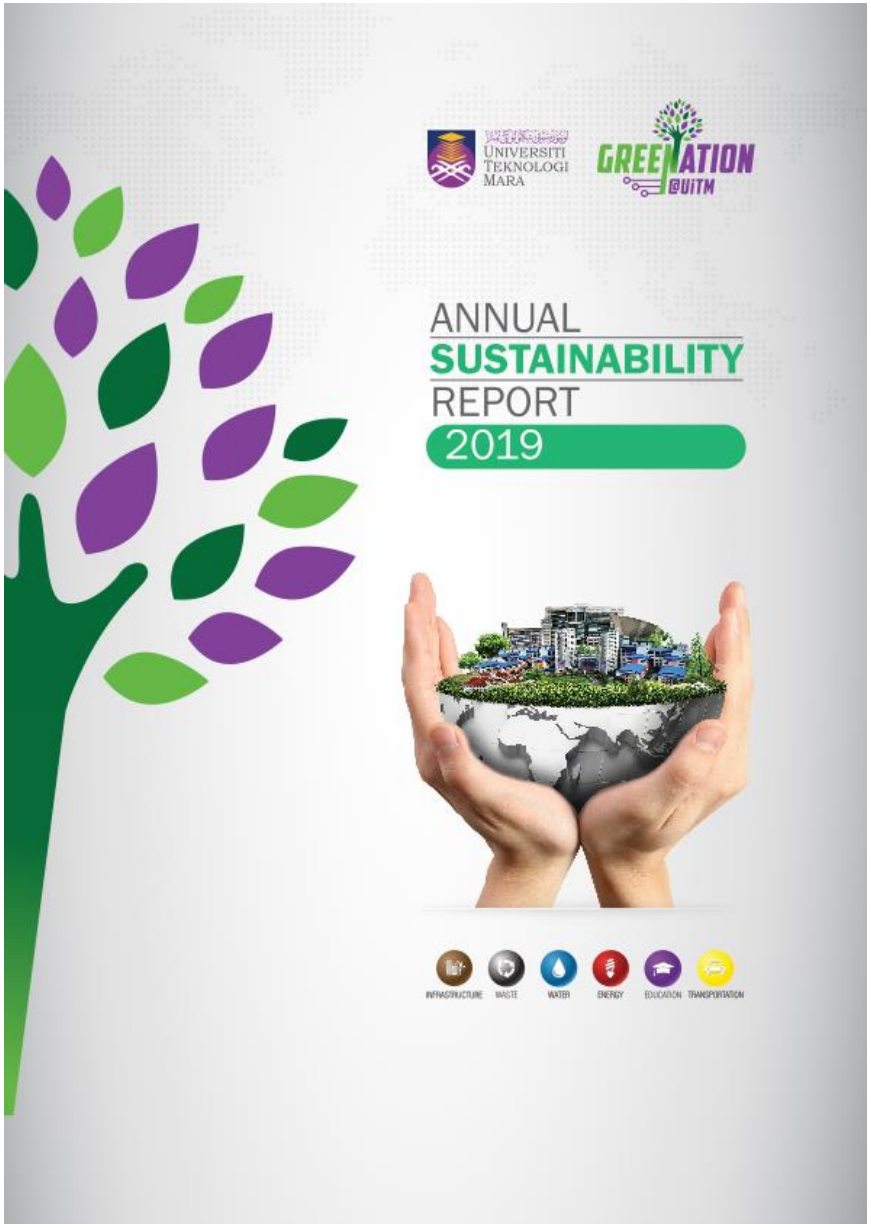

UNIVERSITI TEKNOLOGI MARA
GREENATION @UITM
ANNUAL
SUSTAINABILITY
REPORT
2019
INFRASTRUCTURE
WASTE
WATER
ENERGY
EDUCATION
TRANSPORTATION

Foreword

In 2015, world leaders agreed to commit with both of the 17 Sustainable Development Goals (SDG) and to the new climate change accord agreement in Paris at COP 21. These milestones reflect on the role of universities, and in particular how the UiTM might contribute to foster SDGs agenda in the campus. The initiatives on the sustainability have been started few years back in UiTM however the efforts are not well driven until the establishment of UiTM Sustainability Committee in 2018. The official launching of Greenation@UiTM is the mark of the new era for the sustainability agenda in UiTM. 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 in turn will cultivate culture and awareness among UiTM community in emphasizing their roles and contribution on the global Sustainable Development Goals (SDGs) which will address the core sustainability components including economic, environment and social.

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. There are challenges including energy-intensive laboratories and the use of hazardous substances; internationalisation and increasingly collaborative research leading to increased international flights and long distance travelling; high student turnover; and very diverse, often old, buildings that can be difficult to make more energy and water-efficient. Given the nature and scope of global sustainability challenges, there is a real responsibility and urgency associated with tackling operational sustainability within our universities. Combination of

high research output on sustainability and the advantage of the current destructive technology trend will enables Greenation@UiTM to drive and synergize the whole university system to ultimately achieve smarter and safer eco-friendly lifestyle.

UiTM Sustainability Committee was established on 7 November 2018. This committee was established to carry out sustainability activities as well as to synergize the collection of data and monitoring for UiTM sustainability initiatives. The data that has been collected is then used to participate in the UI-Green Metric (UIGM) University Ranking to measure UiTM's achievements that involving campus sustainability in global agenda. This sustainability working committee has focused on six key clusters measured in UIGM ratings namely (1) infrastructure and facilities, (2) waste management, (3) water management, (4)energy and climate change, (5) education and research and (6) transportation.

Among the initial initiatives that have been implemented by this working committee is to provide data to participate in the UI-Green Metric World (UIGM) University Ranking where this committee serves as a platform to mobilize the involvement of all university stakeholders to obtain updated data through online data collection system which was successfully developed in a short time.

As a result of UiTM's participation in the UIGM rating in September 2019, UiTM has been announced as the 10th Most Sustainable University among the 20 Institutions of Higher Learning Malaysia (IHL) and also ranked 183th out of 780 universities participating in UI-Green Metric World University Ranking worldwide which is a commendable achievement considering the first efforts of UiTM in participating in this ranking.

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 Sustainable Development Goals (SDGs).

UiTM Sustainability Committee 2019/2020

Message from UiTM Vice Chancellor

"Praise to Almighty Allah with his permission, the UI Green Metric Sustainability Report 2019 was produced for the first time by the UiTM Sustainable Committee. This is considered as another milestone since the establishment of this committee in November 2018 with the main function is to synergize and centralized all the initiatives and programs as well as consolidating the data related to sustainability for UiTM.

As the biggest university in Malaysia, UiTM realized the crucial responsibility as an educational institution in disseminating knowledge, thus it is our focus to do research and provide awareness to others in order to confront the challenges of climate change and sustainability. An education institution is the world's greatest source of ideas and innovation to generate knowledge about discoveries in science, technology, and policy analysis to create a sustainable environment for the generations to come.

It is also important for UiTM to become a governance role model in planning, executing and evaluating the impact towards sustainability development for the whole 36 campuses around Malaysia as well as engaging and collaborating with external agency, industry and communities in supporting national and global sustainable agenda. Therefore, this sustainable report is the key platform for communicating the sustainable performance to the stakeholders at all level hence enables the transparency of the current achievement and the related risks and opportunities which is beneficial in providing insights in formulating the strategic action plan to address emerging local global challenges".

Emeritus Professor Datuk Ir Dr Mohd Azraai Kassim
Vice-Chancellor
Universiti Teknologi MARA (UiTM)

Table of Contents

1.0 Reporting Scope and Boundary

This annual Greenation@UiTM Sustainability Report highlights the key achievements and activities during 2019 to improve the sustainability performance of our university. Focusing primarily on campus operations, the report looks at Setting and Infrastructure, Waste Management, Water Management, Energy and Climate Change, Education and Research and Transportation, before outlining priorities for 2020/2021.

This Greenation@UiTM Sustainability Report is seen as an important component in coordinating and facilitating the campus sustainability initiative action plan to be the main reference covering six (6) core areas (focus areas).

INFRASTRUCTURE Setting and infrastructure

WASTE Waste

WATER Water

ENERGY Energy and Climate Change

EDUCATION Education and Research

TRANSPORTATION Transportation

2.0 Our Commitment to Sustainability

Greenation@UiTM Sustainability Strategy (2019) set the goals and aims in incorporating sustainability into all aspects towards enabling the sustainability agenda into all aspects of university life. The strategy focused on six focus areas: Setting and infrastructure, Waste Management, Water Management, Energy and Climate Change, Education and Research and Transportation. The strategy also specifically calls for the strong collaboration that are being built between the University, industrial partner, and community linkage.

Greenation@UiTM vision's is to establish UiTM as a Smart and Safe Eco-Friendly Lifestyle educational institution in embracing the national and global sustainable agenda.

Greenation@UiTM mission's is to cultivate/foster sustainability ecosystem in UiTM through value-based governance in upholding green talents that bring benefit to the nation.

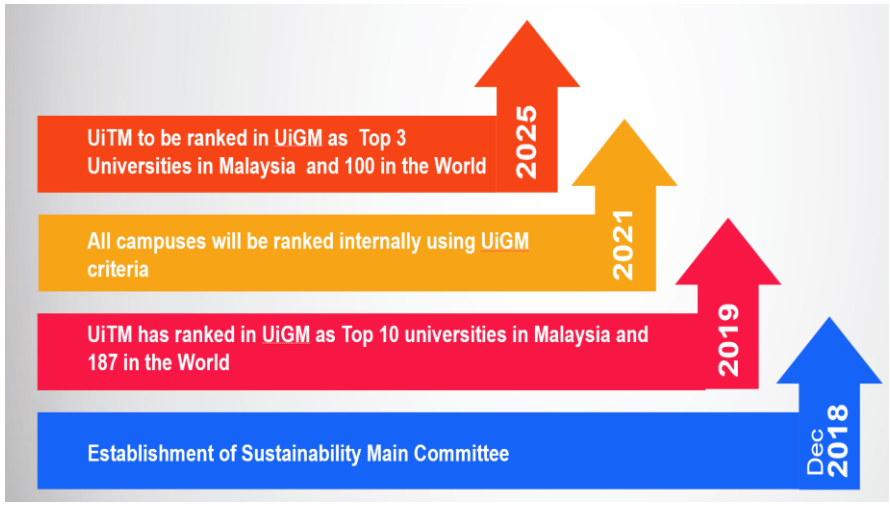
Objectives

1. To incorporate the creativity and innovation of sustainable through teaching, learning and research towards the development of green talent.
2. To transform sustainable governance in managing goal setting, execution, and performance management of the institution.
3. To commit in protecting and enhancing the green campus ecosystem.
4. To leverage the university engagement and expertise in community well-being, quality of life and environment inclusively.

Greenation@UiTM Sustainability Strategy speaks directly to the United Nations Sustainable Development Goals and much work is ongoing across the university to assess how the goals are implemented across our teaching, learning, research and outreach, as well as to measure the impact of these activities.

The SDGs and their related targets address the most important economic, social, environmental and governance-related challenges of our times to promote transformational change in the campus.

UiTM Sustainability Target Towards 2025



UiTM Sustainability has put a target to be ranked in UiGM as Top 3 Universities in Malaysia and 100 in the World by 2025.

Engaging with the SDGs will also greatly benefit university by helping us to demonstrate university impact, capture demand for SDG-related education, build new partnerships, access new funding streams, and define a university that is responsible and globally aware.

