USM LOW CARBON CAMPUS
BLUEPRINT IMPLEMENTATION DOCUMENT

2019 - 2025

Prepared by:
Centre for Global Sustainability Studies (CGSS)

UNIVERSITI SAINS MALAYSIA

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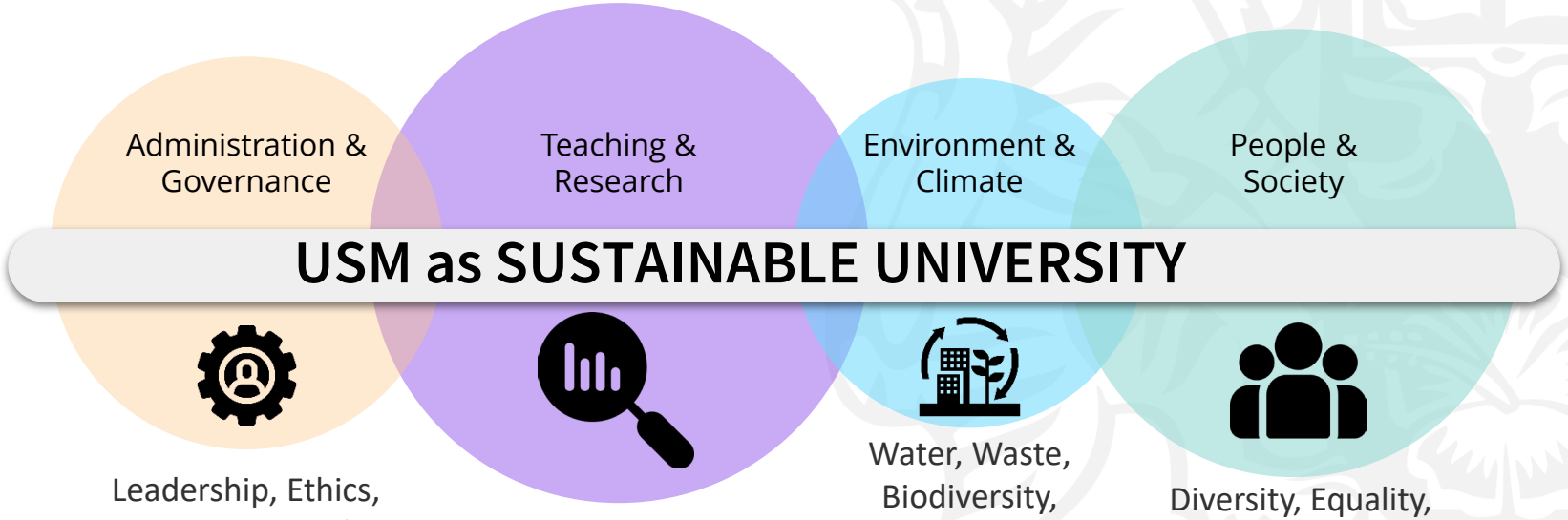
USM Commitment

Transforming Higher Education for a Sustainable Tomorrow. USM is a pioneering, transdisciplinary research-intensive university that empowers future talents and enables the bottom billions to transform their socio-economic well-being. USM is committed to achieving its 2050 carbon-neutral target in line with Malaysia's commitment.

