



UNIVERSITY OF MALAYA

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ECO-CAMPUS BLUEPRINT

PELAN PEMBANGUNAN EKO-KAMPUS UNIVERSITI MALAYA

A Joint Initiative:



Sustainability science

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK



Title:

**University of Malaya Eco-Campus Blueprint
(UMECB)**

**First Edition 2016
Second Printing 2017**

ISBN 978-983-100-910-9
[Perpustakaan Negara Malaysia]

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Published in Malaysia by
Sustainability Science Research Cluster
University of Malaya

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GLOSSARY

Terms	Definition and relevant information
Eco-Campus	: Campus which emphasizes interests of the initiative on conserving the natural surroundings and promoting sustainable lifestyle in a holistic manner with involvement and participatory of all stakeholders
Sustainable	: A state or condition able to be maintained at a certain rate or level, continuous
Action Plan	: It is a statement of what you want to achieve over a given period of time.
Energy Efficiency	: A means to reduce the amount of energy required to provide products and services.
Standard Operating Procedures (SOP)	: A set of step-by-step instructions created to help workers carry out routine operations. Their purpose is to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply to regulations.
Milestone	: An important point in the progress or development of something
National Green Technology Policy	: Policy which governs and oversees the development and application of products, equipment and systems used to conserve the natural environment and resources, which minimizes and reduces the negative impact of human activities. The policy is based on four primary pillars: energy, environment, economy and social perspective.
Stocktaking	: The act of appraising a present situation, condition, degree of progress, etc., in terms of accomplishments and ultimate goals.
Interested parties	: A person or group that has a stake in the success or performance of an organization. Interested parties may be directly affected by the organization or actively concerned about its performance.
Stakeholder	: A person, group or organization that has interest or concern in an organization. Stakeholders can affect or be affected by the organization's actions, objectives and policies.

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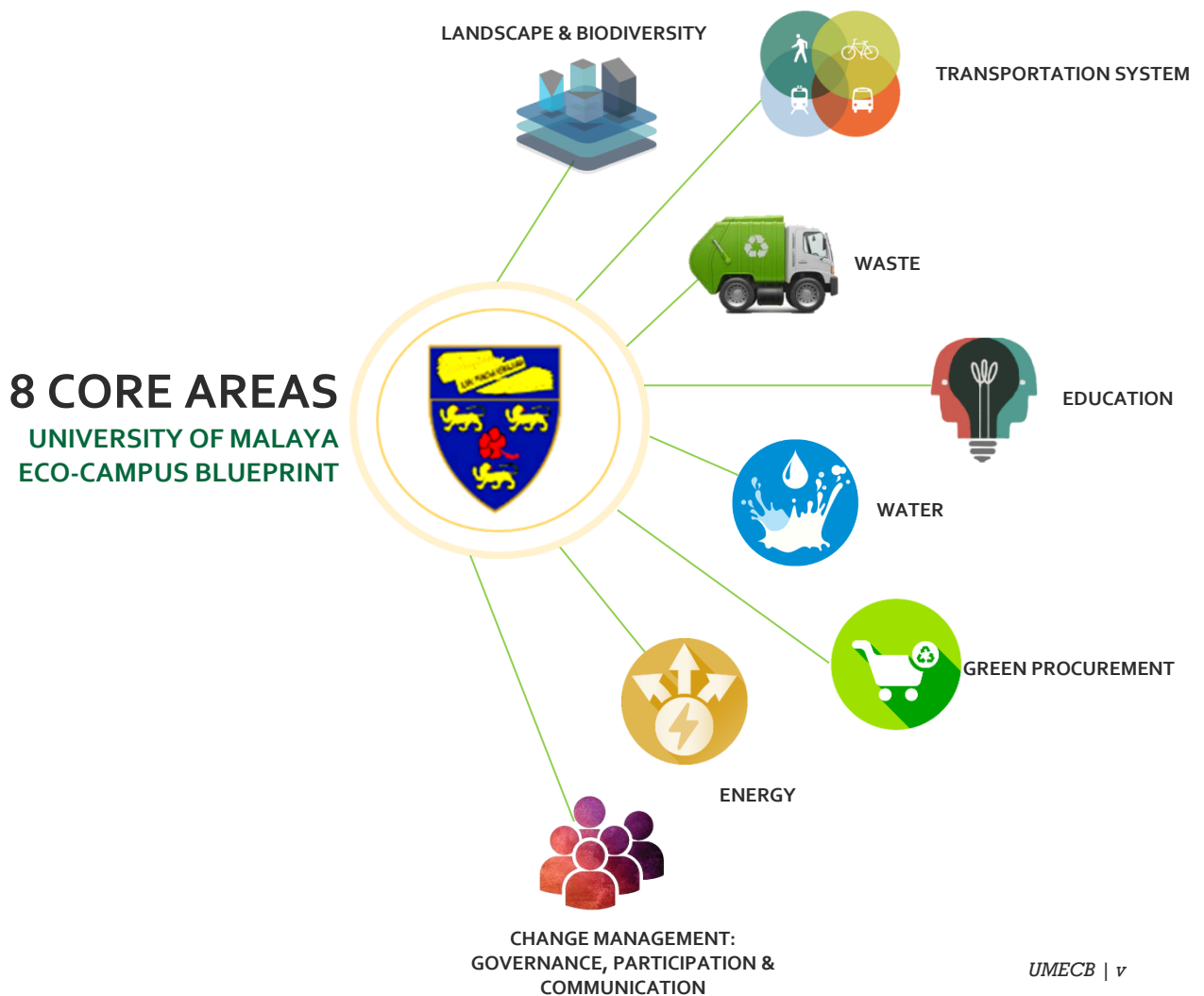
ACRONYM

UMECB	University of Malaya Eco-Campus Blueprint <i>Pelan Pembangunan Eko-Kampus Universiti Malaya</i>
UMCSR2015	University of Malaya Campus Sustainability Report 2015 <i>Laporan Kampus Lestari Universiti Malaya 2015</i>
SuSci	Sustainability Science Research Cluster <i>Kluster Penyelidikan Sustainability Science</i>
UM	University of Malaya <i>Universiti Malaya</i>
JPPHB	Department of Development and Estate Maintenance <i>Jabatan Pembangunan dan Penyelenggaraan Harta Benda</i>
RC	Responsibility Centers <i>Pusat Tanggungjawab (PTj)</i>
WW	Water Warriors
ZWC	Zero Waste Campaign
UM SDSN	University of Malaya Sustainable Development Solutions Network

UNIVERSITY OF MALAYA ECO-CAMPUS BLUEPRINT

EXECUTIVE SUMMARY

University of Malaya Eco-Campus Blueprint (UMECB) is a guideline that gives emphasis to eight (8) Core Areas of University of Malaya (CAUM), namely (1) Landscape and Biodiversity Management, (2) Waste Management, (3) Water Management, (4) Energy Management, (5) Transportation System Management, (6) Green Procurement, (7) Education Management - Environment and Climate Change, and (8) Change Management in Governance, Participation, and Communication. All eight core areas identified as a field that requires commitment and holistic approach cutting across disciplinary, expertise, responsibility center (RC) which involves the top management of UM, academic and non-academic staff and students. UMECB sought to be an aspiration in a form of University of Malaya commitment as one community working synergically toward a more sustainable campus in the future. All action plan is displayed in the form of short term plans and long term plans to give room of opportunity to the campus community to take proactive measures, by stages, as a show of support towards promoting the University of Malaya as one of the prominent Eco-Campus model at the local, regional, and international level in tandem with UM status as a premier and leading universities.



UNIVERSITY OF MALAYA ECO-CAMPUS BLUEPRINT



WELCOME LETTER FROM VICE-CHANCELLOR UNIVERSITY OF MALAYA

Assalamualaikum w.b.t and Greetings,

In the initial phase of the introduction of the concept of sustainable development, it seems to bring a new mindset in the field of environment and development of the country. In the context of sustainable development, 'development' must keep pace with environmental concern on the background so that the process does not leave a negative impact on people and the environment in particular. For the campus sustainability initiatives, it can be traced back in phases since the 1990s, for example through the establishment of the Malaysia University Consortium for Environment and Development (MUCED), courses offered based on the environment at the faculty level, and also the recognition of the University of Malaya Environmental Secretariat (known as UMCares). In 2014, the University introduced the UM Living Labs Program for the first time to the campus; a new form of experimental and exploratory in promoting campus sustainability initiatives focus on three key areas: water management (Water Warriors), waste management (Zero Waste Campaign), and landscape & biodiversity management (The RIMBA Project). I hope that such efforts have the potential to exhibit and to be a model of best practices encouraging all parties (UM management team, staff and students) to work together to achieve a common goal, namely towards a sustainable campus. Basically, the sustainability initiative at the University of Malaya is still in the development phase (work-in-progress), and once again I emphasize that it is a process that requires a level of deep understanding and strong commitment from everyone at the University of Malaya.

With a new sustainability mindset, I am pleased to share a document entitled University of Malaya Eco-Campus Blueprint (UMECB) to all citizens, especially the UM campus; a document in a form of guidelines which includes a framework and action plans which provide the basic referral point for all staff and students to assist, support, and eventually to achieve our goal towards the University of Malaya as an Eco-Campus at the department / faculty / Responsibility Centers (RCs) respectively. UMECB is the result of a joint venture led by Sustainability Science Research Cluster (SuSci) with University of Malaya Sustainable Development Solutions Network (UM SDSN), the Department of Department of Development and Estate Maintenance (JPPHB), input contributors, consists of academic community and students across various disciplines. UMECB displays eight (8) Core Areas of University of Malaya Sustainability Initiative: landscape and biodiversity management, waste management, water management, energy management, transportation system management, green procurement, education management, and change management in governance, participation, and communication. The entire University community, especially the stakeholders should take proactive measures to ensure the sustainability of the commitment and achievements of the University progress hand-in-hand with outstanding academic performance and research achievements.

Thanks to everyone for their willingness and efforts to work together to ensure the University of Malaya is another step forward toward a sustainable and eco-campus.

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WELCOME LETTER FROM DEPUTY VICE-CHANCELLOR (RESEARCH & INNOVATION)

Assalamualaikum w.b.t and Greetings,

Research Portfolio is one of the main components in the vision and mission of University of Malaya to achieve the status of leading institutions of higher learning at the national and international levels. In an effort to boost the research activities at the University, various research grant scheme has been offered by the university.

It is undeniable that some of the areas of research that are getting attention and response in the arena of current research trends include research project which is 'translational', 'solutions-driven', the theme of sustainable development, environmental sustainability, and social development.

Thus, through proactive initiatives and measures taken up by Sustainability Science Research Cluster (SuSci) which is fully supported by the UM Research Management, starting in the 2015-2016 session, UM for the first time introduced another concept of research grants known as 'University of Malaya Living Labs'.

UM Living Labs program is a one step 'experiment' which combine two main components, namely research and sustainable campus transformation plan. UM Living Labs emphasizes the concept of sustainable development which will focus on a few core areas such as water management, waste management, energy management, transportation management systems, and landscape and biodiversity management. A new element is introduced which requires research to support the aspirations of UM to be among the leading eco-campus while promoting the participation of the entire campus; rarely visible in other research grants or program.

I would like to congratulate and thanks the SuSci Research Cluster and all individuals involved in the publication of an important document of 'University of Malaya Eco-Campus Blueprint' (UMECB) which provide user-friendly guidelines for the development of sustainable campus and support efforts to promote translational and transformative research. I hope this document can be utilized and should be practiced by all campus community, particularly researchers involve directly or indirectly in any of the Eight Core Areas of UMECB as a sign of support to the development of eco-campus.

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WELCOME LETTER FROM DEPUTY VICE-CHANCELLOR (DEVELOPMENT)

Assalamualaikum w.b.t and *Salam Lestari*,

The University of Malaya is well-known as a leading institution of higher learning in Malaysia in accordance with its status as the oldest university in Malaysia history established on October 8, 1949. One of the aspects that contribute to the branding of the University of Malaya in the public eye is the aspect of infrastructure development which is coherent with the vision and mission of the university. In line with UM achievements in various areas, UM Development Management team strongly support the aspirations of all initiatives towards making UM as an eco-campus such as UM's annual participation in the University of Indonesia GreenMetric World University Ranking. There are three main thrusts in development management in UM which shape the aspirations and direction of UM namely (1) continuous improvement project management, (2) the empowerment of staff at the responsibility centers (RCs) and residential colleges, and (3) strategy of rebranding the University of Malaya. All of these core is pertinent to consistently support UM to become an eco-campus university.