Establishment of UiTM Sustainability Committee

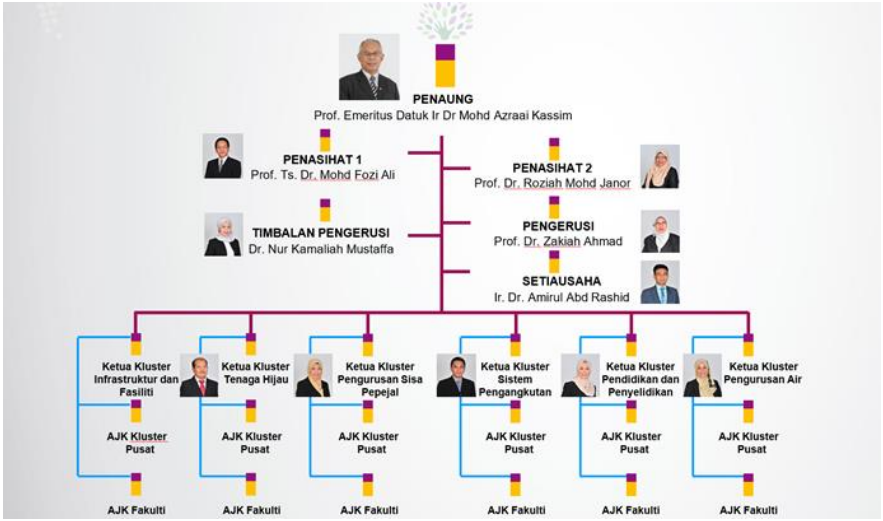
The UiTM SUSTAINABILITY Committee has been established in December 2018 (after approval by MEU Bil. 28/2018 in November 2018) to

Plan the UiTM sustainability agenda in a structured and synergistic way

Enable UiTM to be ranked in UiGM to benchmark UiTM's sustainability agenda

Systematically gathers and updates all data and information regarding UiTM sustainability agenda

GREENATION @UiTM
13 June 2019
Dewan Annex, UiTM Shah Alam
Officiated by Deputy Minister of MESTECC,
YB Isnaraissah Munirah Majilis



UiTM Sustainability Main Committee

3.0 Key Areas

3.1 Setting and Infrastructures

Setting and infrastructure cluster aims to drive the university commitment towards green environment through sustainability efforts in providing more space for greenery in safeguarding environment.

Function of setting and infrastructure cluster

Setting and infrastructure component plays important roles as follows:

- To secure green area that full fill the sustainability policy.
- To promote the awareness on the importance of green ecosystem in campus
- To encourage internal landscape initiatives at faculty and department level.
- To strengthen university - community engagement in adapting sustainability agenda through tree and vegetation planting.

For 2019 UIGM Score, the results from SI Cluster were slightly increased than the year of 2018 due to our initiative on the internal planting programme. Therefore, 7.5% out of the total 15% has been scored which covered open space, forest, planted vegetation and water absorption areas, together with the university budget for sustainability efforts.

Focus area

The focus area for Setting and Infrastructure cluster as follows:

- Preserving the forest area in campus through gazette.
- Increasing the area of planted vegetation and green landscape in campus.
- Raising the university budget allocation for sustainability activities.
- Retaining the water absorption area.
- Reducing the population (i.e., physical attendance) in campus via online learning.
- Protecting the existing open space area in campus.

3.1.1. Indicators of setting and infrastructure cluster

For the setting and infrastructure cluster, the performance indicator is divided into six (6) indicators as shown below:

Figure 1 Indicators of setting and infrastructure cluster

3.1.2. Initiatives of setting and infrastructure cluster

There are several alternatives can be done to increase the score for UIGM score especially under setting and infrastructure cluster. The main focus is preserving the green area within the campus area and transforming the potential area to become green area. Therefore, this cluster has proposed the policy to gazette the existing forest and vegetation area within campus.

Figure 2 Initiatives of setting and infrastructure cluster

i. Conduct tree tagging program activity to gazette all existing trees within UiTM campus

Tag Trees,
Stay Green!

Figure 3 Tagging trees campaign

The activity conducted by SI Cluster to deliver the aspect of loving nature by tagging the trees around campus. The program which started at 8:30am on 15 November 2019 had been officiated by UiTM Vice Chancellor at the main entrance of UiTM Shah Alam. There were about 200 students from various faculties in UiTM Shah Alam had joined this programme to tag 45 trees along the roadside in the campus. All wooden board used to tag these trees were put some advice notes to educate people to take care the environment.

ii. Gazette all existing forest area, establish mini forest and create policy regarding tree elimination within UiTM campus

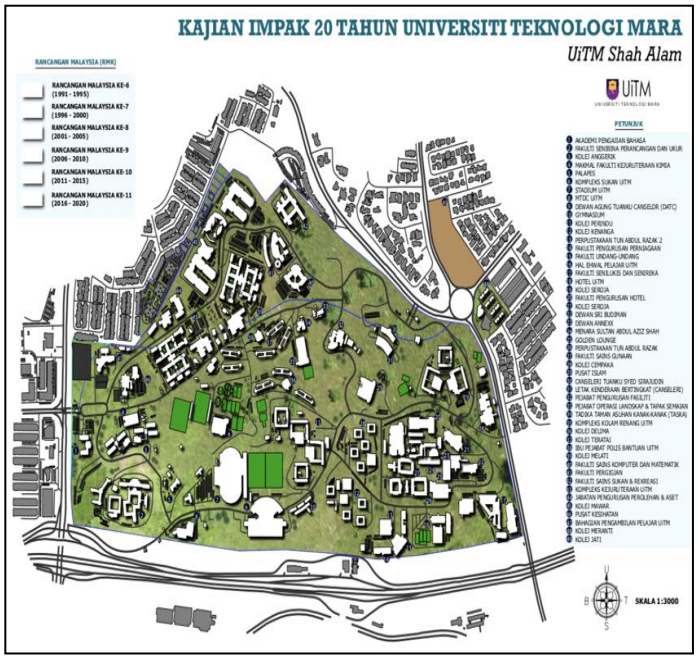


Figure 4 Existing forest area, mini forest, and green areas within UiTM campus

Evidence for campus layout site which show location of buildings within the campus.

iii. Conduct tree replanting program to replace all tree elimination within UiTM campus.

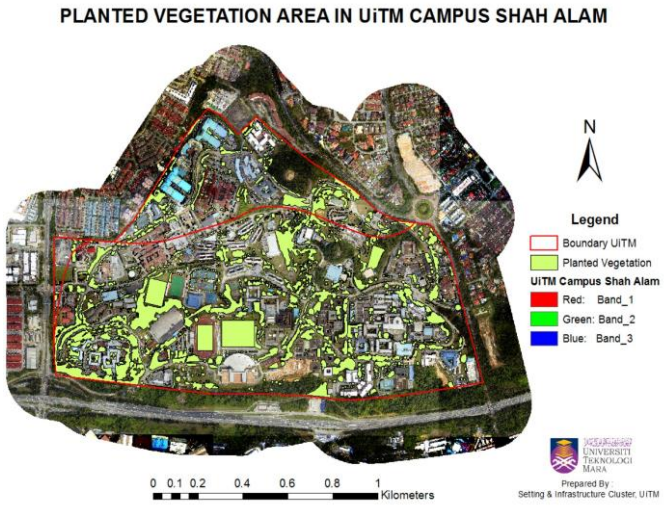


Figure 5 Tree replanting program

This evidence is for the percentage of the area on campus covered in planted vegetation (include lawns, gardens, green roofs, internal planting; for vegetation purposes) to the total campus area.

iv. Encourage internal planting among UiTM staff.

Internal planting can increase the sustainable environment inside the building. At the same time, it can provide healthy environment and good for working space.

Figure 6 Internal Planting inside the office

This evidence shows the example of internal planting which has been implement by several faculty in UiTM campus. The calculation of vegetation area in UIGM score will also include the percentage of internal planting within the campus.

v. Proposal on UiTM Landscape master plan.

UiTM landscape master plan has been designed by professional Landscape Architecture from Faculty of Architecture Planning and Surveying. This landscape master plan has transformed the existing landscape layout towards the green environment.

Figure 7 Propose UiTM Landscape mater plan

This evidence locates the potential area to increase vegetation and forest area within the campus. This master plan can increase the UIGM score especially in setting and infrastructure indicators.

vi. Proposal on Bamboo and vertical garden.

Bamboo and vertical garden have been proposed as one of the alternatives to increase the UIGM score. The selected locations have been identified for bamboo garden and several vertical walls have been identified to establish vertical garden.

Figure 8 The proposed vertical garden

Figure 9 The proposed bamboo garden

SDGs related to setting and infrastructure cluster

3.2 Waste Management

Universiti Teknologi MARA (UiTM) is designed to be a smart and green campus in the strategic plan. One of focus area is waste management. Currently, waste management is the responsibility of the Facility Unit, Office of Infrastructure, and Info-structure Development (PPII). All activities related to waste generation, collection and disposal will be recorded and monitored by this unit.

In light of the new strategic plan, more sustainable approaches for UiTM needs to be implemented. New ideas and methods of waste generation, collection and treatment were introduced based on scientific data collection on campus. Sustainable waste management is a new norm for UiTM to ensure the objective, mission and vision as smart and green campus is achievable.

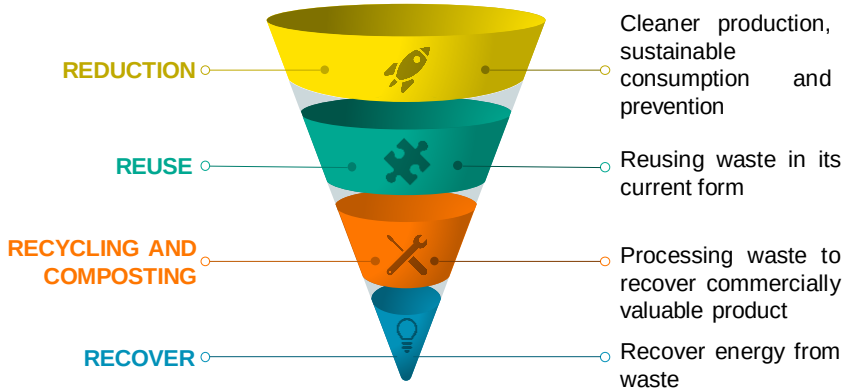


Figure 10 The concept of sustainable waste management for UiTM campuses

Figure 10 shows the concept of sustainable waste management for UiTM campuses. Reduction of waste generation is the priority for all campus communities. All events, programs and daily activities need to consider ways to reduce waste production and have alternatives to single use packaging materials. For example, replacing plastic water bottles with water dispensers or encouraging bringing own containers for food and beverage. Reuse of plastic bottles, paper or in organic waste such as metals and old PVC pipes from offices and laboratories is second option in the sustainable waste management. Recycling of inorganic waste and composting of organic waste are the third option if waste generation is unavoidable. In this third option, the value of waste generated is upgraded to a more valuable product. Scientific data on waste characteristics and composition is important to decide whether the capacity of waste generated is adequate to produce energy and can sustain long term condition. At present, most of solid waste in UiTM will be transported to landfill by authorized vendor.

The objective of having sustainable waste management in UiTM campus is to avoid final disposal to the landfill.

3.2.1. Function of waste management cluster

Waste management component plays important roles as follows:

- To promote awareness on the importance of waste management.
- To assess the waste generated in the campus and provide best practice in preventing, reducing, and treating the amount of waste produced by the campus community.
- To nurture and educate campus community in managing waste.
- To collaborate with government and non-governmental agencies in empowering agenda of waste management.
- To strengthen university - community engagement in adapting sustainability agenda through good waste management practises.

