to become the Center of Excellence for smart farming by 2025



Figure 6.3 NPRDC Progress Meeting

# Research on Water Treatment

The findings from the research are proposed to be expanded and applied to the river rehabilitation projects for Sarawak rivers. The project is still at the proposal stage, and the researchers have already presented it to the representatives of the Sarawak State Government for approval.

## Monitoring of Electric Usage

Computerized systems for facility and building management are used to monitor electric usage in the buildings. For facilities management, a system known as Tomms is used to help the Facility Unit plans more effective and sustainable planning, to be in line with the Facility Management System (FMS) approach (Figure 6.4). For building management, UiTM Sarawak uses Pegasus software to monitor and control building services such as mechanical ventilation systems, lighting and fire prevention systems. A smart meter at the main switch is also installed to obtain electricity consumption readings in each building to monitor electricity consumption.



*Figure 6.4 Facility Management System Using Tomms Dan Building Management System Software*

## Hydroponic Project

At present, UiTM Sarawak successfully established mini hydroponics for herbs and aquaponic (a combination of aqua and plant) in research activities. In the future, UiTM Sarawak has agreed to start a project on chilies production, based on fertigation systems. It was found that there is a demand of organic products by the local residents in which UiTM Sarawak plans to explore further and becomes one of the producers in this area.

# Air Quality



Continuous ambient air quality is continuously monitored in Samarahan campus. The parameter measured is fine particulate matter which is the main contributor to Air Pollutant Index (API). The measurement is important for early detection of incoming haze. The result of the monitoring is being

reviewed periodically as shown in Figure 6.5. The monitoring of indoor air quality (IAQ) in the office building is conducted by the certified laboratory as shown in Figure 6.6 for continual improvement of IAQ.

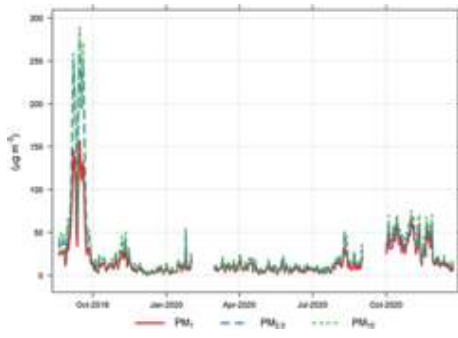


Figure 6.5 Concentration Of Particulate Matter In Samarahan Campus

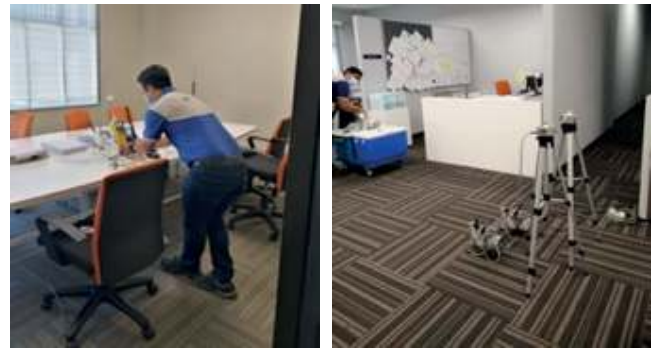


Figure 6.6 Concentration Of Particulate Matter In Samarahan Campus

# e-Reporting System of Sustainable Initiatives

Figure 6.7 e-Reporting System Kampus Lestari UiTM Sarawak

The e-reporting system records, reports, and monitors all sustainable initiatives conducted on campus as depicted in Figure 6.7. Mr. Adib bin Sarkawi, one of the Sustainable Campus Committee fellows and a lecturer at the Faculty of Computer Science and Mathematics has developed the system called Pelaporan Kampus Lestari UiTM Sarawak. The information is obtained from PTJ and the student club activity advisor on an ongoing basis.