Here is some development initiatives undertaken by the Department of Development and Estate Maintenance (JPPHB) in collaboration with the Information Technology Centre (PTM); (1) Administration: cleaning services of buildings, including afforestation effort in campus (tree planting and landscape management) and eradication of pests and waste disposal, (2) Property Management Division: preparation of inventory system for building blocks toward a more systematic asset management system, (3) Civil Engineering and Development: the conservation of the physical quality of the campus to enhance the image and surrounding environment of UM to be more sustainable, (4) Mechanical Engineering Division: maintenance and prevention efforts, including the maintenance of UM official vehicles such as HEP buses, and (5) Electrical and Electronic Engineering Division: ensuring efficient consumption of electricity and efficient telecommunication system such as the use of LED lamps for lighting systems with sensor by phases, across campus renovation project known as the CUBE which successfully incorporating smart technology innovation and energy efficiency, as well as construction of Green Building. The management of development also contributes in the area of risk prevention with the setup of early disaster prevention systems such as flash floods around the campus. All these initiatives were carried out without neglecting the participation and active contribution of the campus and it can be realized in the concept of Eco-Campus and University of Malaya Living Labs (in its initial phase that has been successfully applied through the Water Warriors, The RIMBA Project, Zero Waste Campaign and Rainwater Harvesting).

I sincerely hope that the University of Malaya Eco-Campus Blueprint (UMECEB) could serve as general guidelines for the entire campus, especially the university management, staff and students in supporting the aspiration of transforming UM as an Eco-Campus University.

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SUSTAINABILITY NOTE FROM DEAN, SUSTAINABILITY SCIENCE RESEARCH CLUSTER

Assalamualaikum w.b.t and *Salam Lestari*,

Today, the issue of environment and sustainability poses a challenge faced by all communities in the world. Sustainability Science has its origins in the concept of sustainable development as proposed by the World Commission on Environment and Development (WCED) in 1987 aims to achieve the status of sustainable and balanced society and well-being between physical development and environmental protection. In tandem with such progress and demands, efforts to enhance sustainability science discipline is also increased in the academic field in a form of course offerings, academic publications, and research in multi-field contributed to the sustainability science.

Sustainability Science Research Cluster at the University of Malaya plays a role as a catalyst to encourage research and initiatives in a holistic and comprehensive manners to solve problems and perspectives relevant toward a sustainable world, social, and human life system.

University of Malaya Eco-Campus Blueprint (UMECB) a first document produced in University of Malaya 'journey' towards sustainable campus or eco-campus. This journey requires attention, support, cooperation and commitment of all stakeholders and any individual or party willing to support sustainability initiatives in a holistic and inclusive manner. The campus community should be given opportunity and platform it deserves either at the planning phase, implementation, and continuous development of University of Malaya sustainability initiatives. At SuSci, we believe that the campus community should be informed on performance and progress of the University of Malaya annually. It is important to allow each one of them to be given the opportunity to contribute input, ideas, views, or efforts in campus sustainability initiatives.

We hope this document can be used as a basic guide for each of the RCs in the University of Malaya as a model of framework and action plans that can be applied according to their capacity and resources. We would like to express our appreciation and thanks to all input contributors (academic, technical, staff and students) to ensure the success of University of Malaya Eco-Campus Blueprint (UMECB).

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INTRODUCTORY NOTE FROM PROGRAM LEADER, UM SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK

Assalamualaikum w.b.t and *Salam Sejahtera*,

University of Malaya Sustainable Development Solutions Network (UM SDSN) is a unit of a network in the University of Malaya established in 2014 under the initiative of the office of Deputy Vice-Chancellor Research & Innovation. UM SDSN envisaged to become a recognized sustainability referral center in multi-, inter-, and trans-disciplinary approach in supporting University of Malaya endeavors on sustainable development. Hence, UM SDSN is entrusted as a unit under the office of the Sustainability Science Research Cluster and reporting to the Deputy Vice-Chancellor of Research & Innovation.

In 2015, this unit has been entrusted to lead the coordinating efforts in several sustainability initiatives on the campus especially on the participation of UM in Universitas Indonesia GreenMetric World University Ranking which led to the preparation of University of Malaya Campus Sustainability Report 2015 (UMCSR2015). The effort continues with the preparation of University of Malaya Eco-Campus Blueprint (UMECB) in Malay which was launched in April 2016 in tandem with the celebration of UM111 @ SuSci 2016. In mid 2015, UM SDSN have strengthened its network through invitation to be part of the coordinating team which later become Secretariat for the Youth for Education on Sustainable Development and Peace (YESPeace) Network Malaysia Chapter with close collaboration with the Sustainable Development Solutions Network (SDSN) Malaysia Chapter and UNESCO Mahatma Gandhi Institute of Education for Peace and Sustainable Development (UNESCO MGIEP); a "UNESCO category One Institute" of its kind.

Throughout these years, UM SDSN is closely assisted and supported by the Sustainability Science Research Cluster, UM Living Lab Programs, YESPeace and UM SDSN Core Volunteers as well as the team assistants consist of students and staff. Thanks to all for your time, energy and support.

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1.0 INTRODUCTION & BACKGROUND

Universiti Malaya through the initiative of Sustainability Science Research Cluster (SuSci) set a target of 2016 to be the year to focus on preparing the campus toward achieving the eco-campus status and a more promising sustainable future. As a result of the participation of the University of Malaya in UI GreenMetric World University Ranking 2015, University of Malaya Sustainable Development Solutions Network (UM SDSN), a new unit established in 2014 under the supervision of SuSci taken up the active role to give support to lead the effort to identify the current state of UM sustainability initiatives with close collaboration and positive response of relevant responsibility centers (RCs) in UM.

Thus, realizing the importance of sustainable campus which requires holistic and transdisciplinary approach as well as a network of campus community with surrounding community, the year 2016 become a new starting point with the preparation of University of Malaya Eco-Campus Blueprint (UMECB). UMECB is a continuation of the preliminary document of the University of Malaya Campus Sustainability Report 2015 (UMCSR2015), the first edition published in 2015. UMECB should be viewed as an important component and referral point in coordinating and facilitating all necessary action plan for campus sustainability initiatives. UMECB consists of eight (8) core areas, namely:



1) CAUM01: Landscape and Biodiversity Management

The first Core Area of UM Eco-Campus Blueprint is seen as one of the essential element pertaining to landscape management which is aligned with the preservation and conservation efforts of biodiversity in the campus.



2) CAUM02: Waste Management

Waste management is a day-to-day non-stop business, seven days a week which requires attention and a strong commitment to ensuring that all waste on campus is manage in an orderly manner and in accordance with established procedures. The second core area of Eco-Campus Blueprint is coordinated by UM Living Lab (Zero Waste Campaign) with close cooperation with JPPHB pertaining to technical advice and expertise. This area also requires the cooperation of the café operators in the campus; where food waste covers an average of approximately 40 % of the overall composition of the waste on campus.



3) CAUM03: Water Management

Water is one of the main commodities and basic elements of the life of an ecosystem. UM needs a systematic and sustainable water management in order to minimize the cost of its expenditures on high water bill payments as a result of wasteful water consumption pattern of the campus community. The third core areas of Eco-Campus Blueprint emphasize on a guideline on the reuse of rainwater through the application of 'rainwater harvesting system' concept. In addition, water is also used as an element of leisure and recreation in UM through collaborative efforts on the conservation and revival of UM Varsity Lakes taken up by UM Living Lab (Water Warriors), JPPHB and Sports Center, University of Malaya.



4) CAUMo4: Energy Management

The fourth core areas of UM Eco-Campus Blueprint provides information on energy management. In this section, energy would refer to electricity and alternative energy that is currently used in UM. Efficient energy management integrated with intelligent building applications (smart building) and application of energy saving equipment (energy efficiency) have the potential to help UM to reduce the burden of annual payment of electricity bills that keep increasing from year to year.



5) CAUMo5: Transportation Management

Transport is one of the contributors to the increase in carbon footprint. Hence, we should look forward toward initiatives and guidelines that are more environmentally friendly. The campus community should be provided with a good infrastructure and 'friendly' policies to ensure that UM campus community particularly students which is the largest population in campus can equally contribute to and support the efforts of campus sustainability initiatives more effectively. This core area requires continuous support, action and monitoring from all RCs especially the UM Security Office (in and out of the campus traffic, UM vehicle stickers, and the use of vehicles on campus), Student Affairs (campus bus services), and JPPHB (campus bus services and UM official vehicles).



6) CAUMo6: Green Procurement

Green Procurement is an integration of new elements to be introduced in the procurement procedure in University of Malaya; this is considered as preparation towards to the implementation of the Government Green Procurement (GGP). GGP refers to the procurement of supplies, services and works in the Malaysia Government by emphasizing environmental standards in order to conserve the environment and natural resources, as well as to minimize or reduce negative effects on the environment and natural resources caused by human activities.



7) CAUMo7: Education Management – Environment & Climate Change

Formal or informal education is considered as the most important medium in ensuring the continuity of any long-term efforts for sustainability of campus. The existing curriculum of UM is viewed relevant in the field of sustainability, sustainable development, climate change or environmental management and this should be the focus of environmental awareness or global climate change message to the campus citizen. In addition, the process of teaching and learning (P & P) and also the usage of the latest technology applications should be utilized as a model. Discussions using the concept of case studies are examples of effective instructional strategy. Stakeholders for CAUMo7 includes the Academic Division, Students' Affairs & Alumni Division, and UM academic community.



8) CAUMo8: Change Management - Governance, Participation & Communication

The final Core Area of UM Eco-Campus Blueprint concerning the aspects of management, governance, participation, and communication. Transformation towards a green and sustainable campus requires proper and in advance planning process, and taking into account all core activities of the university: teaching, research, development, community-and-industrial engagement, and networking. Strategic and efficient governance help facilitate the implementation of green and sustainable campus policies and it needs support in a form of a holistic participation and involvement of various parties; students, staff, university higher management and relevant stakeholders of various levels and backgrounds. The transformational and change process at the institutional level is long-term in nature and require continuous improvement. Through strong internal transformation, UM will be prepared to play a greater and leading role in greening and sustainability efforts at the local, national, regional and global level.

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- Vice-Chancellor of University of Malaya
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- Deputy Vice-Chancellor (Research & Innovation) University of Malaya
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2.0 METHODOLOGY & MILESTONE OF UMECB



- **PRE-PHASE:** Discussion at *Sustainability Science* Research Cluster level and assigning lead task to UM SDSN
- **PHASE 1:** *Desktop Research* by UM SDSN
- **PHASE 2:** Shortlisting important stakeholders involves in campus sustainability initiative.
- **PHASE 3:** Series of Roundtable Discussion between UM SDSN, SuSci, JPPHB & UM Living Lab
- **PHASE 4:** Data Collection, Interviews, Desktop Research, Telephone and Email Communications.
- **PHASE 5:** Final Discussion: Finalization of Data for UMECB
- **PHASE 6:** Data updates and submission of UMECB to SuSci
- **PHASE 7:** Official Launching of UMECB (Malay Version) in April 2016 and Preparation of UMECB (English Version) for printing.



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CAMPUS LANDSCAPE

Forest, Planted
Vegetation Areas, Green
Areas, & Non-Retentive
Surfaces for Water
Absorption



Landscape and biodiversity management at the University of Malaya are currently managed by the JPPHB in collaboration with UM Living Lab: The RIMBA Project and RIMBA Ilmu.

The RIMBA Project initiative began in 2014 with a focus on environment and biodiversity education. RIMBA organized a variety of programs include environmental photography exhibitions, activities such as birdwatching, frogging), tree walks, a visit to the Rimba Ilmu and series of mapping workshop and tree saplings harvesting.

3.1.1 Campus areas covered by Forest Plantation (%)

30.4%

[Source: UM Living Lab – RIMBA & FRIM 2013]

3.1.2 Campus areas covered by Planted Vegetation (%)

22%

[Source: UM Living Lab – RIMBA & FRIM 2013]

3.1.3 Campus Green Areas (%)

52.4%

[Source: UM Living Lab – RIMBA & FRIM 2013]

3.1.4 Non-Retentive Surfaces areas for water absorption (%)

47.6%

[Source: UM Living Lab – RIMBA & FRIM 2013]

Data provided in this section is a summary of one of the assessment criteria required for the data submission of *Universitas Indonesia GreenMetric World University Ranking 2015: Setting and Infrastructure*



3.2 Waste Treatment and Waste Recycling Program

Organic and Inorganic Waste Management in UM is currently managed by UM Living Lab: Zero Waste Campaign (ZWC) in collaboration with JPPHB. Among ZWC's core activities are the production of compost from waste collected, campaign as well as educational workshops and awareness about the importance of waste management, segregation at source, recycling, 3Rs and electronic waste campaign.