3.2.2. Indicators for waste management cluster

For the waste management cluster, the performance indicator is divided into six (6) indicators as in Figure 11 below:

Figure 11 Indicators of waste management cluster

3.2.3. Waste generation

Annual data on waste generation in Shah Alam campus was collected by the Facility Unit. Figure 12 shows a comparison of monthly collection from 2018 to 2019. Factors that contributed to this data include the number of events on campus, overall campus population, student intake and the daily activities of campus communities. UiTM is in the process of developing policy and strategic planning for waste management in the campus. Effective policy and sufficient planning for waste management will contribute to achieve the objective of UiTM as smart and green campus.

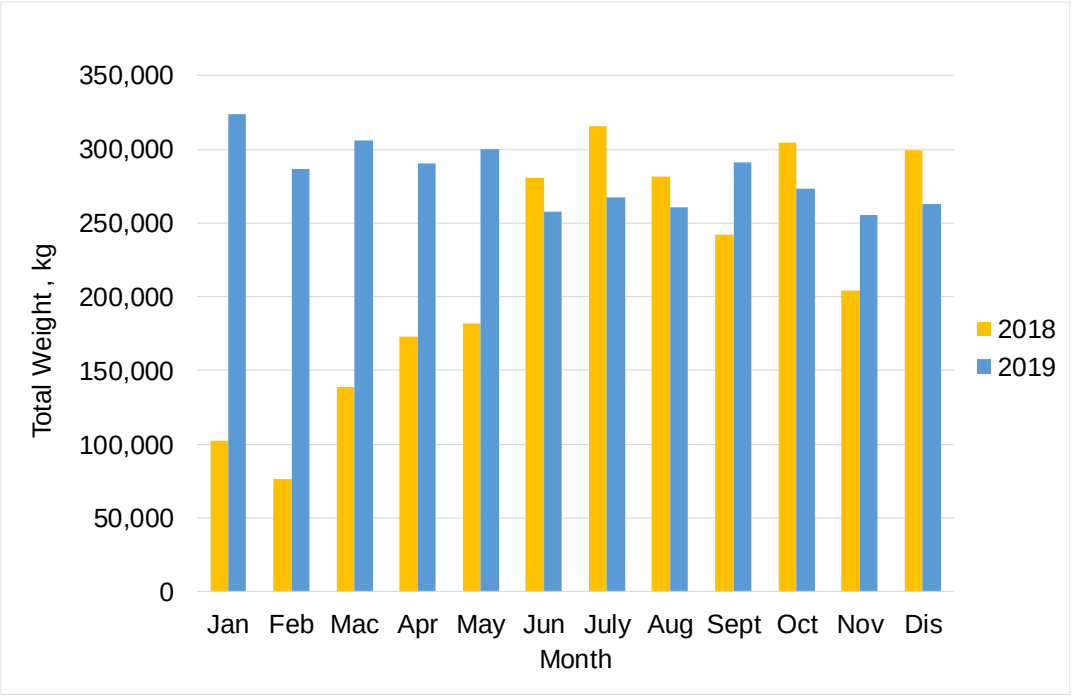


Figure 12 Solid waste generation in UiTM campus 2018-2019

3.2.4. Waste Type and Sources

Waste types and classification generated in UiTM campus is shown in Table 1. At present, no detailed data was collected for each type and classification. This table only shows the general waste type in UiTM campus based on common events and activities. To date, no specific study has been conducted to determine the overall percentage of waste according to type and classification generated in UiTM campus. All studies were mostly conducted at faculty level. However, no detail study for waste type and sources at university level.

Table 1: Waste type and classification

Item	Classification
Cardboard	Packaging cardboards
Plastic	PET, Polystyrene and HDPE
Metals	Beverage containers, tins, ferrous material, wires and glass container caps
Glass	Beverages containers and broken glassware
Paper	Office fine paper, glossy paper, newspaper, lined answer sheets booklet
Yard waste	Garden waste, dry leaves
Food	Pre-processing waste, post processing waste and excess food
Foil	Wrapping material
Foam	Meal containers
Hot beverage cups	Laminated paper cups
Electronic waste	Personal Computer, Laptop, LCD Projector, wire, lamp, bulb, printer, cartridge, fan etc.
Hazardous waste	Battery, toxic waste from laboratory, oil
Other	Dirt, wood, textile etc.

Sources of waste in campus are identified from offices, faculties, residential college, cafeterias, public areas, business area and landscaping.

3.2.5. Initiatives for sustainable waste management in UiTM campus

i. Recycling programs for campus waste

The evaluation is based on the number of activities or programs carried out on campus to create awareness and for educational purposes. In 2019, many programs were conducted at the University level and faculty level by staff and student committees. Table 2 shows programs for creating recycling awareness in 2019.

Table 2: Recycling Programs

No.	Programme	Description
1.	Waste Recycle Competition	The program was held at Faculty of Civil Engineering on 4 November 2019. The competition was to construct buoyance prototype using recycling items.
2.	Plogging Activity Collaboration with UiTM Health Centre	Plogging was designed by a student 'Civil Outdoor Club' combining jogging and collect a trash at same time. The activity was conducted on 9 November 2019.

3.	3D e-Poster Competition	Competition organized by students from Faculty of Civil Engineering with participant around 100 students. Using Blippar and Artvive.
4.	Seminar on Solid Waste Management: Industrial talk on solid recycle program	The Seminar was organized by Course Coordinator Solid Waste Engineering and management and collaborated with WHB, KDEBWM, SWCorp and MBSA. It was held on 12 November 2019 and involved 220 participants.
5.	Innovative Thinking Ideas from Plastics	Sharing session by Faculty of Mechanical Engineering with a group of 18 students from Universitas Jayabaya, Indonesia.

ii. Programs to reduce the use of paper and single-use plastic on campus

There were a few programs conducted in 2019 as part of our campaign to reduce the use of paper and plastic on campus. The main target is to develop the business unit of UiTM under the operations of the Facility Unit, Office of Infrastructure, and Info-structure Development (PPII) to monitor and ensure all business activities on campus will comply with the contract agreement. The cooperation of this target group is important to help the sustainable committee achieve the goal in reducing plastic waste generation on campus. Initiatives by the Language Academy in collaboration with FSKM and FSPU, successfully reduced single-use plastic consumption in these two cafeterias up to 80%. Having ongoing programs such as campus wide campaigns to create awareness on the environmental hazards of plastic waste, competition among faculties, businesses communities and students to reduce single-use plastics, encouraging innovation on reusing and upcycling of plastic waste as well as policy implementation to achieve our set target are important to ensure continuity of sustainable initiatives. A forum session was organized to share knowledge and success stories with others as shown in Figure 13.

Figure 13 Forum session to reduce single used plastic in campus

iii. Organic waste treatment

Organic waste in UiTM campus focuses on food waste and green waste. The treatment used for this type of waste is composting. Food waste generation in UiTM campus is shown in Figure 14.

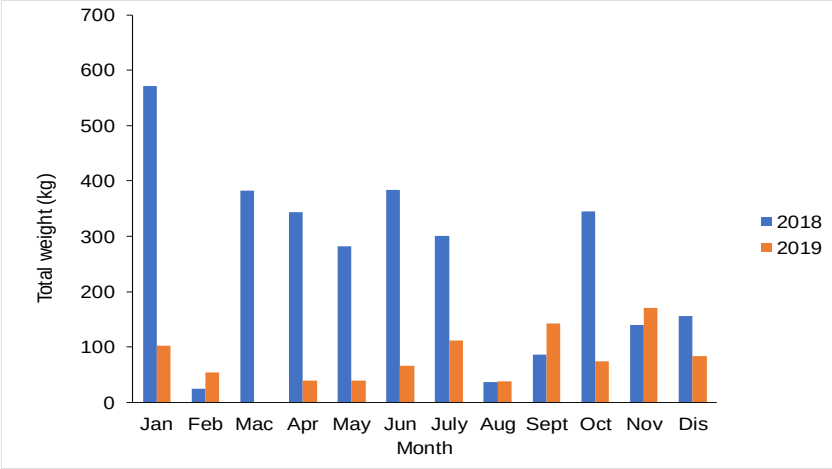


Figure 14 Food waste generation

However, considering food waste has a potential to produce biogas as new source of energy, a study was conducted to determine the potential of producing biogas from food waste from cafeteria in UiTM campus. Figure 15 shows an anaerobic digestor is located at Faculty of Civil Engineering, UiTM Shah Alam.

Figure 15 Anaerobic digestion for biogas production from food waste

Composting material from green waste is conducted using windrow composting method. It takes about 1- 3 months to produce composted material which is then used as additional nutrient or soil fertilizer for landscaping on campus as shown in Figure 16.

Figure 16 Composted material from green waste

In order to reduce food waste generation in campus, Office of Student Affair took an initiative with collaboration with four (4) private companies Tesco Store (Malaysia) Sdn Bhd; 99 Speedmart Sdn Bhd; Nestle (Malaysia) Berhad and Kumpulan Legasi Z Sufi to create UiTM Food Bank for students. The Food Bank Pantry concept was introduced and organized by students under UiTM Food Bank Crew in 2019 as shown in Figure 17. The objective of this program is to provide excess food from the grocery stores to the student with financial disabilities. Almost 1000 students benefited from this program.

Figure 17 Food Bank Pantry

iv. In organic waste treatment

Inorganic waste in UiTM campuses contribute from construction, building maintenance, students' workshop, and research activities. Examples of inorganic waste is glass, aluminium, metal, plastics, and other materials that cannot decompose by bacteria.

Currently only plastics material from tables and chairs was collected and re-process to produces souvenir and card folders. This incentive was driven by few faculties such as, FKM and FSSR. However, no direct data was monitor on the amount of materials been process. 2000 unit of cardholders were produced and sold to students from UiTM Campus Dengkil.

The other materials were collected in one special bin and handling by contractor appoints by UiTM. Figure 18 shows the program for demonstrating melting aluminium cans collected from UiTM campus.

Figure 18 Demonstration melting aluminium can

Ideas and Innovative Projects with Recyclables was conducted at FKM Smart Classroom and Advanced Manufacturing Laboratory on 12th January 2019 and attended by 30 students from Asasi UiTM, Dengkil and seven(7) staff as shown in Figure 19. The objective of this program was to demonstrate the method use to melt can to the participant.

Figure 19 Participants from UiTM Dengkil

v. Toxic waste treatment

The chemical waste from laboratories are collected in suitable temporary waste storage containers such as drums, plastic bottles, glass bottles or plastic bags. All the containers need to be properly labelled (complying with national and international regulations) for the safety of storage and picked up according to schedule and transported for safe disposal.

Clinical waste from the clinics, operating theatres and laboratories from the hospital and clinics are collected into biological waste, biohazard waste and clinical waste plastic bags and sharp bins which are distinctly identified by its yellow colour as shown in Figure 20.

Figure 20 Toxic and hazardous waste management

vi. Sewerage disposal

Sewerage disposal on UiTM campus is treated conventionally using aeration method and activated sludge method. There are three (3) sewerage treatment plants on campus, Chancellery STP, Mawar college STP (8540 PE) and Rotu STP (3352.4 PE). Some researchers in UiTM had conducted the possible use of treated sludge from the sewage disposal as a material to create the more sustainable products such as ceramics, concrete etc.

In conjunction of Seminar on Wastewater Wealth 2019, UiTM signed Memorandum of Understanding with IWK Sdn. Bhd. on 29th August 2019. The collaboration focuses on research and development in sustainable wastewater and sludge treatment technologies.

SDGs related to waste management cluster

3.3 Water Management

Water cluster aims to synergize efforts in managing water through implementation of water conservation program, water recycling program, usage of water efficiency appliances and the consumption of treated water system.

UiTM is committed to provide solutions for water management crisis and develop effective policies towards effective water consumption.