4 Core Areas



Current Area
USM Campus Map

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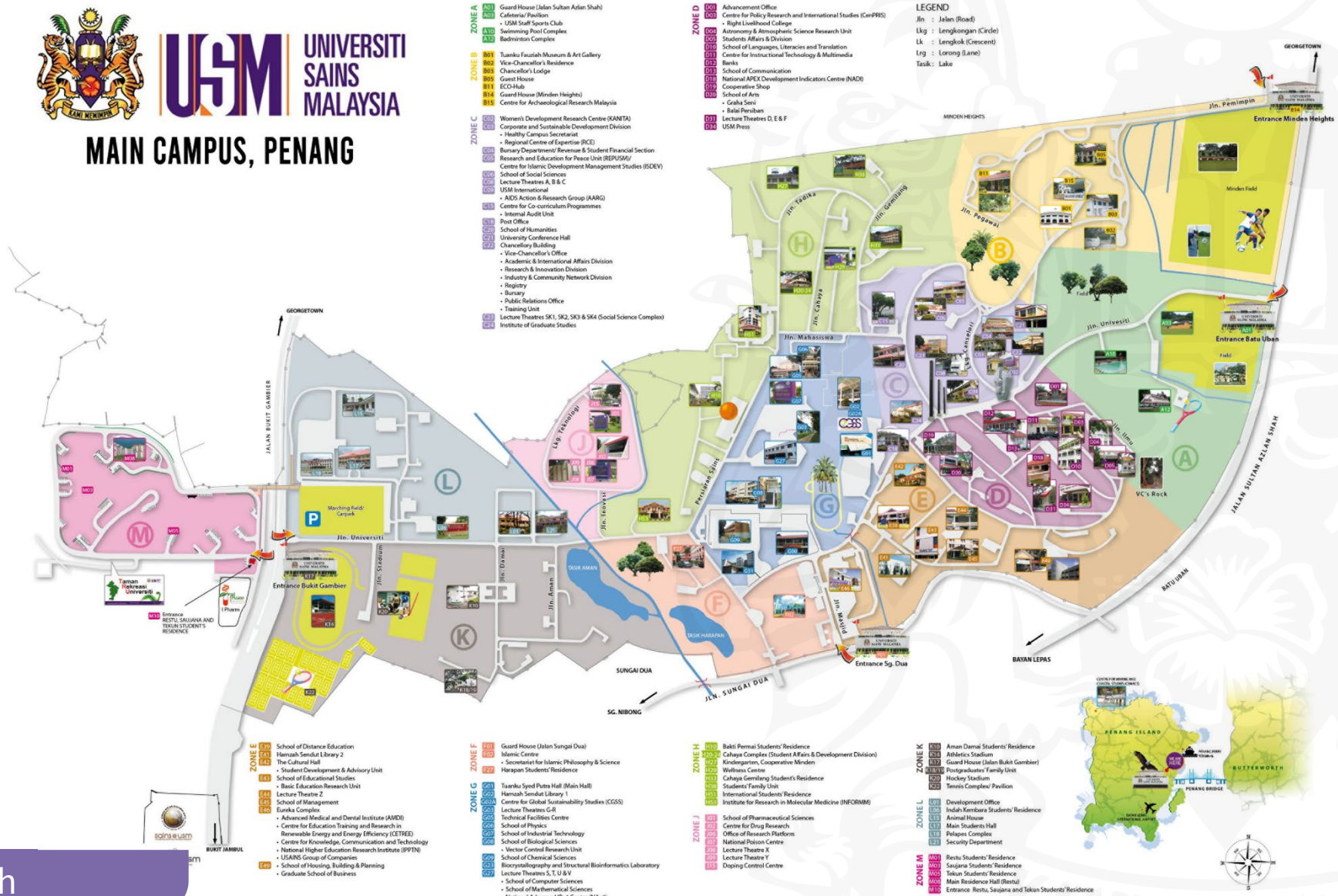
MAIN CAMPUS, PENANG



Whole System Approach

Integrating the Whole System Approach
Visions

To embed sustainability with all institutional matters of USM (vision & mission, operational objectives, values and outcomes, performance indicators)

+ Energy

Support efficient energy consumption

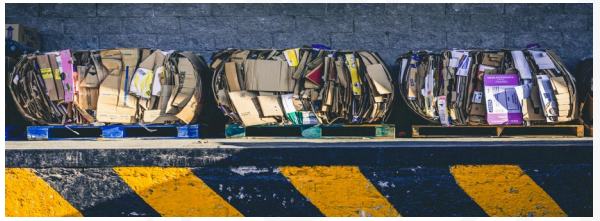
- By 2030, energy consumption is reduced without compromising productivity.
- By 2030, renewable energy generation in campus will be increased by 75%.
- By 2030, university vehicles being hybrid technology compliant.

+ Mobility

Promote sustainable transport

- By 2025, 100% reduction of motor vehicles (MV) usage during the MV free-day.
- By 2025, 30% reduction of registered MV.
- By 2025, 70% increase of rental and refurbished bicycles.
- By 2025, 90% increase of university walking during office hours*
- By 2025, 50-70% shaded pathway (including tree orientation).
- By 2025, Implementation of pedestrian and walking zone in the campus, 50%-70% increase of walking and cycling activities at the zones.

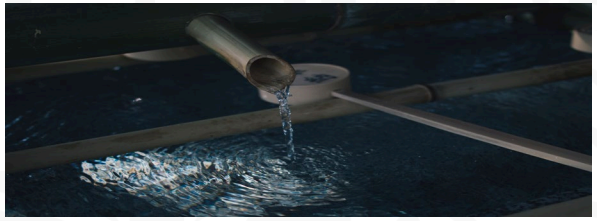
+ Waste



Become a zero-waste campus

- By 2030, continuous, precise and sustainable waste management operation to achieve zero waste is achieved in campus.
- By 2030, income generated from “waste to wealth” program.