Waste Collection Data in UM October 2014 - September 2015

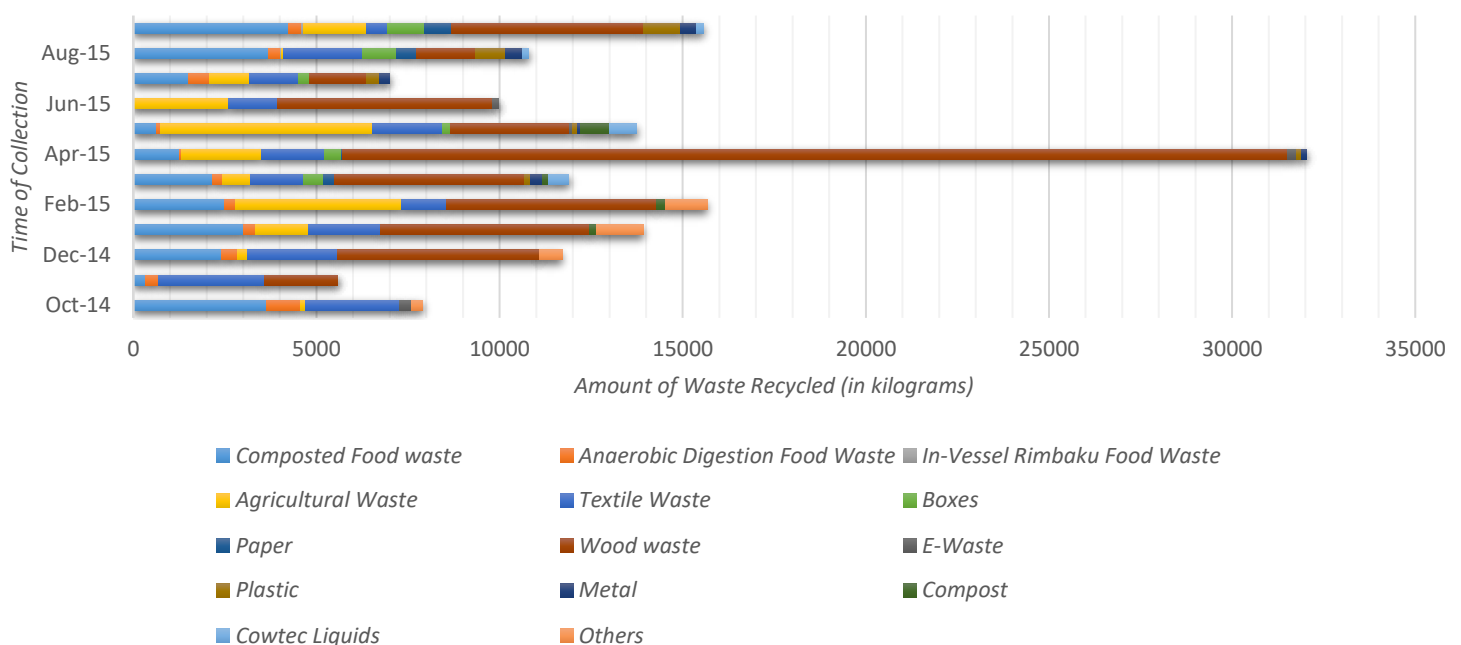


Figure 2.1: Waste Collection in University of Malaya in Different Categories from October 2014 – September 2015 (one year time frame)
[Source: UM Living Lab - Zero Waste Campaign]

Data provided in this section is a summary of one of the assessment criteria required for the data submission of Universitas Indonesia GreenMetric World University Ranking 2015: Waste Management

WATER MANAGEMENT IN UM



3.3.1 Water Usage in UM Main Campus

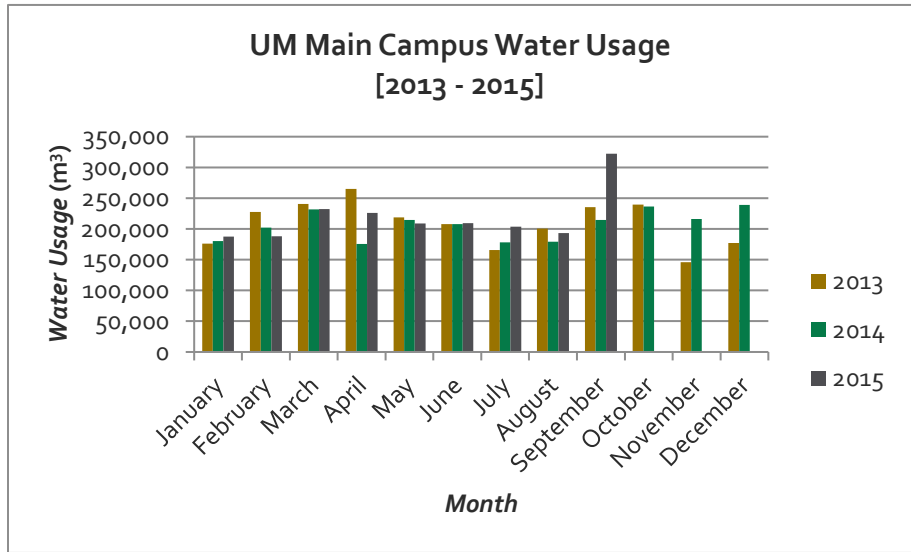


Figure 3.1: UM Water Usage in m³ from 2013 - 2015
[Source: JPPHB UM & UM Living Lab - Water Warriors]

3.3.2 Water Conservation Program

Maintenance and water conservation initiatives at UM is one of a portfolio of UM Living Lab: Water Warriors with close cooperation with JPPHB. Among the programs organized by Water Warriors and JPPHB including monitoring program on campus water consumption, groundwater project for Varsity Lake, Flood Monitoring System, Rainwater Harvesting Program, awareness programs, and partnership with the campus community.

Data provided in this section is a summary of one of the assessment criteria required for the data submission of *Universitas Indonesia GreenMetric World University Ranking 2015: Water Management*

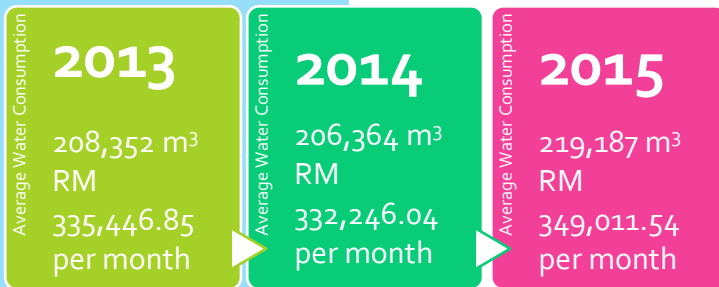


Figure 3.2: Average Estimation of University of Malaya Monthly Water Consumption in m³ and Ringgit Malaysia from 2013 – 2015
[Source: UM Living Lab: JPPHB UM & Water Warriors]

RAINWATER HARVESTING PROGRAM

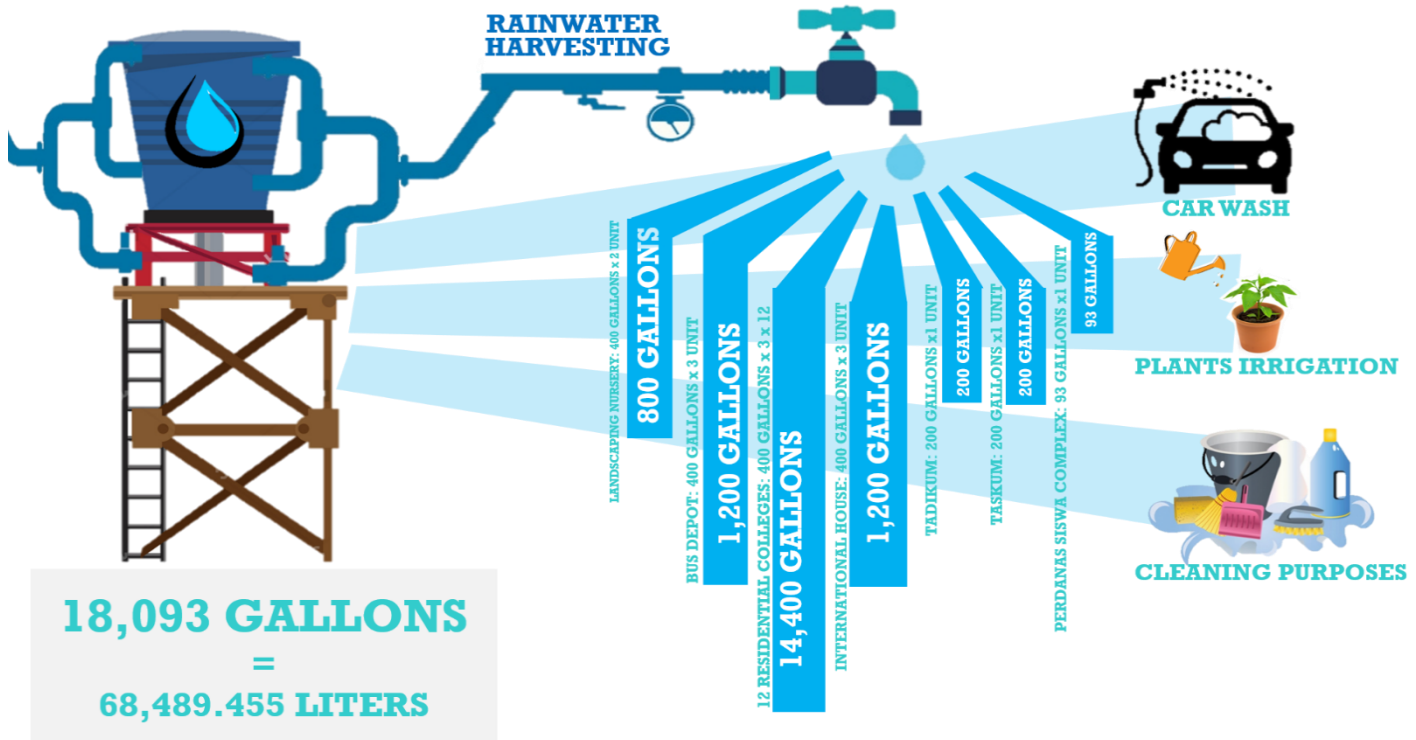


Figure 3.3: Rainwater Harvesting Program in 2015

[Source: JPPHB & UM LIVING LAB - Rainwater Harvesting]

Rainwater harvesting (collection and storage of rainwater) has been widely used around the world as a method of using rainwater for local use and others and is a practice that has existed for centuries.

When the water supply is limited, practical solutions that can meet this gap is through the use of rainwater harvesting system and rainwater run-off containment. Studies show that the use of rainwater harvesting systems can reduce the water consumption of tap water supply by more than 60 %.

Data provided in this section is a summary of one of the assessment criteria required for the data submission of *Universitas Indonesia GreenMetric World University Ranking 2015: Water Management*

3.4 TRANSPORTATION SYSTEM CAMPUS MOBILITY 2015: CARS & MOTORCYCLES

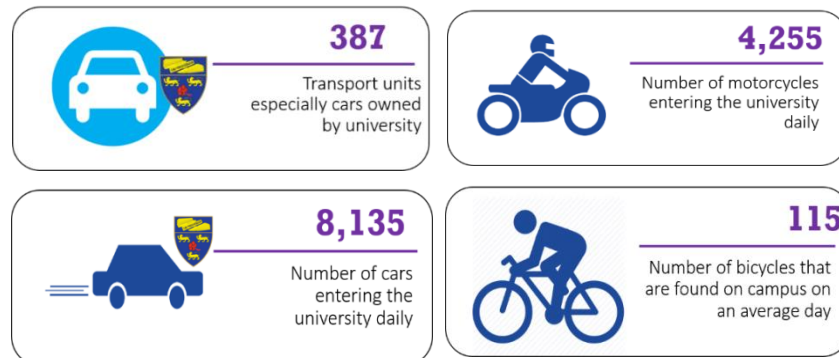


Figure 4.1: Total Vehicles in UM Main Campus per day in 2015



RATE OF VEHICLES ENTERING UM MAIN CAMPUS based on categories in a day for 2015 (estimation)

Registered Vehicle (Official Sticker User)		Number	Total Number Registered Vehicle (Official Sticker User)	
1	Staff	6,755	8,832	
2	Students	1,510		
3	Others (example: café operator)	567		
Based on Population Group		Number	Based on Vehicle Categories	Overall Total
5	Number of staff	7,394	Cars 80 % 5,915	7,394
			Motorcycles 20 % 1,479	
6	Number of students	17,092 A. Residential College: 11,541 B. Outside of Campus : 5,551	Cars 30 % 1,665	5,551
			Motorcycles 60% 3,331	
			Other mode of transportation 10% 555	