3.3.1. Function of water management cluster

Water management component plays important roles as follows:

- To create awareness on the importance of water education and management
- To encourage campus community to reduce water usage and increase water conservation programs
- To assess the water consumption, water treatment and water recycling in the campus.
- To develop green integrated water management system for UiTM

3.3.2. Indicators for water management cluster

For the water management cluster, the performance indicator is divided into four (4) indicators as in Figure 21 as below.

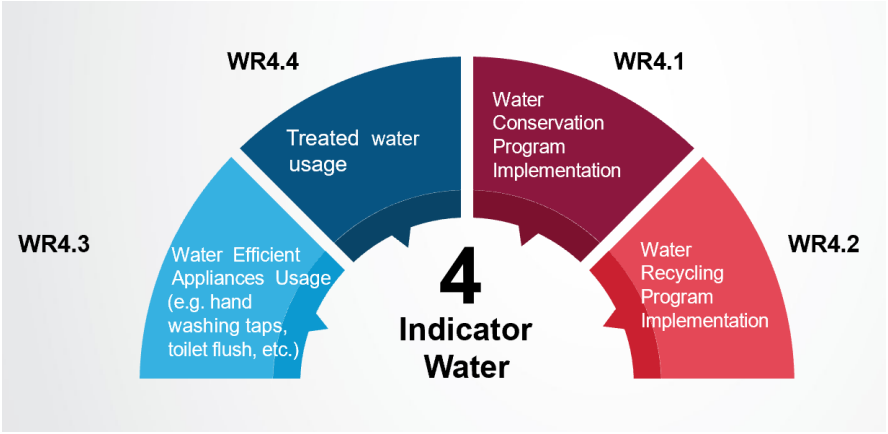


Figure 21 Indicators for water management cluster

3.3.3. Initiatives of water management cluster

i. Water Conservation Program Implementation

Awareness and education program provided by HEP, UiTM Shah Alam

There were several water conservations programs that have been implemented in 2019. Table 3 shows that four (4) main programs have been implemented in April, May, September, and November in this year. Students and lectures were involved in these programs. The propose of these programs were to expose students to nature and to create awareness on the water and its ecosystem.

Table 3: Awareness and education campaign for water conservation in 2019

BIL	AKTIVITI/ PROGRAM/ PERMOH	ANJURAN	BULAN AKTIVITI/ PROGRAM/ PELAKSANAAN	TARIKH AKTIVITI/ PROGRAM/ PELAKSANAAN	TEMPAT AKTIVITI/ PROGRAM/ PELAKSANAAN
1	PROGRAM KEM CABARAN PERAIRAN KEMBARA (KAYAK)	PUSAT KOKURIKULUM, HEP	APR	26 - 28 APRIL 2019	REDTMA RECREATION SPORT CENTRE, AYER KEROH, MELAKA
2	MENGHADIRI PROGRAM SAYANGI BAKAU	FSPPP	MEI	5 MEI 2019	TAMAN REKREASI PAYA BAKAU, KG SIJANGKANG, SELANGOR
3	PROGRAM KONSERVASI BAKAU BERSAMA MAHASISWA UITM SHAH ALAM DAN POLITEKNIK BENGKALIS	KRESMA	SEPTEMBER	30 OGOS - 1 SEPTEMBER 2019	POLITEKNIK NEGERI BENGKALIS, RIAU
4	PROGRAM EKSPIDISI RAKIT TEKNIKAL SUNGAI PAHANG	KRESMA	NOVEMBER	28 OKTOBER - 1 NOVEMBER 2019	SUNGAI PAHANG, PAHANG

Figure 22 Education program for undergraduate and postgraduate students on water quality monitoring

Final Year Project for Water Conservation Program in 2019

There are seven (7) final year projects that related with Water Conservation Program. These projects are related with Water quality and awareness study on water. Students need to know the importance of clear water in our environment and how it may impact the society.

Table 4: Final Year Project for Water Conservation Program in 2019

No	Final Year Project for Water Conservation Program Implementation	Theme	Faculty	Year
1	Sustainable Cities for Water Index: Water Efficiency Indicator	Water Quality	Civil Engineering	2019
2	Water Mass Balance Analysis in UiTM Shah Alam	Water Conservation	Civil Engineering	2019
3	An Investigation of the Public Perspective of Desalinated Water as Potable Water	Awareness Study	Civil Engineering	2019
4	Wash hand habit and water usage for UiTM Students	Awareness Study	Civil Engineering	2019
5	Arduino Based Aquaponic Monitoring System	Water Quality	Civil Engineering	2019
6	A Study on Big Data of the Community Acceptance on Recycled Water	Awareness Study	Civil Engineering	2019
7	Sustainable Cities for Water Index: Water Quality Indicator	Water Quality	Civil Engineering	2019

ii. Rainwater Harvesting Project

One unit of rain harvesting system has been identified at the UiTM Landscape Unit. The rainwater is used for watering plants. This project has been implemented since 2010 and still function as alternative source of water for landscape activity.

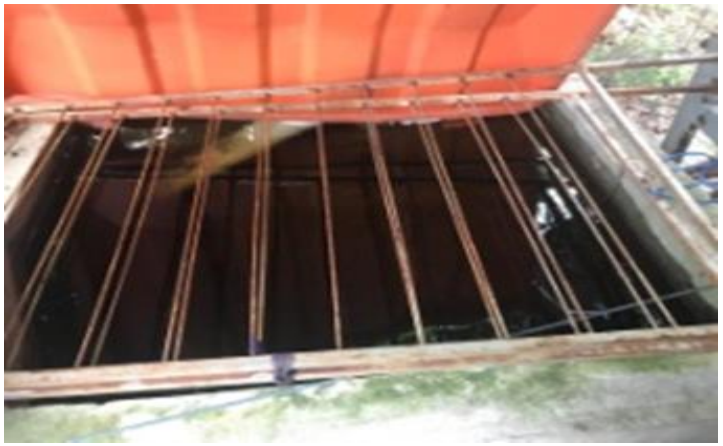


Figure 23 Rainwater harvesting system in UiTM Shah Alam

iii. Water Recycling Program Implementation

There 23 final year projects that related with Water Recycling Program. These projects are related with water treatment using chemicals and microorganism. Table 5 shows list of final year projects that have been conducted in 2019 by students from the Chemical and Civil Engineering. Students need to know the importance of clear water in our environment and to understand various water treatment to remove organic and inorganic pollutants in surface water and groundwater.

Table 5: Final Year Project for Water Recycling Program in 2019

No	Final Year Project For Water Recycling Program Implementation	Theme	Faculty	Yea
1	Development of biosorption for dye wastewater by using natural coffee skin	Water Treatment	Chemical Engineering	201
2	Development of biosorption for dye wastewater from physical modified of coffee skin	Water Treatment	Chemical Engineering	201
3	Development of biosorption for dye wastewater by using chemical modified coffee skin	Water Treatment	Chemical Engineering	201
4	Development of kenetik study in biosorption for dye wastewater from physical modified of coffee skin	Water Treatment	Chemical Engineering	201
5	A Review On Photocatalytic Degradation of Methyl Orange Dye	Water Treatment	Chemical Engineering	201
6	Degradation of Methyl Red Dye Effluent in Textile Industry: A review	Water Treatment	Chemical Engineering	201
7	Decomposition of toxic chemicals (Polycylic Aromatic hydrocarbon, PAHs) compounds) from wastewater by using catalyst.	Water Treatment	Chemical Engineering	201
8	The characteristic of biochars derived from the Pyrolysis of sewage sludge.	Water Treatment	Chemical Engineering	201
9	Efficiency of Aluminium Sulphate as an Inorganic Coagulant in Latex Wastewater Treatment: A Review	Water Treatment	Chemical Engineering	201
10	Treatment of texttile wastewater via coagulation/flocculation process	Water Treatment	Chemical Engineering	201
11	Optimisation of pH neutralising sequence of Demin Water Effluent Transfer Facility	Water Treatment	Chemical Engineering	201
12	Pyrloysis of Sewage Sludge	Water Treatment	Chemical Engineering	201
13	Identification of bacteria in wastewater	Water Treatment	Chemical Engineering	201
14	Treatment of Rubber Glove Wastewater by Integrated Fixed Film Activated Sludge System	Water Treatment	Chemical Engineering	201
15	Removal of Lead from aqueous solution using surfactant impregnated activated carbon.	Water Treatment	Chemical Engineering	201
16	Removal of nickel from aqueous solution using surfactant impregnated activated carbon.	Water Treatment	Chemical Engineering	201
17	Investigation of physico-chemical characterization of activated carbon derived from industrial Effluent from Treatment System.	Water Treatment	Chemical Engineering	201
18	Heavy metal removal from wastewater using Emulsion Liquid Membrane (ELM)	Water Treatment	Chemical Engineering	201
19	Heavy metal removal from wastewater using Green Emulsion Liquid Membrane (ELM)	Water Treatment	Chemical Engineering	201
20	Application of Liquid Aluminium Sulphate, Ferrous Sulphate Heptahydrate and Ferrous Sulphate Monohydrate as Coagulants in Dye	Water Treatment	Chemical Engineering	201
21	Treatment of latex wastewater via coagulation/flocculation process	Water Treatment	Chemical Engineering	201
22	Removal of Flouride and Ammoniacal Nitrogen in Fertilizer Wastewater by Using Acetylene Production Sludge Waste (APS)	Water Treatment	Chemical Engineering	201
23	Effectiveness of RVFCW System as Filtration Medium for Greywater	Water Treatment	Civil Engineering	201

vii. Research proposal and research grant

We have prepared a research grant to provide several treatments for rainwater harvesting system and to recycle water from chiller system in UiTM Shah Alam campus. We have received RM 25 thousand for this study. Below here is the offer letter from the Research Management Center (RMC), UiTM. This project will be started in 2020.

Figure 24 shows the research project on the recycle of water for hydroponic plant. This project has started in 2018 until March 2020.

Figure 24 Water recycling system for hydroponic plants at Engineering Complex

viii. Water Efficient Appliances Usage

To control volume of water in air-conditioning system.

Auto-sensor to control volume and flow of water in the chiller and air-conditioning systems. This system is significant to control the temperature of building. For example, UiTM has implemented this system in the DATC building

Figure 25 Auto-sensor to control volume and flow of water in the chiller and air-conditioning systems

To control volume of water from SYABAS to pump house UiTM

Additional appliance is added at the connected pipe between water from SYABAS and pump house. During the semester break, this appliance is activated to control volume of water flow into the pump house because the number or consumers (students) are decreasing.

Figure 26 Manual-sensor to control volume of water from SYABAS to pump house UiTM

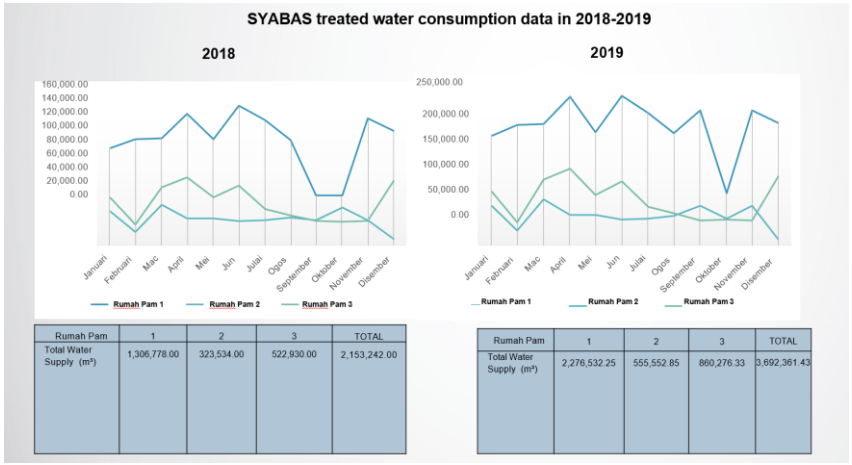
Install low and dual flush model

UiTM Shah Alam has installed low and dual flush model in several faculties. This system significantly controls volume of water.