# Recognition

## Green Sustainable Campus Awards (AKLH) 2021

The report of Green Sustainable Campus Awards (AKLH) 2021 presented key achievements and practices from 2019 to 2021 at UiTM Sarawak Branch (UiTMCS) in relation to sustainable efforts as shown in Figure 7.1. This report emphasizes six (6) main thrusts, namely management, infrastructure, waste, water, education, energy and transportation, in supporting the SDGs at the university level. It would be an essential reference for the management as an input for policy formulation, monitoring, and evaluation on the effectiveness of UiTMCS's green sustainable campus development programme. It was also a great starting point on the effort of getting the best position in the international UI-GreenMetric (UIGM) World University Ranking. UiTMCS has received first runner-up in the campus category for the Sabah and Sarawak zone.



Figure 7.1 Green Sustainable Campus Awards 2021

**TIMES for**

# Higher Education Awards UiTM

2021

UiTMCS has received recognition for its project, Empowering Sustainable Environment and Community Development Art in Sarawak from The Times for Higher Education Awards UiTM 2021 in the category of Excellence and Innovation in Arts as shown in Figure 7.2. It was awarded as an acknowledgement of UiTM Sarawak's efforts in promoting artwork using environmental-friendly products and in contributing to the community of art development in Sarawak.



Figure 7.1 TIMES Higher Education Awards UiTM 2021

# 10<sup>th</sup> Premier of Sarawak Environmental Award 2021/2022

UiTMCS received the Gold Award for the outstanding efforts in the 10<sup>th</sup> Premier of Sarawak Environmental Award (PSEA) 2021/2022. This was UiTMCS's first entry for the prestigious competition and the award was presented by the Premier of Sarawak. It is indeed a great platform for many organisations to share their vigorous efforts in practising environmental related initiatives. The documentation and evidences presented in the report will help reveal the determination and commitment of UiTMCS in the essence of environmental stewardship.



*10<sup>th</sup> Premier of Sarawak Environmental Award*

# Green Sustainable Campus Awards (AKKH) 2022

In 2022, UiTMCS was ranked third out of all UiTM campuses for Green Sustainable Campus Awards (AKKH). The competition was organised by UiTM Green Centre (UGC). This time, the report structure focused on the most effective initiatives connected to environmental sustainability. All efforts must be recorded in the IS-CARE system, which was managed by UGC Shah Alam and should be aligned with the SDG goals. The award was presented by the Vice Chancellor of UiTM in UiTM Shah Alam.



*Green Sustainable Campus Awards 2022*

# CONCLUSION

It is hoped that UiTM Sarawak branch will continue to shine in the area of sustainable environmental management and continuous improvement will be put forward with the integration of SDGs in all its initiatives. SDGs play a significant role in terms of environment sustainability as they help transform our world to be a better place to live in by focusing on the main pillars of sustainability which are on human, social, economic and environmental.

UiTM Sarawak dreams of becoming the benchmarking for other organisations when it comes to great practices of environmental sustainability among its staff, students and governance. With its mission towards recognition as a Globally Renowned University (GRU) of Science, Technology, Humanities and Entrepreneurship by 2025, UiTM Sarawak is also moving forward in its research and development areas to produce new discoveries with regards to environment sustainability. Hence, this report may become great evidences to showcase what UiTM Sarawak has achieved and structured in its policies towards greening initiatives.



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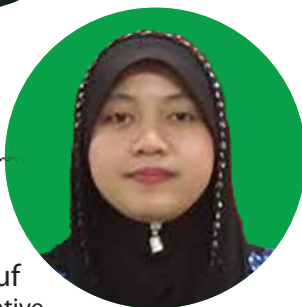
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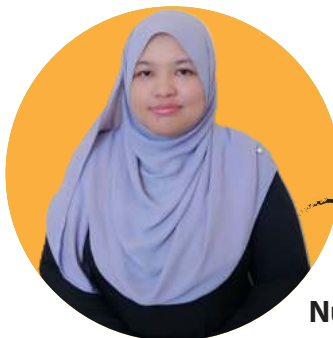
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