Figure 4.2: Rate of vehicles entering UM Main Campus based on categories in a day for 2015

[Original source: UM Security Office & ICR's statistic, an estimation has been calculated based on series of interviews with Traffic & Vehicle Stickers Unit, Security Office UM]

Data provided in this section is a summary of one of the assessment criteria required for the data submission of *Universitas Indonesia GreenMetric World University Ranking 2015: Transportation Management*

ENERGY CONSUMPTION

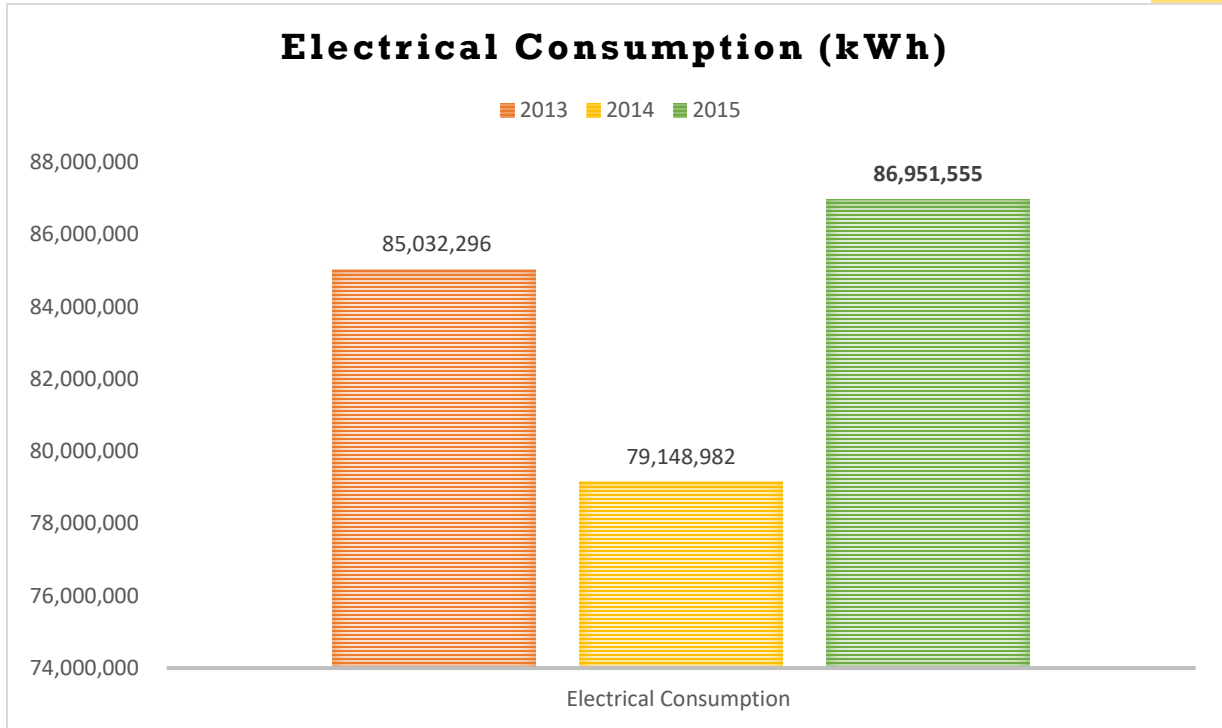


Figure 5.1: Electrical Consumption in UM Main Campus from 2013 - 2015
[Source: JPPHB UM – Electric and Electronic Engineering Division]

5.1 **Energy Efficient (EE) Appliances in replacing Conventional Appliances**

Most EE appliances are replacing the present conventional appliances includes lighting system based on motion-sensor with 97% for all public washrooms in campus and LED Lighting System with 30% by phases.

Data provided in this section is a summary of one of the assessment criteria required for the data submission of *Universitas Indonesia GreenMetric World University Ranking 2015: Energy Management*



1) CAUMo1: Landscape and Biodiversity Management

The first Core Area of UM Eco-Campus Blueprint is seen as one of the essential element pertaining to landscape management which is aligned with the preservation and conservation efforts of biodiversity in the campus.

ACTION PLANS

OBJECTIVES

AP1.1

To provide platform for awareness and educational activities on the importance of biodiversity and landscaping management for campus community

Menyediakan platform untuk aktiviti kesedaran dan pendidikan berkenaan kepentingan kepelbagaian bio dan pengurusan lanskap bagi warga kampus

- Conduct awareness and educational activities on biodiversity and sustainable landscape management to the entire campus community: staff and students
- Provide supports and improve understanding and awareness on the campus landscape and biodiversity management to the campus community

AP1.2

To coordinate, to conduct and to maintain landscape management and biodiversity conservation efforts in supporting the University of Malaya eco-campus initiative

Menyelaras, melaksana dan menyelenggara pengurusan lanskap dan pemeliharaan kepelbagaian bio bagi inisiatif penghijauan kampus Universiti Malaya

- Advice and make the selection of appropriate trees for the purpose of conservation and reforestation in UM campus.
- Design campus landscape environment which is more sustainable in terms of cost, environmental values, and maintenance.

AP1.3

To conduct local studies and relevant research on landscape and biodiversity management

Menjalankan kajian dan penyelidikan setempat berkenaan pengurusan lanskap dan kepelbagaian bio

- Conduct potential research to facilitate more effective landscape management
- Review the impact of landscape management on existing biodiversity around campus
- Design a strategy for preservation and conservation of the existing biodiversity to be coordinated with the implementation of landscape management

AP1.4

To ensure all development, progress and activities in CAUMo1 be documented, updated and reported periodically to one unit of 'clearing house'

Memastikan segala perkembangan, kemajuan dan aktiviti dalam BTUMo1 didokumentasi, dikemaskini dan dilaporkan secara berkala kepada satu unit 'clearing house'

- Proper documentation and regular updates on all progress of activities relevant to CAUMo1
- Report progress periodically to the 'clearing house'

ACTION PLAN 1.1: To provide platform for awareness and educational activities on the importance of biodiversity and landscaping management for campus community

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> • A very minimum level of understanding and awareness on the importance of CAUMo1 among the campus community 	<ul style="list-style-type: none"> • Briefing session to raise awareness in the form of mini-seminars for the whole campus • Conduct surveys to study the level of understanding and knowledge on CAUMo1 • Publication materials in various form: periodic printed forms and educational video recordings. 	<ul style="list-style-type: none"> • Students of Residential Colleges in campus • Students and staff at all Responsibility Centers (RCs)
Impact and Implication		
<ul style="list-style-type: none"> • Human resource • Technical Training and Courses • Financial – surveys, seminars, quiz, and QR codes • Coordination of all relevant stakeholders 		
Activities Information		
<ul style="list-style-type: none"> • Provides quizzes for students during orientation week such as 'green treasure hunt 	<ul style="list-style-type: none"> • Conduct entrance and exit surveys for each quiz and seminars pertaining to the level of understanding and knowledge about CAUMo1. 	<ul style="list-style-type: none"> • Produce an educational video recording in 15 minutes duration which serves to disseminate and to promote information as well as the importance of CAUMo1 to the campus community.
<ul style="list-style-type: none"> • Provide QR code which shares information and 	<ul style="list-style-type: none"> • Introduce and promote Green Community 	<ul style="list-style-type: none"> • Conducting a dialogue session for the campus

identification to species of trees in campus.	Engagement programs with the theme 'Bridging the heritage and discovery'.	community in order to raise awareness of the importance of biodiversity and forest ecosystem services on campus.
<ul style="list-style-type: none"> Enlist all relevant and potential periodical publications format in the form of pamphlets, handbooks and other types of digital publications. 		

ACTION PLAN 1.2: To coordinate, to conduct and to maintain landscape management and biodiversity conservation efforts in supporting the University of Malaya eco-campus initiative

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> There is no master plan or blueprint pertaining to landscape management and maintenance of campus biodiversity. The design of the existing landscape is based on piece-meal efforts and ad-hoc basis . No viable platform for planning, management and coordination which involves all relevant stakeholders. Existing procedures and protocols could not fully monitor damage done to trees due to the construction work carried out by contractors. 	<ul style="list-style-type: none"> Prepare a master plan for landscape design and maintenance of campus biodiversity which supports the Higher Management plans, policies, and directions. Convene a Greening Roundtable periodically for the purpose of coordinating all campus greening initiatives with all stakeholders as members of the roundtable. Identify the land use planning management and allocated zones within the campus . Ensure procedures / protocols available to the contractor in the campus is strictly enforced and closely monitored. 	<ul style="list-style-type: none"> JPPHB UM Living Lab – The Rimba Project Appointed Contractors by JPPHB UM
Impact and Implication		
<ul style="list-style-type: none"> Executive Capacity – Human Resource Financial- Official appointment of Malaysia Architect Association (<i>Pertubuhan Arkitek Malaysia</i>) for professional services Coordination of all relevant stakeholders 		
Activities Information		
<ul style="list-style-type: none"> Conduct a brainstorming session / competition to identify potential themes of landscape 	<ul style="list-style-type: none"> Provide a landscape management and conservation of biodiversity plan based on the concept of 	<ul style="list-style-type: none"> Conduct brainstorming sessions with consultants to determine the 'core area-protected area'

management which represent University of Malaya with regard to the existing biodiversity management and land use planning zones.	'biosphere reserve' as basis of any ecological planning in campus, in addition to the existing land use planning.	on campus .
<ul style="list-style-type: none"> • Prepare a complete list of stakeholders to attend the Greening Roundtable Discussions. 	<ul style="list-style-type: none"> • Prepare action plans for the Rimba Ilmu . • Conduct mapping activities to identify the geographical boundaries of Rimba Ilmu. 	<ul style="list-style-type: none"> • Prepare a plan that identifies campus areas that require 'reforestation' and 'afforestation'.
<ul style="list-style-type: none"> • Conduct a technical and feasibility studies of the Responsibility Centers (RCs) in order to identify the potential areas to introduce the concept of 'green roof' of high-rise buildings in the campus. 	<ul style="list-style-type: none"> • Conduct consultations and roundtable discussions with stakeholders at the residential colleges and the Responsibility Centers (RCs) to identify the quota of green spaces in the campus. 	<ul style="list-style-type: none"> • Identify the potentiality of gazetted Rimba Ilmu to be recognized as one of the university or national 'treasure'.
<ul style="list-style-type: none"> • Provide detailed guidelines and strategies for the short, medium and long-term planning to ensure the sustainability of management and maintenance of the CAUMo1. 	<ul style="list-style-type: none"> • Indicate and emphasize in the guidelines regarding the implementation of the concept of 'insert' and not 'intrude' in landscape planning and design of campus development and identify the location of the implementation . 	

ACTION PLAN 1.3: To conduct local studies and relevant research on landscape and biodiversity management

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> • No comprehensive and in-depth planning of the scope and category of studies to be conducted with respect to the management of the campus landscape and biodiversity. 	<ul style="list-style-type: none"> • To identify critical areas of studies and research focusing on the landscape and biodiversity management of the campus • To offer and open up the application for research grants at university-level focusing on the landscape and biodiversity management of the campus • Involving undergraduates in research. 	<ul style="list-style-type: none"> • Researchers under the Sustainability Science (SuSci) Research Cluster especially from Institute of Biological Sciences Faculty of Science and Faculty of Built Environment • UM Living Lab – The Rimba Project • Undergraduates from relevant programs / courses • Non-Governmental Organizations (NGOs) for potential research collaboration

Impact and Implication		
<ul style="list-style-type: none"> • Financial sustainability for research grants • Human resource capacity 		
Activities Information		
<ul style="list-style-type: none"> • Enlists all programs and courses in the curriculum component of the existing potential program to be included as a basic degree level program under the concept of ' UM campus community engagement through contributing and appreciating by researching' 	<p>Among potential research to be considered:</p> <ul style="list-style-type: none"> • Studies on the clustered theme of landscape planning, inventory of existing and present biodiversity in campus, • Studies on the inventory of biodiversity and mechanism of long-term monitoring, • Studies on campus community satisfaction level on the soft-and-hard landscaping of the campus, • Studies on the campus landscape design and the effectiveness of such design elements, • Studies on 'Is UM campus carbon negative?' - That can be applied to in the framework of Low Carbon Society - Kuala Lumpur City Hall (DBKL), • Review and include a chapter on the implementation of the result of the studies into the 'campus guideline' for campus visitors reference • Design a web-based GIS to prepare biodiversity inventory of a campus. 	<ul style="list-style-type: none"> • Provide a full checklist on the research collaboration undertaken by UM and its relevant stakeholders pertaining to short-term, medium-term and long-term - 'corporate social responsibility'.