Figure 27 Install low and dual flush model

ix. Treated water usage

For treater water usage, UiTM Shah Alam is using clean water from the SYABAS. SYABAS is authority that responsible to supply treated water in Selangor. Refer Figure 28 on the treated water consumption by SYABAS for 2018 and 2019.



Rumah Pam	1	2	3	TOTAL
Total Water Supply (m³)	1,306,778.00	323,534.00	522,930.00	2,153,242.00

Rumah Pam	1	2	3	TOTAL
Total Water Supply (m³)	2,276,532.25	555,552.85	860,276.33	3,692,361.43

Figure 28 Treated water consumption data in 2018-2019

SDGs related to water management cluster

3.4 Energy and Climate Change

Energy and climate change cluster aims to synergize efforts in energy efficiency initiatives as well as energy reduction and low carbon emissions program.

UiTM is committed to provide solutions for climate change issues and develop effective policies to meet the energy standards in protecting the nature and energy resources.

3.4.1. Function of energy and climate change cluster

Energy and climate change component play important roles as follows:

- To create awareness on effective energy consumption
- To promote activities and initiatives on energy efficiency in the campus
- To propose deployment of renewable energy solutions and energy saving appliances for the university.
- To monitor the effectiveness and impact of the energy efficient for continuous improvement effort
- To strengthen university - community engagement in adapting sustainability agenda through energy efficiency good practices.
- To create awareness on the importance of water education and management

3.4.2. Indicators for energy and climate change cluster

For the energy and climate change cluster, the performance indicator is divided into eight (8) indicators as in Figure 29 as below.

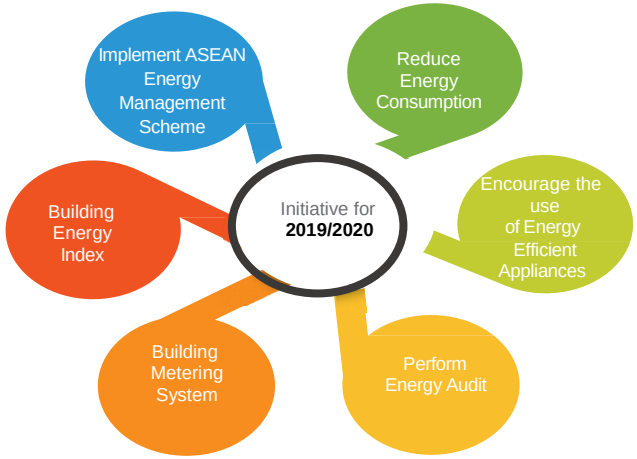


Figure 29 Indicators for energy and climate change cluster

3.4.3. Initiatives of energy and climate change cluster

Since UiTM's main agenda is to make all campuses a sustainable campus, more aggressive initiatives need to be planned and implemented to achieve that agenda. Therefore, the responsibility of energy & climate change cluster is to promote programs that involve energy efficiency and climate change. Among the initiatives that have been planned for 2020 are as follows:

i. Reduce energy consumption
ii. Encourage the use of Energy Efficient Appliances
iii. Perform Energy Audit
iv. Building Metering System
v. Building Energy Index
vi. Implement ASEAN Energy Management Scheme

Figure 30 Initiatives of energy and climate change cluster for 2019/2020

Besides all the planned initiatives by the university, faculties also conduct activities that lead to campus sustainability programs. One of the initiatives that has been carried out by Faculty of Computer Science & Mathematics, UiTM Shah Alam was their new building was designed so that more glass windows are used to promote energy saving through daylight saving as shown below.

Figure 31 Design of the buildings allows significant energy saving through daylighting

Apart from that, the UiTM student association also actively carries out activities that involve energy sustainability. One of the programs that has been conducted was the Renewable Energy Summer Programme 2019, a cooperation program between UiTM-Universitas Jayabaya, jakarta, Indonesia.

Figure 32 UiTM student association carries out activities that involve energy sustainability

3.4.4. Strategies and planning

To ensure the university's initiative towards this sustainability program, energy & climate change clusters have made a long-term planning. Table 6 shows the strategies that need to be continuously monitored in order to achieve the sustainability goal.

Table 6: Strategies to achieve the sustainability goal

Strategies	Actions	Means of Verification	Target Year	Status
Scheduling operation of equipment	To schedule chiller plant, street lighting, water pump and student academic timetable.	Electricity Bills	2025	Ongoing
Change to highly efficient air conditioning & lift	To replace the existing chiller with variable speed drive (VSD) system	Electricity Bills	2025	Ongoing
Ensure at least 1 building in the campus to be a smart building	To educate staff & student on smart building implementation		2025	Ongoing
Encourage awareness program	To propose each faculty must have at least one subject on the sustainable management energy.		2025	Ongoing

3.4.5. Activities and implementation

UiTM is currently in the process of replacing all electrical equipment to a more energy efficient device which can be seen from the energy rating for each equipment. As for the lighting system, the university is also in the process of replacing all the lights with energy efficient lamps which could save about 30% of electricity bills.

Figure 33 Energy efficient appliances

Another important activity that need to be conducted continuously is the awareness of energy usage to all campus community. All campus community should be educated on how to use energy efficiently in order to save on the electricity bills.

Figure 34 Awareness program on energy usage for switching, lighting and electrical appliances

3.4.6. Training for the technical staff

All the technical staff need to undergo a regular training course in order to know the method to perform energy audit and also how to identify significant usage in maintenance operations.

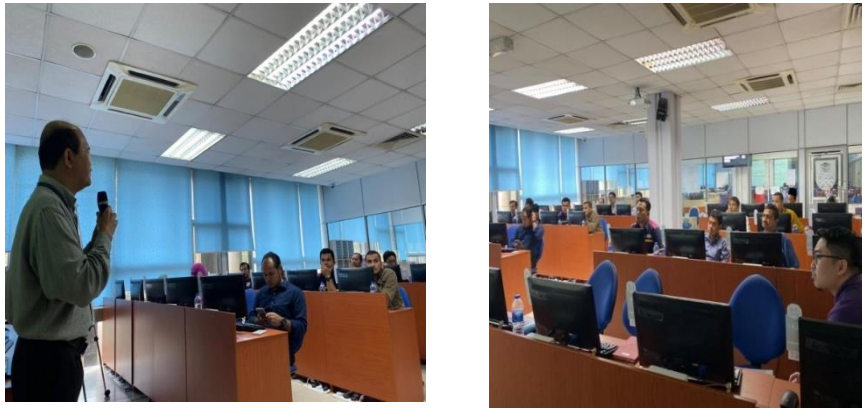


Figure 35 Training course for technical staff

3.4.7. UiTM Energy management policy

UiTM is committed to:

i. Consume energy efficiently in a continuous and comprehensive manner
ii. Ensure new development projects, renovations and upgrading to be cost-efficient with low energy consumption and maintenance costs.
iii. Mainstreaming green technology in all aspects of infrastructure development, energy generation, research as well as teaching and learning.
iv. Strengthen awareness among university populations on the need for energy conservation and saving as well as environment sustainability

Figure 36 UiTM Energy Management Policy

SDGs related to energy and climate change cluster

3.5 Education and Research

Universiti Teknologi MARA (UiTM) has begun to integrate sustainability principles in education and research to encourage campus community in endeavouring sustainability principles and practices.

Education and research are explicitly recognized in a number of the SDGs and universities have a direct role in addressing these. However, the contribution of universities to the SDGs is much broader, as they can support the implementation of every one of the SDGs as well as the implementation of the SDG framework itself. Some of these main areas of contribution are learning and teaching, research, organizational governance, culture and operations of the university and leadership.

At the level of higher education institutions (HEIs), sustainability practices remain in the early stage. University administrators and sustainability practitioners are exploring appropriate ways to integrate sustainability into institutional missions, strategies, curriculum, and daily operations. Universiti Teknologi MARA (UiTM) has begun to integrate sustainability principles in education and research to encourage campus community in endeavouring sustainability principles and practices.

This sustainability education and research includes the provision of sustainability-based courses, focus on grants that have elements of sustainability, the development of UiTM sustainability hubs as well as creating sustainability leadership from the student and staff levels of UiTM (campus community). These components have exemplified the future sustainability into education and research to strengthen the sustainability ecosystem in the campus.

The main goal of this component is to create sustainability-based education and research foster awareness of the importance of sustainability in the lifestyle of campus residents. The application of this sustainability is not limited to classroom education but exemplify research, co-curricular activities as well as the development of self-leadership as well those involving community activities.

3.5.1. Function of education and research cluster

Education component plays important roles as follows:

- To promote element of sustainability in curriculum and research.
- To nurture, educate best practices and strategies of sustainability in education and research among campus community.
- To collaborate with government and non-governmental agencies in empowering agenda of sustainability development.
- To strengthen university - community engagement in adapting sustainability agenda

Indicators for education and research cluster

For the education and research cluster, the performance indicator is divided into seven (7) indicators as in Figure 37 below.

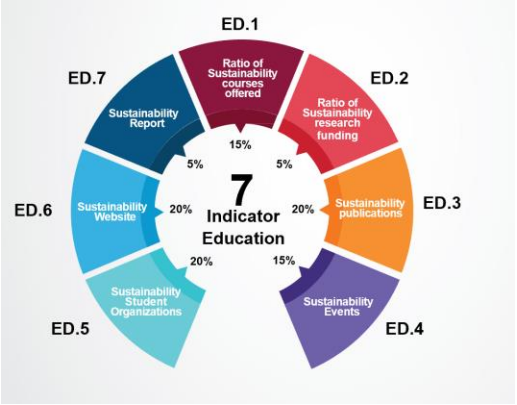


Figure 37 Indicators for education and research cluster

3.5.2. Summary achievement for 2019

Figure 38 below has summarized the performance of each component in education for 2019.

2266 courses Courses Related to environment and sustainability offered	**6,955844.21 USD** Research funds dedicated to environmental & sustainability research
361 publications published Scholarly publication on environmental and sustainability	**38 students organizations** Student organizations related to environment and sustainability

3.5.3. Education element description and performance

i. Courses

The individuals including the students and communities on campus must become sustainability change-makers. Therefore, it is crucial to require the knowledge, skills, values and attitudes that empower them to contribute to sustainable development. The approach of Education for Sustainable Development empowers learners with a mindset for sustainability to take informed decisions and responsible actions for environmental integrity, economic viability and a just society for present and future generations. These are to ensure that students are equipped with a mindset and key competences for sustainability, which, combined with their factual knowledge based, make them ready to take an action to ensure a sustainable future for our societies.

Knowledge based and curriculum about sustainable development may be organized in many and complementary ways, by creating and/or demanding learning outcomes related to the SDGs including research perspectives on the SDGs in the Master and PhD programs. There are two main approaches to this, 1) include SDG relevant topics in existing courses and 2) create new courses with direct focus on sustainability.

Figure 39 Course mapping learning outcomes related to the SDGs

All sustainable courses enable students to develop skills and knowledge to address issues in rapidly changing social, cultural, political and environmental contexts. These courses focus on the complex interdependencies between people, institutions and the built environment in pursuit of equity, efficiency and sustainability.

There are 2266 courses addressing SDGs that will give the student perspective to discuss the SDG specifically. Courses has addressed sustainability issues like quality education, water & sanitation, economic growth, livelihoods, climate action, property rights, environmental management, conflict, peace building and sustainable development as shown in Figure 40 below. Problem-oriented basic research on the SDGs also produces knowledge that can be integrated in established curriculum.