+ Water



Encourage sustainable water management

- By 2030, 30% reduction in water bills.
- By 2030, 30% use of RWH for campus toilets.
- By 2030, 100% use of RWH for gardening.
- By 2030, 70% reduction of missing water in campus.
- By 2030, sustainable water management is integrated in campus.

Integrating the Whole System Approach

Implementation Strategies

The workframe involved institution-wide implementation of 17 Sustainable Development Goals (SDGs). The USM LOW CARBON CITY BLUEPRINT IMPLEMETATION DOCUMENT (2019-2025) covers the following six (6) domains: Students, Academics, Research, Community / Industry, Institution and Environment with emphasize of four LCC elements; Energy, Mobility, Waste, and Water.

01 Appointment of Committee Members

- Experts are identified and appointed as committee members.

02 Action plan outline – set SDGs priorities

- Current status of sustainability on the assigned domain is analysed.

03 Focus groups (domains) discussion

- Relevant stakeholders (local government and local community groups, within and/or outside USM) in reviewing current sustainability status are engaged.

04 Final Action Plan & Narratives

- Sustainability strategies and action plan based on the assigned domain are compiled.

05 Integrated Action Plans

- Tangible strategies are implemented.

USM LCC

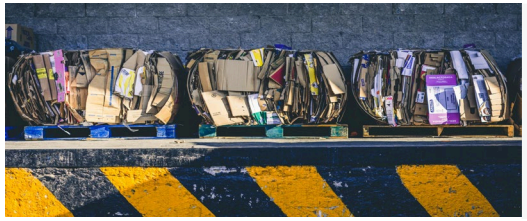
Objectives

+ Energy

1. To reduce energy consumption without compromising productivity.
2. To ensure USM Overall Building Energy Index (OBEI) is MS 1525:2007 compliant.
3. To increase renewable energy generation in campus.
4. To ensure university vehicles being hybrid technology compliant.

+ Mobility

1. To promote healthy living environment by encouraging sustainable mobility.
2. To provide supporting environment for sustainable mobility.
3. To promote safer roads on campus including freedom of space for cyclists & pedestrian.



+ Waste

1. To ensure continuous, precise and sustainable waste management operation to achieve zero waste in campus.
2. To generate income from “waste to wealth” program.

+ Water

1. To integrate sustainable water management plan in campus.

USM LCC

Target and Data Requirement

TANGIBLE TARGET

- 10% reduction in energy bills by 2030
- Renewable energy generation in campus will be increased by 75% by year 2030.
- OBEI less than 136 kWh/ m^2/ year
- 50% of electricity maximum demand

INTANGIBLE TARGET

- Attainment of Energy Management Gold Standard (EMGS) Certification by ASEAN Energy Management Scheme (AEMAS).
- Compliance to MS 1525:2007 in all university buildings.
- Increase renewable energy generation in university campus.
- University vehicles being hybrid technology compliant.

DATA

- Electricity bills

+ Energy

USM LCC

Target and Data Requirement

TANGIBLE TARGET

- 100% reduction of MV usage during MV-free day.
- 30% reduction of registered motor vehicles.
- 70% increase of rental and refurbished bicycles.
- 90% increase of university walking during office hours.

INTANGIBLE TARGET

- Awareness towards traffic and safety regulation in the campus.
- Implementation of pedestrian and walking zone in the campus, with the increase of walking and cycling activities at the zones.
- Awareness for EV and AV as alternative mode.
- Campaigns, competitions, public engagement, workshops and/or townhall (as medium for healthy lifestyle) to staffs and students.

DATA

- Mobility usage of USM owned vehicles

+ Mobility

USM LCC

Target and Data Requirement

TANGIBLE TARGET

- 100% zero waste in all USM campuses.

INTANGIBLE TARGET

- Continuous, precise and sustainable waste management operation to achieve zero waste is achieved in campus.
- Income generated from “waste to wealth” program.