ACTION PLAN 1.4: To ensure all development, progress and activities in CAUM01 be documented, updated and reported periodically to one unit of 'clearing house'

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> No one-stop center which works on documentation of all activities and progress of CAUM01. 	<ul style="list-style-type: none"> Identify the physical and virtual location of the proposed 'clearing house' which befits the function of a one-stop center. 	<ul style="list-style-type: none"> Staff of UM Living Lab – The Rimba Project JPPHB Sustainability Science (SuSci) Research Cluster
Impact and Implication		
<ul style="list-style-type: none"> Financial Human Resource Infrastructures 		
Activities Information		
-		



2) CAUMo2: Waste Management

Waste management is a day-to-day non-stop business, seven days a week which requires attention and a strong commitment to ensuring that all waste on campus is managed in an orderly manner and in accordance with established procedures. The second core area of Eco-Campus Blueprint is coordinated by UM Living Lab (Zero Waste Campaign) with close cooperation with JPPHB pertaining to technical advice and expertise. This area also requires the cooperation of the café operators in the campus; food waste covers an average of approximately 40 % of the overall composition of the waste on campus.

ACTION PLANS	OBJECTIVES
<p>AP2.1</p> <p>Establish a program to reduce, reuse, recycle, and compost a high percentage of campus waste.</p> <p><i>Melaksanakan program pengurangan, penggunaan semula, pengitaran semula dan pengkomposan sisa kampus pada kadar peratus yang tinggi</i></p>	<ul style="list-style-type: none">• Applying the concept of waste reduction in all aspects of administration and management• Promote the acquisition and reuse of materials that could potentially be reused.• Encourage the practice of recycling among campus community and visitors of University of Malaya
<p>AP2.2</p> <p>Increase the percentage reduced, reused, recycled, and composted annually.</p> <p><i>Meningkatkan peratusan tahunan kadar pengurangan, penggunaan semula, pengitaran semula, dan pengkomposan sisa kampus</i></p>	<ul style="list-style-type: none">• Practice the 3Rs concept in all relevant areas / activities• Introducing the concept of waste separation at source.• Providing more infrastructure that can help improve recycling practices on campus.
<p>AP2.3</p> <p>Expand the scope of waste reduction programs at all areas and facilities of the campus</p> <p><i>Menyebarkan skop dan pengisian program pengurangan sisa di seluruh kampus</i></p>	<ul style="list-style-type: none">• Promote the concept of 'paperless'• Increase level of awareness and involvement of campus community on waste reduction activities

ACTION PLAN 2.1: Establish a program to reduce, reuse, recycle, and compost a high percentage of campus waste.

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> Increased amounts of waste paper by the Responsibility Centers (RCs) in UM Unnecessary and excessive provision of stationery items during meetings and conference / discussion at the university level. 	<p>Printing of documents in large quantities for a variety of purposes, especially meeting agendas, minutes of meetings, paperwork, application forms and so on.</p> <p>All RCs should not provide material / stationery to all participants of the meeting / conference / discussion unless requested</p>	<p>All Responsibility Centers (RCs)</p>
Impact and Implication		
<ul style="list-style-type: none"> Significant Reduction In Paper Use Reduction Usage Of Printing Equipment Saving electricity for printing purposes. No need for storage Do not cause any form of unnecessary wastage or excessive materials including stationery, pens, papers, files and so on. Cost reduction of the budget expenses on stationery. 		
Activities Information		
<ul style="list-style-type: none"> Encourage the use of email and documents in various electronic forms. 	<ul style="list-style-type: none"> Abolish the requirement of an application using printed / written forms and encourage the use of e-forms / e-application. 	<ul style="list-style-type: none"> Ensure that the material is not printed unless necessary.
<ul style="list-style-type: none"> Encourage the use of 'projector' for the purpose of reviewing the minutes and present the agenda in the meeting 	<ul style="list-style-type: none"> Encourage and permitting the use of used paper for printing and communication purposes in campus 	<ul style="list-style-type: none"> Provide guidelines in electronic and printed form to present information concerning the use of an electronic system.
<ul style="list-style-type: none"> Do not provide stationery to all unless requested by participants 	<ul style="list-style-type: none"> Do not encourage the provision of 'door-gift' for any occasion 	<ul style="list-style-type: none"> Do not provide 'door-gift' that is not practical but encourage the replacement with environmentally friendly materials.

ACTION PLAN 2.2: Increase the percentage reduced, reused, recycled, and composted annually.

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> • Activities of repairing , designing and building / facilities on campus generate a lot of construction waste • Demolition waste was removed without any assessment of potential activities for the purpose of recycling • Food waste is not segregated properly at source • Food waste is still sent to landfill 	<ul style="list-style-type: none"> • Construction activities generate a lot of waste, dust, and pollute the environment as a result of the inefficient waste management • The contractor must ensure that waste is managed properly and does not pollute the drainage system etc. • To provide appropriate guidelines to encourage the separation of materials at source. 	<p>University of Malaya building contractors</p> <p>Café operators in campus</p>
Impact and Implication		
<ul style="list-style-type: none"> • The problem of dust and pollution can be avoided • Avoid water drainage blockage due to the failure of good waste management practices by the contractor. • Food waste disposed in landfills can be reduced / avoided. • The percentage of raw material for composting process can be improved. • Composting process can be carried out more systematically and in a more uniform quality 		
Activities Information		
<ul style="list-style-type: none"> • Effective monitoring is essential to ensure that the contractor adhered to the regulations. 	<ul style="list-style-type: none"> • Waste with high value of reusability can be stored meanwhile waste with high value of recyclability can be sold to generate income 	<ul style="list-style-type: none"> • A temporary construction and demolition waste storage site must be provided to ensure segregation at source can be efficiently run.
<ul style="list-style-type: none"> • Café operators should be given exposure and training courses on how to manage food waste at source 	<ul style="list-style-type: none"> • Café operators should provide appropriate and adequate amount of signages for the café visitors 	<ul style="list-style-type: none"> • Food waste should be collected at the appropriate time and in accordance with the schedule agreed by the contractors.

ACTION PLAN 2.3: Expand the scope of waste reduction programs at all areas and facilities of the campus

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> Lack of awareness among the campus community on waste reduction program Lack of facilities to encourage activities / behaviors that prevent or minimize waste generation 	<ul style="list-style-type: none"> The campus community is less sensitive to the concept of waste reduction or 3Rs, 'open day' at the department or program level should be held periodically. Less emphasis is given to implement the concept of values and virtues in waste reduction practices Citizens are less exposed to the impact and implications of the uncontrolled waste generation. 	<ul style="list-style-type: none"> Campus community Visitors
Impact and Implication		
<ul style="list-style-type: none"> Increase the level of awareness among campus community. Increase the level of understanding on waste management that can be translated into a habit that favors waste-reduction practices in daily life. Encourage creative thinking in campus activities Reduce wastes that have short life spans such as bottled drinks / plastic and plastic bags. 		
Activities Information		
<ul style="list-style-type: none"> Organize open days to promote the concept of waste reduction, by targeting specific groups at the department / program level with mandatory participation to ensure the effectiveness of activities. 	<ul style="list-style-type: none"> Organize series of competition at the department level to encourage the sharing of ideas / strategies that are effective in reducing the generation of waste on campus. 	<ul style="list-style-type: none"> Conduct more effective campaigns with the involvement of influential individuals in order to encourage more participation from the campus community.
<ul style="list-style-type: none"> Provide more facilities to encourage the use of materials that have a longer shelf life. 	<ul style="list-style-type: none"> Avoid the use / provision of water bottles / packages to reduce the generation of plastic bottles by providing 'water cooler' facilities. 	<ul style="list-style-type: none"> Stop providing plastic bags in any transaction to purchase food / beverages from the department or cooperative store.



3) CAUMo3: Water Management

Water is one of the main commodities and basic elements of the life of an ecosystem. UM needs a systematic and sustainable water management in order to minimize the cost of its expenditures on high water bill payments as a result of wasteful water consumption pattern of the campus community. The third core areas of Eco-Campus Blueprint emphasize on a guideline on the reuse of rainwater through the application of the concept of 'rainwater harvesting system'. In addition, water is also used as an element of leisure and recreation in UM through collaborative efforts on the conservation and revival of UM Varsity Lakes taken up by UM Living Lab (Water Warriors), JPPHB and Sports Center, University of Malaya.

ACTION PLANS

OBJECTIVES

AP3.1

Establish a program to reduce, reuse, systemized water management system as well as to recycle a high percentage of campus water.

Melaksanakan program penjimatan, penggunaan semula, pengitaran semula dan pengurusan sistem air pada kadar peratus yang tinggi

- To establish systematic water management system including reduce, reuse and recycle of water
- More programs related to water conservation is planned to be employed eg: actual approach program for reduce, reuse and recycle of waste stormwater / rainwater.

AP3.2

Increase the percentage reduced, reused, recycled water annually.

Meningkatkan peratusan tahunan kadar penjimatan, penggunaan semula, dan pengitaran semula air

- To increase the percentage of reduce, reuse and recycle water every year.
- The percentage of water usage can be reduced by knowledge sharing by professionals and putting into practice as RC's KPI

AP3.3

Expand the scope of water conservation programs at all areas and facilities of the campus

Menyebarkan skop dan pengisian program penjimatan penggunaan air di seluruh kampus

- To expand the scope of water conservation programs throughout campus by educating the campus community through programs and activities related to water and environmental awareness and conservation

ACTION PLAN 3.1: Establish a program to reduce, reuse, systemized water management system as well as to recycle a high percentage of campus water.

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> Lack of awareness in water usage among campus community 	<ul style="list-style-type: none"> Water usage awareness campaign 	<ul style="list-style-type: none"> University staff and students, all RCs especially residential colleges
Impact and Implication		
Campus community engagement in strategic and practical initiatives to drive sustainable water management		
Activities Information		
Poster, sticker, and flyers on reduce, reuse and recycle water	Seminar by professionals	
Poster war program	Team activities	
Water conservation competition		

ACTION PLAN 3.2: Increase the percentage reduced, reused, recycled water annually.

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> • Minimum practice in water cycle on campus especially in residential colleges • Lack of awareness and enforcement in application of rainwater for gardening, cleaning and irrigation • Well designed subtropical campus has now become a priority 	<ul style="list-style-type: none"> • Rainwater and stormwater harvesting project to make sure every single Responsibility Centers (RCs) has their own rainwater collection system for use of cleaning, gardening and irrigation purposes • Development of stormwater collection system in easily flooded areas like near Pantai River and Varsity Lake. 	<ul style="list-style-type: none"> • Residential Colleges • Faculties
Impact and Implication		
<p>The access of bulk unharvested rainwater and stormwater can be reused and recycled in order to reduce the water usage percentage</p>		
Activities Information		
Design and mapping of water flow throughout campus	Build overland flow paths and waterways as public space	Continuous information sharing on monthly water usage by JPPHB
Commissioning and developing the collection tanks	Provide liveable spaces using accessible water features for social benefits in campus	

ACTION PLAN 3.3: Expand the scope of water conservation programs in all areas and facilities of the campus.

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> • Minimum and small scale awareness programs on campus • The campus community needs more educating and knowledge sharing programs as additional activities 	<ul style="list-style-type: none"> • Develop education and information programs to disseminate information and engage younger community members to create lifelong water learning like water quality monitoring projects 	<ul style="list-style-type: none"> • Campus community (students, staff and public)
Impact and Implication		
<p>The water-related engagement and communication programs across university is integrated</p>		
Activities Information		
Seasonal Water Campaign	Tree planting and knowledge sharing by water warriors experts	
Water quality monitoring	Water futures program	



4) CAUMo4: Energy Management

The fourth core areas of UM Eco-Campus Blueprint provides information on energy management. In this section, energy would refer to electricity and alternative energy that is currently used in UM. Efficient energy management integrated with intelligent building applications (smart building) and application of energy saving equipment (energy efficiency) have the potential to help UM to reduce the burden of annual payment of electricity bills that keep increasing from year to year.

According to Omer (2008), nearly half of the world's energy use is associated with providing environmental conditioning in the buildings and about two-thirds of this is for heating, cooling and mechanical ventilation. In addition, buildings represent approximately 40% of onshore energy usage (Ryghaug & Sorensen, 2009).

Hasse and Amato (2006) came up with the Energy Triangle Approach in developing a new building design that also can be adapted in the existing buildings.