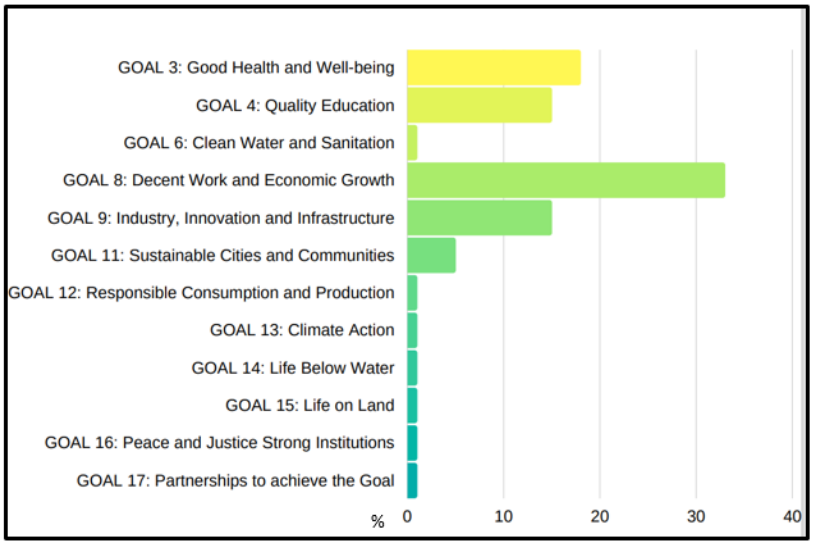


Figure 40 Courses addressed sustainability issues in the study programs

Engaging with the SDGs greatly benefits universities through learning and teaching by providing students with the knowledge, skills and motivation to understand and address the SDGs. In the future, the education aims to increase the students who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

Figure 41 Learning and teaching out of the class by providing students with the knowledge, skills and motivation to understand and address the SDGs

ii) Research Funding

In supporting the full spectrum of research approaches needed to address sustainability, a wide range of research approaches is needed to address the breadth and nature of the challenges posed by the SDGs. Table 7 shows research grant awarded for the year 2017-2019. These include interdisciplinary and transdisciplinary research that encourage and promote the SDGs as a topic of research within the university (Table 8).

Table 7: Total research grant awarded at UiTM for the year 2017-2019 (USD)

Year	Non-UIGM Grant (USD)	UIGM Grant (USD)	Total Grant (USD)	Percentage (%) (UIGM Grant)
2017	6,291,161.806	472212.7392	6,763,374.545	6.98
2018	31,402,188.59	437,097.9552	7,973,622.017	5.48
2019	4,674,530.107	6,955844.21	11,630,374.32	59.81

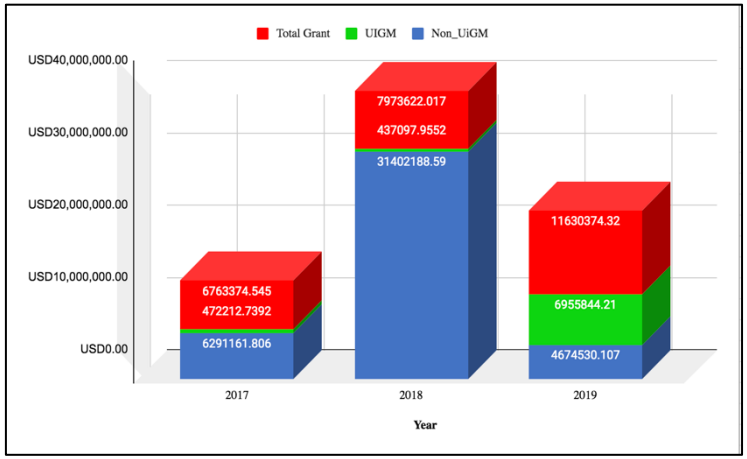


Figure 42 above shows the distribution of sustainability grant for 2017-2019 in bar chart

Table 8: List of grants which related to SDG for 2019

SDG	Topic of grant
1 NO POVERTY	• Developing a sustainability framework for social enterprises in Malaysia towards community governance • Modelling the determinants of educational technology acceptance in Malaysia • Analysis on micro-climate and soil properties for agricultural production in solar park • Poverty reduction through agropreneurship among youth in Sabah: developing a conceptual framework for an integrated agropreneur model
	• Co-integrated poverty and food insecurity mitigation framework for people with disabilities: a blockchain concept approach • Food security in urban areas of Malaysia: developing a new urban poor family business model using cognitive approach • Real-time monitoring of nutrient status in rice cultivation using normalized difference vegetative index (NDVI) • Smart urban farming for vegetables (V-surf)
2 ZERO HUNGER	
3 GOOD HEALTH AND WELL-BEING	• Developing an integrated model for the sustainability care of elderly people in Malaysia • Development of virtual lifestyle management program (e-smarthl) for promoting health behaviour change
4 QUALITY EDUCATION	• Gamification model for intrinsic motivational design in massive open online courses (MOOCS)
6 CLEAN WATER AND SANITATION	• Assessment of water scarcity-related drought index for water security in Malaysia • Sustainable water treatment for the Orang Asli village
7 AFFORDABLE AND CLEAN ENERGY	• An intelligent machine learning classification model of house ownership based on job mobility determinants • Morphological regularities of solar burst during solar activity due to geomagnetic storm and its effect to the geomagnetic induced current (GIC) level and climate change • Effect of sodium loading on clay based heterogenous catalysts for transesterification of waste cooking oil to biodiesel

	• Malaysian sustainable agribusiness value chain model: the moderating role of agriculture revolution 4.0 e-traceability • Modelling an integrated Islamic generating income model (IIGIM) in enhancing sustainable development goals (SDG)
	• Challenges and opportunities in digital transformation towards sustainable development: a case of Malaysia • Enhancement of environmentally benign hybrid sensor by using conducting polymer and waste shells • Formulating greenhouse gas emissions model due to equipment idling in construction • Mechanism of mechano chemical analysis in transforming palm oil fuel ash (POFA)and waste paper sludge ash (WPSA) into nano materials
	• A new framework for WAQF to solve ageing society problem • A comprehensive model to reduce income inequality amongst B40 in Malaysia • Profiling and segmentation of urban poor's children for better quality of life • Workplace violence, resilience and health-related quality of life (HRQOL) among nurses of government hospital in Kuala Lumpur and Selangor: a mixed method design

	• Mechanisms of drone-assisted technology on efficiency of mass disaster victim identification (DVI) • Developing a framework of inter-organizational coordination in humanitarian supply chain during flood disaster in Malaysia • A conceptual adaptive thermal comfort model for institutional buildings in equatorial Malaysia
	• Profiling key characteristics Malaysian dwelling aligned to the smart grid system • Conceptual framework for sustainable performance in green cleaning healthcare facilities
	• Disasters prone area
	• Optimization of effective microbes (EM) formula for freshwater lobster (LAT) growth improvement
	• The inclusion of survival value in adaptation-coping behaviour theory: explaining biodiversity • Tropical forest species recognition using hyperspectral sensor and lidar • Low-cost acoustic surveillance intrusion detection system for wildlife protection (ASIDS)

17 PARTNERSHIPS FOR THE GOALS	• By developing better mechanisms to instill collaboration and partnerships, potential exists to pool resources and deliver positive local development outcomes is important. UiTM has initiated collaboration with NGOs and local governments to strengthen the partnership whereby it also can help to explore sources of funding

In the 19th August 2019, to strengthen strategic partnership, UiTM have successfully signing the MOU with Shah Alam City Council (MBSA) under ASEAN SDGs Frontrunner Cities Program together with Urbanice Malaysia and Malaysian Institute Planners.

Figure 43 Appointment of Green Ambassador of Shah Alam City

In the MOU event, the Green Ambassador of Shah Alam were officially appointed as a catalyst to disseminate and implementing independently on green initiative in Shah Alam community. Five (5) UiTM's expert in Low Carbon City Framework were amongst the appointed Green Ambassador of Shah Alam city; Associate Professor Datin Dr Arnis Asmat (Faculty of Applied Sciences), Associate Professor Ramlan Zailani(Faculty of Mechanical Engineering), Assoc. Prof. Ts. Ir. Dr Hjh (CEng) Juliana Bt. Johari (Faculty of Electrical Engineering), Dr Siti Noor Hajjar Md Latip (Faculty of Plantation & Agrotechnology) and Dr Azlin Mohd Azmi (Faculty of Mechanical Engineering) (Figure 43).

The international partnerships are also established to accelerate in achieving the SDG's agenda with Institute for Global Environmental Strategies (IGES) (Figure 44), Figure Sustainability Research Collaboration Meeting with KASETSART University, Thailand (Figure 45) and with Kirk University, Thailand (Figure 46) and many more.

Figure 44 Documentary for Low Carbon City Framework (LCCF) by Institute for Global Environmental Strategies (IGES) under ASEAN SDGs Front Runner Cities Program

Figure 45 Sustainability Research Collaboration Meeting with Kasetsart University, Thailand

Figure 46 Sustainability Research Collaboration Meeting with Kirk University, Thailand

iii) Sustainability Publication

Most of the publications generated for sustainable publications are in the form of journal articles and proceeding papers with a total of 361 publications (Figure 47). This number is still growing considering that some of these projects are still on-going while output monitoring for completed programmes/projects are conducted for another 24 months after the programmes / projects concluded. All sustainable publications were selected which related to 17-SDG goals.

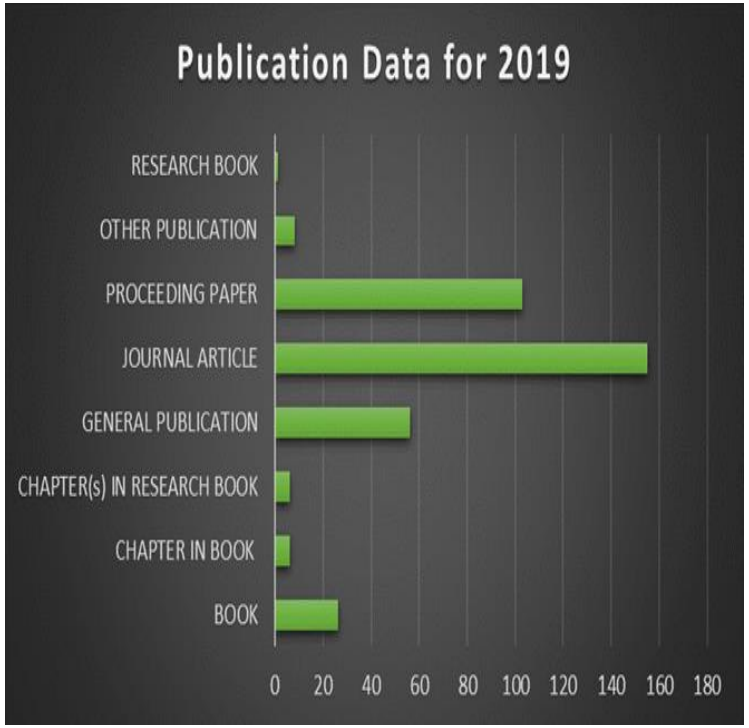


Figure 47 Total number of sustainability publications for UiTM in 2019.

In general, research directly addressing the SDGs in the abstract, title or keywords is constantly growing since 2015. This is also

true with regard to the different research areas. However, differences can be observed in the absolute numbers of research items per discipline. Shown below in Table 9 is the example of publications related to SDG9 (Industry, Innovation and Infrastructure), SD11 (Sustainable Communities & Cities), and SDG13 (Climate Action).