DATA

- Waste disposal bills

+ Waste

USM LCC

Target and Data Requirement

TANGIBLE TARGET

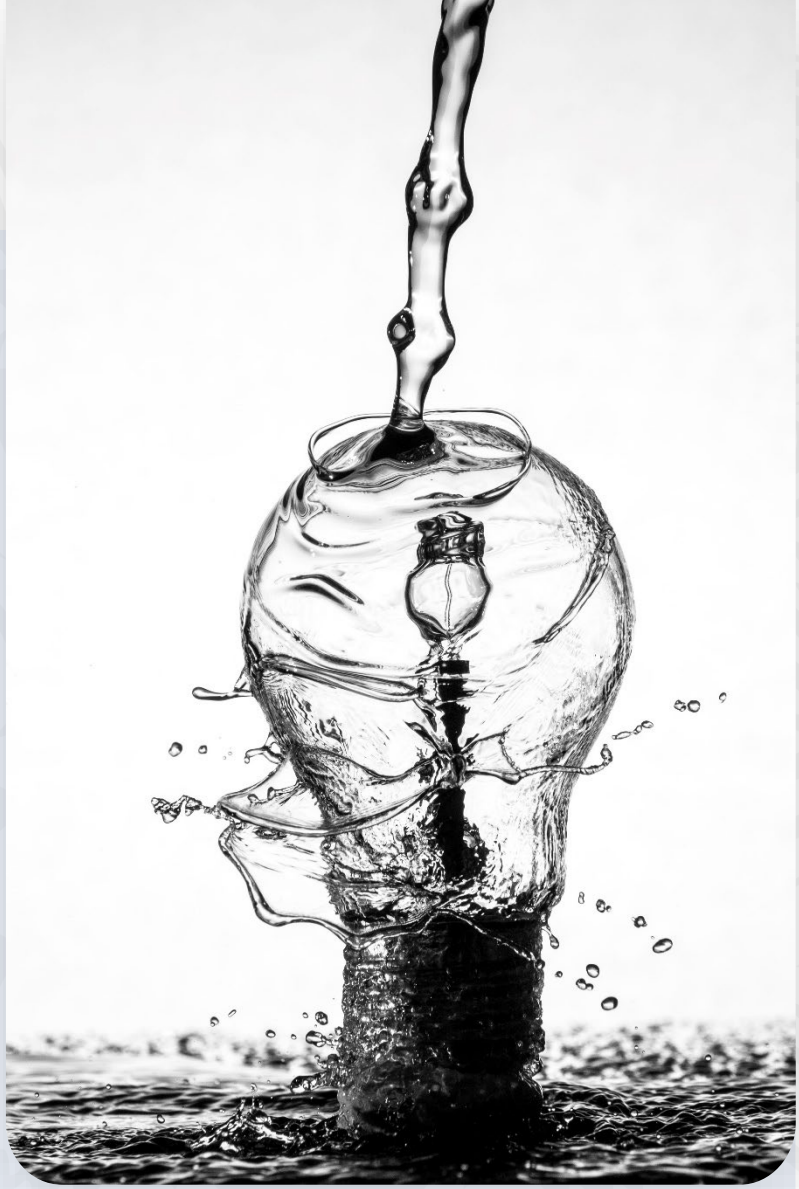
- 30% reduction in water bills.
- 30% use of RWH for campus toilets
- 100% use of RWH for gardening.
- 70% reduction of missing water in campus.

INTANGIBLE TARGET

- Sustainable water management plan is integrated in campus.

DATA

- Water bills



+ Water

USM LCC

Partners (Stakeholders) & Roles

INTERNAL

No.	Partners/ Stakeholders	Roles	LCC Element*
1	Jabatan Pembangunan dan Pengurusan Aset (JPPA)	Strategise, implement, management, monitor	E, WT
2	Kampus Sejahtera	Strategise, implement, management, monitor	E
3	CETREE	Strategise, implement, management, monitor	E
4	All PTJs	Strategise, implement, management, monitor	E, M, WT
5	Bursary	Funding	E
6	CGSS	Strategise, implement, management, monitor	M, WT
7	BikeCommute@USM	Strategise, implement, management, monitor	M
8	Registrar Office	Management, support decision making	M
9	Hostels	Management, implement, monitor	M
10	Institut Pengajian Siswazah (IPS)	Management, support decision making	M
11	International Mobility & Collaboration Centre (IMCC)	Strategise, implement, management, monitor	M
12	Pusat Sejahtera	Strategise, implement, management, monitor	M
13	Jabatan Keselamatan	Strategise, implement, management, monitor	M
14	TNC Kelestarian dan Pembangunan Institusi (TNCKPI)	Strategise, implement, management, monitor, funding, support decision making	WT
15	REDAC	Strategise, implement, management, monitor	WT
16	Pusat Pengajian Kejuruteraan Awam	Strategise, implement, management, monitor	WS