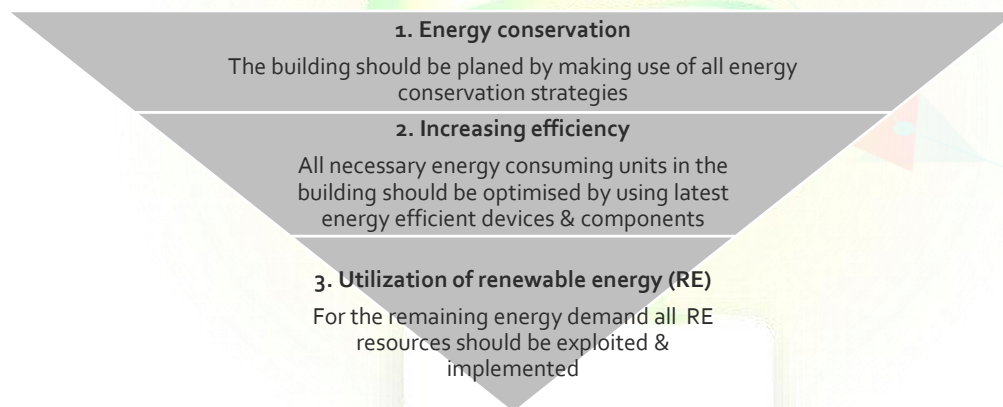


Figure 4.1: Energy triangle approach for a new building design

The **energy conservation** is stated as the first approach, in which with proper planning in an early stage, it will cost nothing and passive design building (without mechanical and electrical) can be developed appropriately. This has been mentioned by Davis et al. (2006) who claim that energy saving over the lifetime of the building can equal the original construction cost. Then, it is followed by **the increase of efficiency** through the use of the latest energy efficient devices and components. This approach will increase the construction cost up to 15% higher than conventional designs; however it can help to reduce 13% of total energy consumption and 48% of electricity consumption in the commercial and residential sector (Al-Mofleh et al., 2009). The **utilization of renewable energy** becomes the last approach due to its relatively high cost of installation coupled with its unproven track record in Malaysia. Only big organizations can afford the installation due to the cost constraints. In addition, the building design has also become a part of the limiting factors as well when energy production is more applicable at specific characteristics of the building; a 15m deep building has a better potential than deeper buildings while a high-rise building which is more than five floors has low potential for electricity production due to lower solar exposure on horizontal surfaces (Haase & Amato, 2006).

Basically, **building's design** is one of the interrelated factors in achieving building energy performance, **besides service design** and **occupant behavior** (Al-Mofleh et al., 2009), as these two factors are not easy to be controlled and maintained (Figure 2). In the existing building, the first two factors require higher cost when it comes to retrofitting and renovation. The successful of building and services design are relying on the needs of the residents which always change over the time. Vice versa, the occupants' behavior requires lower cost with the long term effect especially with the developing of an energy saving culture. In the equatorial region, there are three main elements related to building services that become an energy liability as 60-70% of total energy are used in non-industrial buildings (Omer, 2008). The three main elements are **conditioning** (for thermal comfort), **lighting** (for visual comfort), and **ventilation** (for indoor air quality).

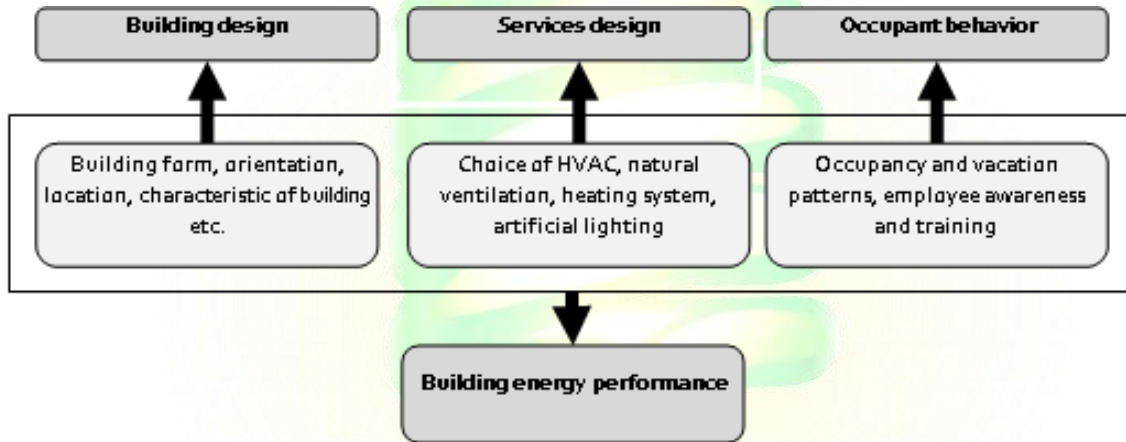


Figure 4.2: Interrelated factors in achieving building energy efficiency

The **electric lighting** is one of the world's biggest end-uses of electricity and a major contributor to the peak demand for electrical power (Aries and Newsham, 2008). Thus, lighting should be the priority in the energy conservation programme because it is believed that by reducing lighting energy consumption, cooling load could be reduced as well (Kamaruzzaman & Edwards, 2006).

Nearly **45% of cooling loads is determined by the internal heat sources** and even the best building envelope design cannot avoid the resulting internal cooling load of which **55%** of the peak cooling loads are influenced by the building envelope design itself (Hasse and Amato, 2006). Therefore, the internal heat sources that are contributed by electrical appliances like artificial lamps should be avoided when the building envelope design itself; which is quite difficult to be controlled especially for existing buildings, contributes higher cooling load in the buildings.

In handling the cooling load and lighting issues, **natural ventilation** and **daylighting** are two well-known strategies in reducing building energy consumption. A lot of studies have been reported regarding the amount of energy that can be conserved through the exploitation of these strategies. The peak-cooling load; that determines the maximum demand of energy, and annual electricity consumption can be reduced substantially by **10%** and **13%** through the applications of daylighting (Li et al., 2002). In warm humid climates, approximately **50%** of energy used for ventilation in buildings can be conserved and by making the right decision in determining the building's characteristics; including the building length, depth, and height, the efficient use of electricity can be improved in the buildings.

Referring to Iwaro and Mwasha (2010), energy use in residential buildings is usually 10 to 20 times lower compared to office buildings. Thus, the total electricity usage in residential buildings in Malaysia amounts to **10 to 25 kWh/m²/year** (Jamaludin et al., 2011), where the electricity use in office buildings in Malaysia is in the range of **200 to 250 kWh/m²/year** (Chan, 2009).

Action Plan: Implementing Campus Energy Saving campus, promoting campus community awareness about the importance of efficient electricity usage and its impact on the environment.

Problem Statement	Scope of Activities	Target Group
<ul style="list-style-type: none"> • Construction of new buildings on campus • Addition of high-tech equipment • Lack of awareness in daily electricity consumption • The ambient temperature 	<ul style="list-style-type: none"> • Implement the replacement of fluorescent lights to LED lights by phases in campus • Installation of light-sensitive sensors that automatically control lighting installation • Make internal public announcements on the electricity consumption of Faculties, Responsibility Centers (RCs) and Residential Colleges at least three times a year as an initiative to create awareness on campus • Installation of electricity meters at Faculties, RCs and Residential Colleges for monthly consumption readings 	<ul style="list-style-type: none"> • Faculty • Department • Responsibility Centers (RCs) • Residential Colleges
Impact and Implication		
<ul style="list-style-type: none"> • Create awareness to campus community on the daily electricity consumption in a more prudent manner. • Financial resources are needed at the early stage of implementation 		
Activities Information		
<ul style="list-style-type: none"> • Installation of separate meters by the Faculty, the Residential College and the RCs has been implemented largely on campus and report on electricity consumption by the Faculty, the RCs and the Residential Colleges in campus shared and publicized through UM info • Installation of LED lights in campus including street lights and around Lake Varsity has been carried out by phases. 		

ACTION PLANS & OBJECTIVES

No.	Action Plan	Targets / Actions
1.	Energy conservation policy (carbon footprint reduction)	Best practice and action plans.
2.	Energy audit (building energy labels or certificates).	
3.	Awareness program on energy conservation	
4.	Implementation of energy saving culture	<ul style="list-style-type: none"> ▪ 200-250 kWh/m²/year (Faculties) ▪ 10-25 kWh/m²/year (Residential Colleges)
5.	Application of daylighting and natural ventilation	
6.	Energy conservation through innovation	
7.	Purchasing efficient electrical appliances	5-Star Label of electrical appliances
8.	Energy conservations grants and rebates	10 grants/year
9.	Increasing the efficiency by using latest devices and components	All staffs and students
10.	Utilizing renewable energy sources	5% of renewable energy sources



5) CAUMo5: Transportation System Management

Transport is one of the contributors to the increase in carbon footprint. Hence, we should look forward toward initiatives and guidelines that are more environmentally friendly. The campus community should be provided with a good infrastructure and 'friendly' policies to ensure that UM campus community particularly students which is the largest population in campus can equally contribute to and support the efforts of campus sustainability initiatives more effectively. This core area requires continuous support, action and monitoring from all Responsibility Centers especially the UM Security Office (in and out of the campus traffic, UM vehicle stickers, and the use of vehicles on campus), Student Affairs (campus bus services), and JPPHB (campus bus services and UM official vehicles).

Universities occupy large areas of land, and growing in populations is likely to increase the traffics with the universities. The trends of motorization in universities are matching those in society and in some ways are worsened by changes in higher education itself as the admission of greater numbers of mature students probably raises the proportion of car-owning students (Balsas, 2003; Tolley, 1996). Moreover, the facilities planning within the UM campus are wide and dispersed creates a low level of accessibility and it constricts the provision of the facilities throughout the campus. UM campus builds by locating the main facilities in the center of the campus, consequently, creates an immense distance between the main facilities and the residential areas without providing proper connection of the covered walkway.

Campus sustainability has become a major focus in global issues, sustainable transportation planning can be seen as a positive movement towards a contribution to our environment. Sustainable transportation system provides incentives for walking, bicycling, ridesharing, discouraging the use of a single-occupancy vehicle and effective land use planning that accommodate transportation planning. UM must proclaim their intent by taking environmental challenges seriously and to be proactive toward mitigating the effect of global environmental degradation. As a result of it, UM needs to find a more comprehensive approach for institutionalizing 'green' in the campus from all dimensions, including the bridging of academic content, administrative policies, and facilities development (Mat et al., 2009).

University of Malaya is a buildup of more than 6km of campus road and consists of more than 30,000 university population. UM has a total of 5 road entrances. Out of these 5 entrances, KL gate and PJ gate are the main entrances where they have the highest daily traffic volume. Traffic congestion is far worse than expected within UM compound due to UM location between 2 most developed cities in Malaysia which are Kuala Lumpur (KL) and Petaling Jaya (PJ). A preliminary data collection was made to monitor the amount of vehicle traveling within UM from the main entrance gate of KL and PJ. The flow of traffic would make approximately 3km of traveling. 5 types of vehicles were found traveling within the campus road with the number of private cars topping the list. Private car found to be the most common vehicle within these roads with 93% of the total number, while motorcycles at 3.5%, trucks 2.35%, and buses 0.7%.

Innovative sustainable transport policy needs to be introduced to reduce the dependency of motorized vehicle, especially cars and at the same time, promotes the usage of other alternatives among the university communities. Each alternative must be assessed with the utilization of four criteria; reduction of environmental impact, cost-effectiveness, feasibility, and potential student and faculty support.

Universities as an important hub that enhance learning and research activities for higher education should welcome all of their stakeholders to endorse collaboration and partnership in policy making and promote sustainability to accommodate the necessities of serving the society. As nowadays university carried an important responsibility in shaping the future generation, therefore it is important to bleach future policy maker with the awareness of sustainability.

ACTION PLANS & OBJECTIVES

No.	Action Plan	Targets / Actions
1.	The implementation of Transportation Demand Management (TDM) strategies	Best practice and action plans.
2.	Policy on unregistered inbound motorized traffic	To reduce inbound motorized traffic within the campus by 30%
3.	Policy on all future development within the campus to incorporate, promote and support non-motorized mode, walkability, pedestrian comfort, and safety.	Best practice and action plans.
4.	Revamp/expand/enhance the campus shuttle services	To reduce unnecessary vehicle usage traffic flow (within the campus) by 30%
5.	To link all facilities inside the campus with covered walkway/natural shaded for walkability and cycling	-
6.	Improve multimodal connectivity, such as "Park & Ride / Walk"	To reduce motorized traffic within the campus by 30%
7.	Introduce new policy on private vehicle, parking space, and car sticker registration	To reduce motorized traffic within the campus by 50%
8.	Car-free campaign	Awareness to all staffs and students



6) CAUMo6: Green Procurement

Green Procurement is an integration of new elements to be introduced in the procurement procedure in University of Malaya; this is considered as preparation towards to the implementation of the Government Green Procurement (GGP). GGP refers to the procurement of supplies, services and works in the Malaysia Government by emphasizing environmental standards in order to conserve the environment and natural resources, as well as to minimize or reduce negative effects on the environment and natural resources caused by human activities.