Table 9: Example of publications related to SDG9 (Industry, Innovation and Infrastructure), SD11(Sustainable Communities & Cities), and SDG13 (Climate Action)

SDG	Publication
	 
	

iv) Sustainability Events

A total 56 average per annum over last 3 years of events was conducted (e.g. conferences, workshops, awareness raising, practical training, etc.). Examples of events related to environmental and sustainability hosted or organised by the University Teknologi MARA campus Selangor in year 2017 – 2019 as in Figure 48.

Total number of 168 events were held in year 2017-2019 as in Table 10 and A total 65 average per annum over last 3 years of events was conducted (e.g. conferences, workshops, awareness raising, practical training, etc.).

Table 10: Event organized in each year 207, 2018 and 2019

Year	2017	2018	2019
No. of event	21	45	130

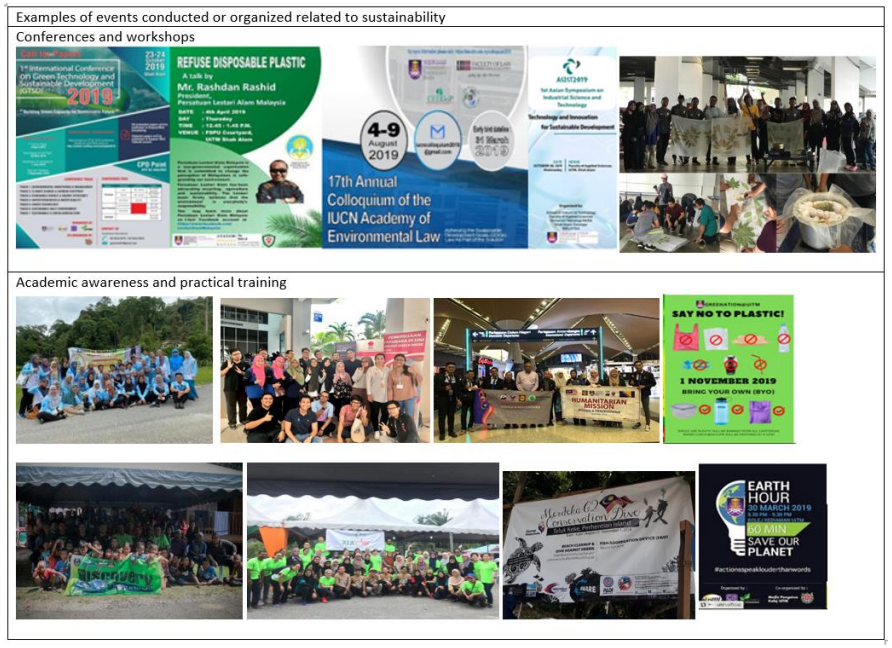


Figure 48: Examples of events related to environmental and sustainability hosted or organised by the University Teknologi MARA campus Selangor in year 2017 – 2019

Events conducted in the academic year of 2017-2019 were mainly based on the SDG 1, 2, 3, 6, 7, 9, 11, 12 and 14 where in general the activities were aimed to improve the surrounding community livelihood and their quality of life. Environmental based projects were also conducted to improve the environment via recycling projects and by protecting the marine lifeforms.

v) Student Organizations

Currently, UiTM has a total of 339 student organizations in various fields. From that total, 38 student organizations are related to sustainability. The list of student organizations that are related to sustainability is given in the Table 11 as below. In general, the student's associations are active in environmental issues such as Persatuan Jabatan Senibina Landskap, Persatuan teknologi Persekitaran (ETES), Environmental Law Awareness Club (ENLAC) etc. as shown in Table 11 below.

Table 11: The list of student associations that related to sustainability.

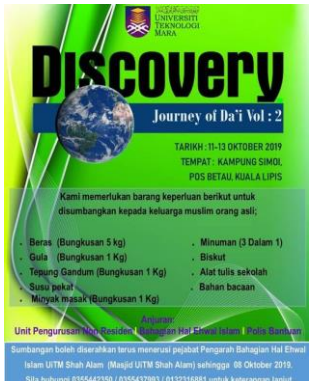
NO	CLUB/STUDENT SOCIETY	CODE NAME	SDG Related
1	Applied Chemistry Society	ACES	YES
2	Kelab Akuatik	AKUATIK	YES
3	Persatuan Reka Bentuk & Teknologi Kasut	REKA KASUT	YES
4	Kelab Rekreasi UiTM	KRESMA	YES
5	Persatuan Sarjana Muda Mekanikal	SARJANA MEKANIKAL	YES
6	Persatuan Pelajar Teknologi Makanan	PERTEMA	YES
7	Persatuan Teknologi Tekstil	TEXSAS	YES
8	Hiking and Camping Club	HACC	YES
9	Persatuan Pembimbing Rekreasi Luar	PERLU	YES
10	Persatuan Mahasiswa/wi Fakulti Pengurusan Hotel & Perlancongan UiTM	SHOCAM	YES

11	Persatuan Teknologi Persekitaran	PERSEKITARAN	YES
12	Jabatan Senibina Landskap	SOLAR	YES
13	Teknologi Persekitaran	PERANCANGAN	YES
14	Persatuan Pengurusan Taman dan Ameniti	AMENITI	YES
15	Persatuan Bangunan	BANGUNAN	YES
16	Persatuan Pelajar Senibina UiTM Architectural Students Association	ARCHISA	YES
17	Persatuan Kejuruteraan Awam	PERKA	YES
18	Persatuan Pelajar Biologi	BIOS	YES
19	Environmental Law Awareness Club	ENVIRONMENTAL LAW	YES
20	Persatuan Senibina Dalaman/ Interior Design Association	IDEAS	YES
21	Persatuan Teknologi Bio-Komposit	BIOKOMPOSIT	YES
22	Persatuan Pelajar Gugusan Sains Dan Teknologi	NEXSTEC	YES
23	Persatuan Agronomi	AGRONOMI	YES
24	Plantation Management Society	PLANTATION	YES
25	Agricultural Engineering Society	AGRICULTURAL	YES
26	Persatuan Sains Tanah	TANAH	YES
27	Persatuan Fisiologi Tumbuhan	FISIO TUMBUHAN	YES
28	Persatuan Pascasiswazah Perladangan Dan Agroteknologi	PASCA AGRO	YES
29	Plant Protection society	PROTECTION	YES
30	Plant Taxonomy Society	TAXONOMY	YES
31	Briged Sukarelawan UiTM	BRIGED	YES
32	IMeche UiTM Student Chapter	IMECHE	YES
33	MyAgrosis	MYAGROSIS	YES
34	Green Technology Society	GREEN	YES
35	Eco Friendster Club	ECOFRIC	YES
36	Eco Centric Club UiTM (Campuran Fakulti Kejuruteraan)	ECO CENTRIC	YES
37	Boiler & Safety Engineering Club	BOILER	YES
38	Association Of Built Environment Researchers (ANBER)	ANBER	YES

Generally, the student society is under the purview of Student Affairs Department and lead by Deputy Vice-Chancellor, UiTM. A committee is usually a prerequisite to form a society as they are vital components to making each society a success – after all, a society with no president or treasurer is hardly a society at all. Below is an example of committee for Environmental Technology Society and reflect a common model of committee at UiTM (Figure 49) and list of programs organized by student society which related to SDG as in Table 12.

Figure 49 Examples of committee for Environmental Technology Society and reflect a common model of committee at UiTM

Table 12: List of programs organized by student society which related to SDG

SDG	Student Programme
1 NO POVERTY	
2 ZERO HUNGER	
3 GOOD HEALTH AND WELL-BEING	

4 QUALITY EDUCATION	
13 CLIMATE ACTION	
14 LIFE BELOW WATER	 ASIA-UNINET international outreach programme- life under water

SDGs related to Education and Research Cluster

3.6 Transportation

Transportation cluster aims to synergize efforts in green transportation initiatives through reducing amount of greenhouse and pollutive gas emissions from transportation sector and to provide a greener environment for pedestrians and cyclists

3.6.1. Function of Transportation Cluster

Transportation component plays important roles as follows:

- To assess the amount of greenhouse gas emissions emitted from vehicles engine in the campus
- To provide solutions in reducing the amount of greenhouse gas emissions in the campus through efficient traffic management and effective transportation policies.
- To propose comprehensive plan in creating low carbon campus
-

3.6.2. Indicator for Transportation Cluster

For the transportation cluster, the performance indicator is divided into eight (8) indicators as in Figure 50 below.

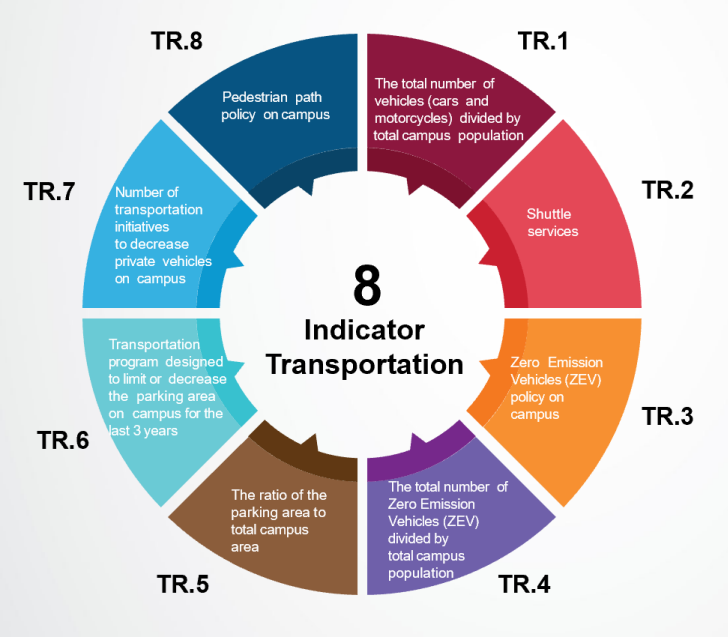


Figure 50 Indicators for transportation cluster

3.6.3. Initiatives of Transportation Cluster

The transportation cluster goal is towards a low carbon campus which is in line with national policy on climate change and MBSA low carbon city.

2019 Achievements

In 2019, the transportation cluster achieved **7** out of **8** targeted KPIs. In the future, we plan to enhance efforts to achieve all our KPIs. The following are the transportation KPI's which were designed and formulated based on the SWEET UIGM world ranking.

TR1: The total number of vehicles (cars and motorcycles) divided by total campus population
TR2: Shuttle services
TR3: Zero Emission Vehicles (ZEV) policy on campus
TR4: The total number of Zero Emission Vehicles (ZEV) divided by total campus population.
TR5: The ratio of the parking area to total campus area
TR6: Transportation program designed to limit or decrease the parking area on campus for the last 3 years (from 2016 to 2018)
TR7: Number of transportation initiatives to decrease private vehicles on campus
TR8: Pedestrian path policy on campus.

In order to achieve all the targeted KPIs, several activities were carried out in year 2019 as shown in Table 13 below.

Table 13 Activities to target KPIs

2019
TR1 & TR2: Data collection to survey and count number of vehicles in UiTM Shah Alam campus.
TR3, TR7 & TR8: Green Transportation @ UiTM Shah Alam meeting at MITRANS
TR4: Online survey: Perceptions of Public Transportation in UiTM Shah Alam
TR5 & TR 6: Parking Evaluation and Road Safety Audit to solve Road Traffic Problem by MITRANS

To continue our efforts towards achieving sustainability transportation in the UiTM's campus, several initiatives have been planned and executed as described below.