This Core Area would be one of the main focus of UMECB as a long-term sustainability strategy of acquisition procedures that needs to be harmonized and implemented by phases. It is important to convince the two parties in UM procurement system (between the applicants and suppliers) to choose the concept of a green procurement as their top priority in every business transactions. Each Responsibility Centers (RCs) plays a vital role in supporting this initiative, especially to all Administrative and Financial Division in UM respectively.

RCs should be prepared towards the implementation of Green Procurement by enhancing their understanding and knowledge of all employees in the relevant Green initiatives in line with current scenarios. For the initial setup, the RC should be able to identify areas that are relevant for the implementation of procurement at RC's level respectively. While waiting towards the full implementation of the GGP in Malaysia, the RC should act proactively by implementing the Green Initiative and other appropriate efforts such as the efficient use of energy and resources, incorporating the concept of Life Cycle Costing, and Value Management.

ACTION PLANS

OBJECTIVES

AP6.1

Ensuring the provision of specifications that are environmentally sensitive in any form of procurement of supplies, services, and works.

Memastikan penyediaan spesifikasi bersifat pro-alam sekitar dalam sebarang bentuk perolehan bekalan, perkhidmatan dan kerja.

Providing precise specifications to any form of procurement

Penyediaan spesifikasi yang tepat sebelum sebarang perolehan dilaksanakan

AP6.2

Encourage the purchase of supplies, services and works with high recycled content, produced in an environmentally sustainable manner, which demonstrates maximum durability or biodegradability, reparability, energy-efficiency, non-toxicity, and recyclability.

Mengalakkan pembelian bekalan, perkhidmatan dan kerja yang bersifat pro-kitar semula, dihasilkan secara lestari, antaranya memaparkan ketahanan atau daya biodegradasi yang tinggi, boleh dibaiki, cekap-tenaga, bukan toksik, dan boleh dikitar semula.

Proceed with purchasing of supplies, services, and works that take into account environmental standards

Perolehan Bekalan, perkhidmatan dan kerja yang mengambilkira kriteria dan standard alam sekitar.

PT6.3

Require all Responsibility Centers (RCs) to comply with University's procurement standards as a whole in implementing the programs of the university.

Conduct activities that support the implementation of environmental conservation

Memastikan semua PTJ menepati piawaian perolehan universiti secara menyeluruh dalam melaksanakan semua program universiti.

Pelaksanaan aktiviti yang menyokong kepada pemuliharaan alam sekitar

ACTION PLAN 6.1: Ensuring the provision of specifications that are environmentally sensitive in any form of procurement of supplies, services, and works.

Problem Statement	Scope of Activity	Target Group
<ul style="list-style-type: none"> The provision of less precise specifications 	<ul style="list-style-type: none"> Dissemination of Government Green Procurement Guideline 	<ul style="list-style-type: none"> All RCs
Impact and Implication		
Green Procurement can help drive higher quality standards for products and services and delivering better performance in management of the campus		

ACTION PLAN 6.2: Encourage the purchase of supplies, services and works with high recycled content, produced in an environmentally sustainable manner, which demonstrate maximum durability or biodegradability, reparability, energy-efficiency, non-toxicity, and recyclability.

Problem Statement	Scope of Activity	Target Group
<ul style="list-style-type: none"> Level of understanding and awareness of campus community toward green procurement 	<ul style="list-style-type: none"> Briefing session on awareness and guideline on its importance pertaining to Government Procurement 	<ul style="list-style-type: none"> All Campus Community
Impact and Implication		
Brand Image: An organization that has gone green is seen as a good corporate citizen. This increases its image in the eyes of the public.		

ACTION PLAN 6.3: Require all Responsibility Centers (RCs) to comply with University’s procurement standards as a whole in implementing the programs of the university.

Problem Statement	Scope of Activity	Target Group
<ul style="list-style-type: none"> Non-compliance with the prescribed standards 	<ul style="list-style-type: none"> Review and monitoring session by the Internal Audit Unit periodically 	<ul style="list-style-type: none"> All RCs
Impact and Implication		
Green Procurement often leads to savings over the whole life-cycle of a purchase: financial and environmental risk		

7) CAUMo7: Education Management – Environment & Climate Change



Formal or informal education is considered as the most important medium in ensuring the continuity of any long-term efforts for sustainability of campus. The existing curriculum of UM is viewed relevant in the field of sustainability, sustainable development, climate change or environmental management and this should be the focus of environmental awareness or global climate change message to the campus citizen. In addition, the process of teaching and learning (*P & P*) and also the usage of the latest technology applications should be utilized as a model. Discussions using the concept of case studies are examples of effective instructional strategy. Stakeholders for CAUMo7 ranges from the Academic Division, Students' Affairs & Alumni Division, and UM academic community.

ACTION PLANS

OBJECTIVES

AP7.1

Integrate environmental and climate change knowledge into courses in all relevant disciplines.

Mengintegrasikan pengetahuan berkenaan alam sekitar dan perubahan iklim ke dalam kursus dan disiplin yang bersesuaian.

- To promote greater understanding of the environmental issues into appropriate courses.
- To integrate appropriate pedagogic approaches related to environmentally-based learning across disciplines.
- To nurture self-awareness of the knowledge construction process.

AP7.2

Include a section in the academic mission statement, such as, "all students, upon graduating, will possess the knowledge, skills, and values to work toward an environmentally sustainable future".

Memasukkan bahagian dalam pernyataan misi akademik, contohnya "kesemua siswa, sebaik sahaja menyempurnakan pengajian, akan memiliki pengetahuan, kemahiran, dan nilai yang membantu ke arah masa depan alam sekitar yang lebih lestari".

- To raise campus awareness of sustainability in practice as well as socializing students into sustainable means of learning and living.
- To develop understanding, skills and values on environmental literacy through greater fulfillment of the exposures given.

AP7.3

Provide facilities and resources for chosen faculties to integrate environmental issues and perspectives into their existing courses, by developing and implementing training programmes, seminars, and also provide funding (if applicable).

Menyediakan fasiliti dan bantuan bagi fakulti yang dikenalpasti untuk mengintegrasikan isu dan perspektif alam sekitar dalam kursus sedia ada, dengan membangun dan melaksanakan program latihan fakulti,

- To provide infrastructure, funding, and support for the faculty as a center from which to educate the campus community about multidisciplinary environmental perspectives.
- To help institutions and campus communities develop strategic programmes that give students

seminar, dan peruntukan dana yang difikirkan relevan.

the skills and knowledge to live and work sustainably.

- To embed sustainable learning in realistic and relevant environments.

ACTION PLAN 7.1: Integrate environmental and climate change knowledge into courses in all relevant disciplines.

Problem Statement	The Scope of Activities	Target Groups
<p>Hopkinson, Hughes and Layer (2008), highlighted although formal curricular is presumably vital aspect of student's learning experience about sustainable development, less attention has been given to interconnect students' learning in relation to sustainable development within a higher education context. Education for Sustainable Development is multidisciplinary in orientation, viewing every course as having an important contribution and perspective to bring to the field.</p>	<p>Include socioscientific issues into relevant courses as a role in Education for Sustainability (Simonneaux, Laurence, Robottom & Ian, 2012)</p> <p>When designing socioscientific-based learning activities, set up scenarios that encourage students to work in groups to explore different perspectives on sustainability issues.</p>	<ul style="list-style-type: none"> • Students
Impact and Implication		
Promoting holistic and interdisciplinary synthesis which could intersect with environmental and climate change concerns		
Activities Information		
<ul style="list-style-type: none"> • Student-centered 	<ul style="list-style-type: none"> • Group discussion 	

ACTION PLAN 7.2: Include a section in the academic mission statement, such as, “all students, upon graduating, will possess the knowledge, skills, and values to work toward an environmentally sustainable future.”

Problem Statement	The Scope of Activities	Target Group
The students’ experience at most universities typically has a limited and fragmented connection to the values, ideals and practical aspects of studying, living or working in a sustainable way (Hophkins et al. 2008)	-	<ul style="list-style-type: none"> Students
Impact and Implication		
Training and producing graduates with critical thinking skills and proactive toward environmental issues		
Activities Information		
This mission can be integrated within UM’s Strategic Planning		

ACTION PLAN 7.3: Provide facilities and resources for chosen faculties to integrate environmental issues and perspectives into their existing courses, by developing and implementing training programmes, seminars, and also provide funding (if applicable) .

Problem Statement	Scope of Activities	Target Groups
Limited institutional drive and commitment is the discipline that has been neglected in promoting learning for sustainable education (Jucker & Martin, 2005).	<ul style="list-style-type: none"> ESD-related events (exhibition, competitions) 3R Campaign E-waste Rimba Project 	<ul style="list-style-type: none"> Campus Communities
Impact and Implication		
Brand Image: UM would be recognized as one institution which support solutions driven approach in engaging environmental and climate change issues		
Activities Information		
Establish 3R campaign to reduce, reuse and recycle waste.		

8) CAUMo8: Change Management: Governance, Participation & Communication



CAUMo8.1: Change Management: Governance

The final Core Area of UM Eco-Campus Blueprint concerning the aspects of management, governance, participation, and communication. Transformation towards a green and sustainable campus requires proper and in advance planning process and taking into account all core activities of the university: teaching, research, development, community-and-industrial engagement, and networking. Strategic and efficient governance help facilitate the implementation of green and sustainable campus policies and it needs support in a form of a holistic participation and involvement of various parties; students, staff, university higher management and relevant stakeholders of various levels and backgrounds. The transformational and change process at the institutional level is long-term in nature and require continuous improvement. Through strong internal transformation, UM will be prepared to play a greater and leading role in greening and sustainability efforts at the local, national, regional and global level.

ACTION PLANS

OBJECTIVES

AP8.1.1

Alignment of the core mission of the university with green and sustainability principles, goals, and targets

Menyelaraskan misi teras universiti dengan prinsip, matlamat, dan sasaran hijau dan lestari.

- Integrate green and sustainable practices in the University Strategic Plan and the University Development Plan
- Establish a policy that leads to the formation of UM campus as a living laboratory for green and sustainable initiative practices

AP8.1.2

Build cooperation and promote co-creation across campus

Membangunkan kerjasama dan menggalakkan 'co-creation' merentas kampus.

- Establish goals and objectives in-line with green and sustainable practices at all levels of the Responsibility Centers (RCs)
- Establish a variety of platforms that could promote cooperation in implementing green and sustainable practices cutting across all core activities of the university; development, teaching, research and community-and-industrial engagement and networking.
- To give due recognition to the RCs and the campus community whose able to portray an active role in promoting green and sustainable practices in and outside of the campus.

AP8.1.3

Ensure monitoring, performance evaluation, and improvement of green and sustainable practices are conducted continuously and effectively.

Memastikan proses pemantauan, penilaian prestasi, dan penambahbaikan dalam amalan hijau dan lestari dilaksanakan secara berkesan dan berterusan.

- Establishing a system which covers all data, documentation, and effective communication for monitoring purposes.
- Implement the review and auditing process of performance evaluation and continuous improvement of the campus.

AP8.1.4

Strengthen university's role and networking in greening and sustainability efforts at the local, regional, national, and global levels.

Memperkuhkan peranan dan rangkaian universiti dalam usaha penghijauan dan kelestarian tempatan, serantau, kebangsaan, dan global.

- Establish a network of communication channel and promote effective communication: local, regional, national, and global.
- Enhance the role of universities through the network of cooperation and sharing of expertise in greening and sustainability efforts at various levels.
- Encourage holistic campus community participation in the formulation of public policy and community activities.

ACTION PLAN 8.1.1: Alignment of the core mission of the university with green and sustainability principles, goals, and targets

Proposed Activities:

- Integrate green and sustainable aspects in more concrete manner in official documents of the UM Strategic Plan and UM Development Plan.
- Conduct a holistic mapping of responsibility centers (RCs) to provide support system for the implementation process.
- Conduct series of discussions with representatives of the RCs in respect of long-term strategy plans and commitment required.
- Setup an Executive and Steering Committee recognized by UM top management with granted authority to implement, monitor, evaluate, and improve the quality of green and sustainable activities on campus.
- Appoint a special officer who will be responsible for the coordination of green and sustainable campus activities including matters related to the development of UM as a Living Lab.

ACTION PLAN 8.1.2: Build cooperation and promote co-creation across campus

Proposed Activities:

- Produce a guide book on the role of the RCs and the UM campus community in the transformation towards a more sustainable campus
- Organize roadshows and capacity building programs for all relevant RCs in promoting green and sustainable practices.
- By phases, create or improve current or available KPI, quality objectives, and SOP to be in line with the green and sustainable practices at all levels of the RCs.
- Develop and improve existing platforms (such as Living Labs UM, UM SDSN, UMCares squad, and UMCares Competition) and form a new platform to promote cooperation in implementing green practices and sustainable development activities cutting across teaching, research, and community networks in campus.
- Establish a formal recognition to the contributions and activities of the RCs and the campus community in the form of KPI assessment, competition, incentive funds, awards, and appropriate publicity.
- Utilize incentives at national and international levels to support activities on campus greening and sustainability initiatives.
- By phases, establish and gain international recognition such as STARS rating, International Sustainable Campus Network (SCN), Campus Sustainability Award, Green Building certification, ISO 14001 and others.

ACTION PLAN 8.1.3: Ensure monitoring, performance evaluation, and improvement of green and sustainable practices are conducted continuously and effectively.

Proposed Activities:

- Develop an integrated system of data storage and analysis that can be adopted for the purpose of monitoring, performance evaluation and continuous improvement.
- Conduct workshops with all data providers and strengthens their role continuously.
- Improving the content and effective communication pertaining to UM Campus Sustainability Report in accordance with current developments.
- To coordinate and improve the performance evaluation based on the University of Indonesia (UI) GreenMetric approach to performance assessment at the international level (where appropriate) such as Sustainable Campus Rating (STAR Ratings), Sustainability Reporting Guidelines (SCN), indicators of corporate responsibility (GRI , global Compact), ISO standard (ISO14001) and Green Building certification (GBI).
- Ensure discussion/convention on UM performance for green and sustainable campus practices as well as holistic continuous improvement to be carried out every year.

ACTION PLAN 8.1.4: Strengthen University's role and networking in greening and sustainability efforts at the local, regional, national, and global levels.

Proposed Activities:

- Analyze UM's strengths, weaknesses, opportunities, and challenges in greening and sustainability efforts at all levels.
- Plan strategic areas where UM can play a more robust and active role in order to develop strong professional networks and sharing of expertise.
- If available, take advantage of incentives and programs at national and international levels to support activities on campus greening and sustainability initiatives.
- Revisit or further promote the role of UM in existing networks such as Talloires Declaration, SCN, UN- RCE, SDSN, and UNESCO.
- Additional to UI GreenMetric World University Ranking, work on and gain other relevant international recognition as STARS rating, SCN Campus Sustainability Award, Green Building Certification, and ISO 14001.
- Increase the impact of green and sustainability research such as Grand Challenges Program and UM Living Labs in the formulation of public policy and community activities.



CAUMo8.2: Participation and Communication Management

Despite the significance of instilling environmental awareness, messages communicated to the public are often lacking in its effectiveness (Aguilar, Waliczek, & Zajicek, 2008; Hudson 2001) Specifically, the ineffectiveness in conveying environmental issues occurs when complex scientific information is executed poorly for the general audience. While it is important that messages be based on reasoning (where science plays a role in the explanation of environmental problems), it is equally important that messages created for the general audience must be easy to understand and inviting. Similarly, while the University of Malaya has shown a positive track record in various forms to disseminate the message of environmental awareness and sustainability, efforts can be further improved to ensure that steps taken involve a collective agency. Taking the above-mentioned studies into consideration and the current measures implemented by the university, the role of effective communication and the media cannot be ignored in this effort.

ACTION PLANS

OBJECTIVES

AP8.2.1

Build diverse campus coalitions.

Membangunkan kerjasama merentas kampus.

- To establish a network of individuals (students, staff, management) that not only monitors the current situation on campus but also offers suggestions and invests in efforts to overcome challenges.

AP8.2.2

Strengthen regional, national, and global communication channels.

Memperkukuh jaringan saluran komunikasi serantau, kebangsaan, dan global.

- To initiate collaborative efforts that engage members of the community (local / regional / national / global)

AP8.2.3

Promote holistic participation in public policy formulation and citizenship education.

Mengalakkan partisipasi dan penyertaan holistik dalam pengubalan dasar awam dan pendidikan kemasyarakatan.

- To provide a platform and encourage participation from all citizens of the university and community in sustainability efforts.


ACTION PLAN 8.2.1: Build diverse campus coalitions.

Problem Statement	Scope of Activities	Target group
<p>There are various levels of environmental awareness among members of the university e.g. some individuals may see it as another minor issue which causes inconvenience. At the same time, there are those who are already taking action, but can be further encouraged by making their efforts easy to continue.</p>	<p>Organize activities that will encourage / combine individuals from different levels of awareness in sustainability efforts. This will help promote knowledge or skill sharing, while involving individuals from all backgrounds.</p>	<ul style="list-style-type: none"> • Campus Community
Impact and Implication		
Networking, knowledge-sharing, direct engagement.		
Activities Information		
Waste separation	Promote the importance of waste separation - whereby trash is separated into different elements.	This can be done at the faculties and residential colleges.
Composting for beginners	Educate students and staff about the benefits and importance of composting.	An activity that can be organized in collaboration with on-campus cafes.
Responsible consumerism	Inform and instill among the students and staff about responsible consumerism.	This knowledge sharing activity can be done by capitalizing on social media as a persuasive tool.
Social campaign - Example: bring your own reusable container to the cafe.	A social campaign is a communication strategy that aims to alter existing social behavior.	This is an activity can be executed by engaging various departments / faculties.

ACTION PLAN 8.2.2: Strengthen regional, national, and global communication channels.

Problem Statement	Scope of Activities	Target group
<p>Activities / efforts organized on campus are sometimes done in isolation e.g. one department/faculty is unaware that another department/faculty is working on a similar project. Goals and resources can be made more efficient with more inter-department or inter-faculty collaboration.</p>	<p>Activities can go beyond the university scope.</p>	<p>University of Malaya staff / students, nearby communities, national / regional / global networks.</p>
Impact and Implication		
<p>Knowledge / Skills-sharing, networking.</p>		
Activities Information		
<p>Campus-level / National / International / round-table discussions.</p>	<p>Provide a platform for academics and/or students to generate and share ideas on issues concerning sustainability. Participants agree on a specific topic and each is given equal rights to participate.</p>	<p>University academics, students, and communities off campus.</p>
<p>Online portal / publication</p>	<p>A virtual space to promote and share all information related to sustainability. This can also function as a portal to network and initiate collaborative projects.</p>	<p>This space can be made open-for-all, regardless whether an individual is a citizen of the university or otherwise.</p>

ACTION PLAN 8.2.3: Promote holistic participation in public policy formulation and citizenship education.

Problem Statement	Scope of Activities	Target group
<p>In their busy pursuit of publications and research activities, academics sometimes overlook the importance of community engagement. Efforts or knowledge relating to sustainability must be made available to society in a manner that is both materially and intellectually accessible.</p>	<p>Community-university engagement requires the university to identify and collaborate with partner groups to address a specific need. Activities that are initiated are valued by all parties and bring mutual benefits and respect.</p>	<p>Academics, students, communities outside of the university.</p> 
Impact and Implication		
<p>Knowledge / skill-sharing, community engagement, networking, life-long learning.</p>		
Activities Information		
<p>Campus / Nation-wide competitions</p>	<p>Provide a creative outlet for students / community to produce imaginative messages relating to sustainability.</p>	<p>This exercise may bring together academics, students, and communities on / off campus.</p>
<p>National / International level conference / seminars.</p>	<p>To make available a platform for academics / students to generate and share ideas on issues concerning sustainability. Participants will have the opportunity to advance their ideas and look into possibilities for collaborative work.</p>	<p>This effort should include university academics, students, and also any interested parties / communities off campus.</p>
<p>Adopt-a-school</p>	<p>To encourage academic and citizen participation by encouraging lecturers to "adopt" their school of choice to make knowledge-sharing less challenging.</p>	<p>Academics can help repackage their expertise relating to sustainability in a manner that is easy to understand and adopt by school children.</p>

5.0 FRAMEWORK & STRATEGY

Series of Roundtable Dialogue and UMECB Coordinating Meeting

- Sustainability Science Research Cluster
- UM Sustainable Development Solutions Network (UM SDSN)
- Input Contributors & JPPHB UM
- Technical and Editorial Panel
- UM Living Labs

Strategy: Milestone

Phase 1:	Desktop research
Phase 2:	Series 1 – Roundtable Discussion & Meeting: UM Living Lab & JPPHB Series 2 - Roundtable Discussion & Meeting: Input Contributors
Phase 3:	UMECB Data Presentation
Phase 4:	Preparation for final Draft of UMECB
Phase 5:	Printing of UMECB
Phase 6:	Official Launching of UMECB on 22 nd April 2016 (UM111@SuSci 2016)
Phase 7:	Distribution of UMECB to UM Management
Phase 8:	UMECB English Version

6.0 SUMMARY

University of Malaya Eco-Campus Blueprint (UMECB) is a document aims to serve as a guideline principle that encompasses framework and action plans in campus sustainability efforts and initiatives in University of Malaya. UMECB is expected to be a useful best practices guide to all Responsibility Centers (RCs) throughout the campus by University of Malaya based on needs, scenarios, sources and capacities to be adapted and practiced. All of the Eight (8) Core Areas is identified and selected to ensure each individual be it UM management, staff and students can equally contribute towards the development of eco-campus.

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8.0 ACKNOWLEDGEMENTS

- 1) Tan Sri Professor Dato' Dr. Mohd Amin Jalaludin & Office of Vice-Chancellor, University of Malaya
- 2) Professor Dr. Awg Bulgiba Awg Mahmud & Office of Deputy Vice-Chancellor (Academic & International): Academic Division, Institute of Biological Sciences (Mr. Mohd Rafizudin Rafiz – Academic Division, Assoc. Prof. Dr. Noor Zalina Mahmood & Dr. Fauziah Shahul Hamid - Institute of Biological Sciences),
- 3) Professor Dr. Noorsaadah Abd. Rahman & Office of Deputy Vice-Chancellor (Research & Innovation): IPPP UM, PPGP, Research Clusters - Sustainability Science RC (Ms. Nor Azlin Mat Radi), Innovative Technology RC (Ms. Nor Hidayah Ismail & Ms. Siti Nurfairuz Ab Rahman), Humanities RC (Ms. Nurul Hidayah Mohamad Nor & Ms. Melati Kassim), Equitable Society RC (Ms. Mushira Zainal Abidin & Ms. Faridah Azwah Kamaruddin)
- 4) Professor Dr. Faisal Rafiq Mahamd Adikan & Office of Deputy Vice-Chancellor (Development): JPPHB – Asset Management Division, Civil Engineering Division, Administrative Division, Financial Division, Electric and Electronic Division, (Mr. Husnil Abdullah, Mr. Mohd Fais Ismail, Ms. Huwaida Borhan, Ms. Nor Suzila Mohamad, Mr. Kalaivhaanan Chokka Lingam SK, Mr. Maszairizam Masri, Mr. Muhammad Faris Ali, Ms. Siti Hamizah, Ms. Ana Maizura, Ms. Nor Fazilla Salleh, Ms. Norzilah Mohamad)
- 5) Professor Datuk Dr. Rohana Yusof & Office of Deputy Vice-Chancellor (Student Affairs & Alumni) Registered Student Bodies Division & HEP Campus Bas Services (Mr. Mohd Hairil Zainal Abidin, Mr. Mohd Khaidir Zulkepli)
- 6) Associate Professor Dr. Sumiani Yusoff (Dean) & Sustainability Science (SuSci) Research Cluster Office, University of Malaya
- 7) International and Corporate Relations Office (ICR)
- 8) UMCares – The Community and Sustainability Centre
- 9) Information Technology Center / *Pusat Teknologi Maklumat* (PTM)
- 10) UM Security Office – Traffic and Vehicle Stickers Unit (Security Officer: Mr. Khairul Anuar Abu Shari)
- 11) UM Living Lab: Ms. Lili Fariza Ariffin (Project Officer)
 - Water Warriors: Mr. Affan Nasaruddin, Ms. Siti Norasiah Abd. Kadir, Mr. Mohammad Shahrul Amin
 - The RIMBA Project: Mr. Benjaming Ong, Ms. Vanessa Ting, Ms. Nurul Fitrah Marican
 - Zero Waste Campaign: Mr. Jaron Keng, Mr. Ng Chee Guan, Ms. Nurfatina Baharuddin
- 12) UM Sustainable Development Solutions Network (UM SDSN)
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- 13) University of Malaya Library: Interactive Portal – Web of Science UM, SciVal & UM Repository
- 14) 12 Residential Colleges in University of Malaya



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ISBN 978-983-100-910-9



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