UiTM Shah Alam Campus, which covers an area of 300 acres, has various developments on the campus. With a high student population and staff of 47,717 students and 4,762 academic and non-academic staff contributed to the high use of vehicles. UiTM Shah Alam has a campus bus service and public buses that operate around the campus with the aim of providing facilities for UiTM residents and visitors to move around the campus area. The total number of campus buses allocated daily is 26 buses that operate on 6 different routes and operate from 7.00 am to 11.00 pm. For shuttle bus service, it has been operated for more than 20 years in UiTM Shah Alam campus. The services have expanded to nearby locations outside UiTM such as Section 2, Section 7 and i-Soho Shah Alam.

Figure 51 Daily Shuttle Bus Service in UiTM Shah Alam

To enhance mobility and green transportation in UiTM Shah Alam campus, MITRANS have conducted a meeting with Business Innovation & Technology Commercialization Centre (BITCOM), Bursary and HEP UiTM. The objective of the meeting is to discuss a plan to have electric buses for staff and student's usage in UiTM Shah Alam. The meeting was held on the 27th July 2019, also discussed the proposed route, budget, and suitability of the electric bus in UiTM Shah Alam campus. This is one of the UiTM initiatives to achieve UI Green Metric ranking.

Figure 52 Green Transportation Meeting @ Mitran, UiTM Shah Alam on 27th July 2019

Figure 53 Parking Evaluation conducted by MITRANS, UiTM

MITRANS have conducted parking evaluation studies throughout the UiTM area to assess parking problems on campus in February 2019. UiTM Shah Alam requires more attention on the parking issues. The feasibility and efficiency of the parking is investigated on traffic planning and management in UiTM Shah Alam. With the aim of exploring the elements related to parking demand and improving traffic in campus, this study analysed several factors relevant to vehicle ownership and usage which may affect the parking demand in UiTM.

To ensure the traffic safety in UiTM campus, a Road Safety Audit was conducted on 20th August 2020. The objective is to identify any potential hazards on the existing roads within the campus. This Road Safety Audit also could highlight any possible solutions to achieve a sustainable campus (e.g. traffic congestion, safety, road infrastructure).

Figure 54 Road Safety Audit was conducted on 20 August 2019

In addition, there are several proposals have been presented in year 2019 to promote green transportation in the campus as follow:

Proposal 1	Proposal 2	Proposal 3
Kertas Kerja Program: *"e-Scooter – Last mile transportation"* Pada: **Tahun 2019** Anjuran: Jawatankuasa Kelestarian Universiti Teknologi MARA (UiTM) Shah Alam	**Kertas Kerja** Program: **"Zero Emission Vehicles (ZEV)"** Pada: **Tahun 2019** Anjuran: **Jawatankuasa Kelestarian Universiti Teknologi MARA (UiTM) Shah Alam**	Kertas Kerja Projek: **'Shuttle Mini Bus for UiTM Community'** Pada: **Tahun 2019** Anjuran: **Jawatankuasa Kelestarian Universiti Teknologi MARA (UiTM) Shah Alam**

The first proposed project is to introduce 'e-Scooter' in the UiTM Shah Alam campus area to encourage UiTM Shah Alam staff and students to choose and use public transport or share vehicles as the main transportation option and finally use the 'e-Scooter' service to go to their desired destination ('last mile destination '). The planning of this 'e-Scooter' project will connect the UiTM Shah Alam campus with the main business centers in Section 2 and Section 7, Shah Alam.

The second project aims to provide Zero Emission Vehicles (ZEV) at the main campus of Universiti Teknologi MARA (UiTM) Shah Alam. This project will provide electric bicycles (E-bikes) as well as electric cars for the use of UiTM staff and students. This program could probably increase the percentage of UIGM index for UiTM campus, Shah Alam for the next following year.

The third proposed project is the long-term project of shuttle public transport services at the main campus of Universiti Teknologi MARA (UiTM), Shah Alam. This program is designed to provide free public transport services to UiTM citizens in particular minibus transport services and generally other public transport services such as taxis, uber, grab, rental cars and others. This program aims to improve air quality as well as the result of easier and efficient transportation services on campus as well as reduce the cost of living, and traffic congestion due to the increasing number of vehicles. With this initiative, it is hoped that the percentage of UiGM index for UiTM Shah Alam main campus can be increased from time to time.

Figure 55: Proposal 1- Proposed e-scooter in the campus as a last-mile mode of transportation

Figure 56: Proposal 2- Proposed project site for E-Bike (example)

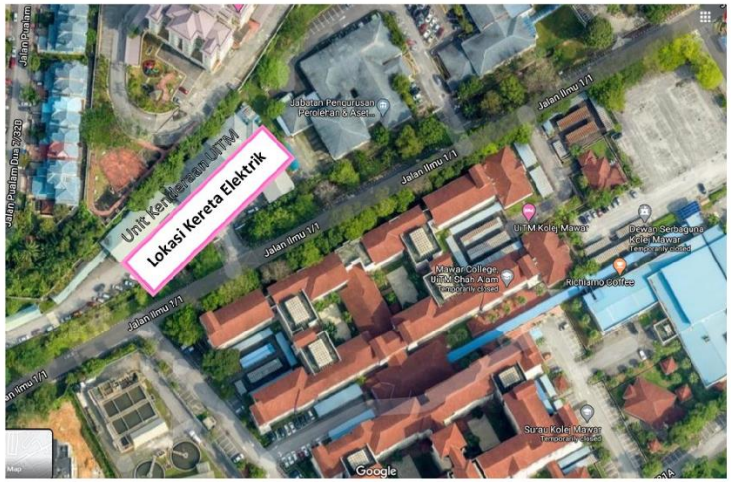


Figure 57: Proposal 2: Proposed project site for electric vehicle (example)

Figure 58: Proposal 3- Road network in the UiTM Shah Alam campus. Proposed new bus route should be accessible by all commuters.

Transportation cluster also plans to further improve our campus towards a sustainable campus by (1) Improve public transport sharing mode, (2) Encourage active mode of transportation (Examples: cycling and walking), (3) Reduce the number of vehicles on campus by encouraging "Open-Distance Learning" and / or "Blended-Learning" learning, (4) Increase the efficiency and frequency of the Public Transport System (Example: Bus), (5) Efficient and efficient shuttle bus management, (6) Shuttle bus routes should be provided for all parking spaces, (7) Prepare a pedestrian route management planning plan on campus, (8) Improve the effective pedestrian walkways provided by the university from time to time, (9) Introduce e-scooters that connect the main campus to the business district area, (10) Regular traffic flow management, (11) Change the gazetted parking status (i.e. less used parking area) to another facility, (12) The evaluation of underused parking studies will be closed, (13) Improve the shuttle bus service provided by the university, regularly and for free,(14) Reduction of speed limits allowed on campus (25km / h) to reduce

air pollution, noise and tremors, (15) Gazette the no vehicle area, (16) Transportation carnival (Examples of activities: campaigns - awareness and safety), and (17) Implementation of Clamping System as a whole.

SDGs related to transportation cluster

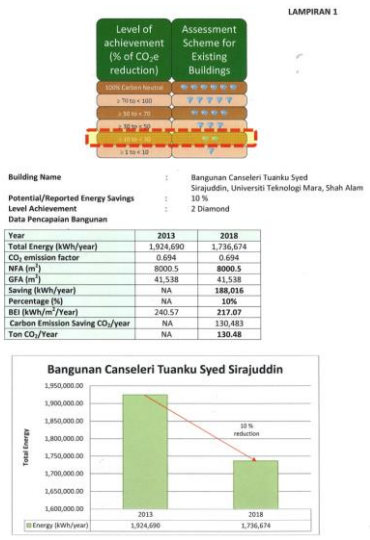
4.0 Awards and Recognitions

Universiti Teknologi Mara Shah Alam Ranked Top Ten Most Sustainable Malaysian University in UiGM 2019

UiTM was ranked 10th Most Sustainable Universities among 20 others Malaysian IHL listed in UI Green Metric World University 2019 and listed at 183 from 780 participated universities all over the world.

This is the first UiTM participation in UI-Green Metric ranking that was initiated in 2010 which specifically measure the campus sustainability and effective environmental management

Universiti Teknologi Mara Shah Alam Towards Low Carbon Campus 2030



SEDA Malaysia Sustainable Energy Low Carbon Building Assessment GreenPass Operation

5.0 Key Actions for 2020/2021

Key Area	Action
Setting and Infrastructure	• To initiate as many as possible the programme or activities in planting trees and vegetation program • To encourage campuses and faculties to establish mini garden, vertical garden and roof top garden in their buildings • To report your activities and initiatives related in greening the campus in the form given.
Waste	• To initiate as many as possible the programme or activities that can reduce the use of plastic and papers. • To conduct recycling activities among students and staff. • To separate all types of waste from sources. • Organic waste - Apply treatment as much as possible for food and green waste. Example of treatments are composting or anaerobic digestion. • Inorganic waste – recycle as many as possible for other purposes or provide appropriate bin to collect e-waste and hazardous waste like batteries • Toxic waste – appoint authorised vendor for collection and treatment • Consider conducting research in advanced treatment process for sewage or collaborate with authorised agency • Report your activities and initiatives related to waste management efforts in the form given.
Water	• To initiate as many as possible the programme or activities that can reduce the water consumption. • To reuse and reclaim water • To develop rainwater harvesting system • To organize water saving campaign • To conduct research in water management or collaborate with authorised agency • To report your activities and initiatives in water management efforts the form given.
Energy and Climate Change	• To initiate as many as possible the programme or activities in energy saving campaign

	• To purchase new electricity equipment with energy efficiency function • To encourage the use of LED bulb for lightings • To report your activities and initiatives in energy efficiency programs in the form given.
Education and Research	• To initiate as many as possible the programme or activities on sustainability development • To promote element of sustainability in curriculum and research. • To nurture, educate best practices and strategies of sustainability in education and research among campus community. • To collaborate with government and non-governmental agencies in empowering agenda of sustainability development. • To report your sustainability activities and initiatives in the form given.
Transportation	• To initiate as many as possible the programme or activities in sustainable transport program, e.g: electric cars, bicycle, walking, electric bus etc. • To collect the data on no. of staffs and students driving electric cars. • To encourage carpool and public transportation in campuses.
	• To report your activities and initiatives in sustainable transportation initiatives and program in the form given.

6.0 Conclusions

In accelerating the adoption of the 2030 Agenda and the SDGs in higher education, a number of issues need to be considered carefully as key consideration to moving forward. The university is ensuring that the spirit of the 2030 Agenda trickles down to all levels of campus community and makes real impacts.

Moreover, in ensuring the comparability of these indicators as a holistic way while also balancing the needs and costs of collecting the data and information, will be needed. Developing the SDG indicators will require a major investment of resources. Digital technology (e.g., developments in big data and open data) presents an opportunity to collect information systematically and routinely, especially since indicators are numerous. The development of *e-report* Greenation@uitm on campus sustainability need to be understood and the responsibility all the unit/department/faculties/centers/state campuses to regularly declare required data through the system.

Sustaining the commitment of numerous stakeholders, within and outside of university is important to achieve SDG-17, likewise is a major challenge. It is important to sustain the commitment and momentum of key stakeholders and partners in this journey towards the 2030 Agenda. Internationally and nationally, UiTM is committed to sharing experiences and technical knowledge in implementing the SDGs, not only within the university but also through other avenues. Securing resources for SDG implementation is a key priority in exploring the next steps for implementation and resource needs, as well as possible means for developing stronger partnerships, innovative resource

mobilisation mechanisms and data readiness necessary for better implementation.

Any queries concerning the content of this report can be directed to Prof Zakiah binti Ahmad, UiTM Chairman of Sustainability Committee at zakiah@uitm.edu.my or Dr. Nur Kamaliah Mustaffa, UiTM Co Chairman of Sustainability Committee at nurkamaliah@uitm.edu.my. Further information can be found at the Greenation@UiTM website at:
https://greenation.uitm.edu.my/.