* E: Energy; M: Mobility; WS: Waste; WT: Water

USM LCC

Partners (Stakeholders) & Roles

EXTERNAL

No.	Partners/ Stakeholders	Roles	LCC Element*
1	Dr. Bike	Collaborate on bicycle projects.	M
2	Urbanice	Collaborate on sustainable mobility programmes.	M
3	Wyeth Water Consultant	Collaborate on water management system.	WT
4	Ichigo Holdings Co Ltd	Collaborate on grant application on Water Resources	WT
5	Tzu Chi Society	Collaborate on recycling projects	WS
6	Yayasan Hijau Malaysia	Collaborate on hands on activities involved Green Tech sectors ,Green Audit activities & Green Technology Competition	E,WT,WS
7	Penang Green Council	Collaborate on zero waste project	WS
8	NuPlas	Monitor and track recycling materials	WS
9	Tenaga Nasional Bhd	Collaborate on Energy Efficiency Programme	E
10	Sime Darby	Collaborate on Mobile Exhibition and Biofuel awareness programme	E
11	Philip Malaysia	Collaborate on Energy Efficiency Appliance Programme	E
12	Sustainable Energy Development Authority (SEDA)	Collaborate on Energy Efficiency Competition	E
13	BEAM Mobility Holdings Pte Ltd	Collaborate on zero emission transportation (e-scooter)	M
14	China Institute of Water Resources and Hydropower Research (IWHR)	Collaborate on grant applications under the topics of urban stormwater, integrated water resources management, and river management.	WT
15	Kantipur Engineering College, Nepal	Collaborate on a special session during the International Conference on Engineering and Technology, titled "Sustainable Urban Drainage System – Malaysia's Experience and Expertise".	WT

* E: Energy; M: Mobility; WS: Waste; WT: Water

USM LCC

Partners (Stakeholders) & Roles

EXTERNAL (CONT.)

No.	Partners/ Stakeholders	Roles	LCC Element*
16	National Hydraulic Research Institute of Malaysia (NAHRIM)	Collaborate on research projects such as Constructed Wetland as Sewerage System Alternative and Atmospheric Water Generator (AWG).	WT
17	UNESCO	Collaborate with UNESCO to establish UNESCO Chair on Ecohydraulics for Sustainable Water Infrastructure for SDG 6 in the Asia and the Pacific Region	WT
18	JKR Malaysia	Collaboration partner in the Research Project	WT
19	JPS Malaysia	Collaborate on BIOECODS projects and the National Conference on Stormwater Management (SWaM)	WT
20	Water Watch Penang	Collaborate on the World Water Day Exhibition to promote awareness of water management to the community.	WT
21	TRASHFORCASH (M) Sdn Bhd	Collaborate on zero waste project and setting up recycling centre	WS

* E: Energy; M: Mobility; WS: Waste; WT: Water

USM LCC

Strategies / Actions and Status of Implementation

USM LCC

Energy

Strategies		Actions		Means of Verification	Target Year			Responsibility	Status
S1	Reduce energy consumption without compromising productivity	1	Change energy consumption behaviour of university community & Install energy efficient equipment and appliances	Energy consumption report	ST	2% (EMGS 1 star)	2022	JPPA, Kampus Sejahtera, CETREE, all PTJs	Ongoing
					MT	5% (EMGS 2 star)	2025		
					LT	10% (EMGS 3 star)	2030		
S2	Compliance to MS 1525:2007 in all university buildings	2	Renovate, retrofit or alter all existing buildings to comply to MS 1525:2007	Energy consumption report	ST	25% (OBEI less than 136 kWh/ m^2/ year)	2022	JPPA	Ongoing
					MT	50% (OBEI less than 136 kWh/ m^2/ year)	2025		
					LT	100% (OBEI less than 136 kWh/ m^2/ year)	2030		
		3	All new buildings to comply to MS 1525:2007	Energy consumption report	ST	100% (OBEI less than 136 kWh/ m^2/ year)	2022	JPPA	Ongoing
					MT	100% (OBEI less than 136 kWh/ m^2/ year)	2025		
					LT	100% (OBEI less than 136 kWh/ m^2/ year)	2030		
S3	Increase renewable energy generation in university campus	4	Utilise university land and buildings to generate solar electricity	Energy consumption report	ST	0% (50% of electricity maximum demand)	2022	JPPA	Ongoing
					MT	50% (50% of electricity maximum demand)	2025		
					LT	75% (50% of electricity maximum demand)	2030		
S4	University vehicles using hybrid technology energy sources	5	Periodic new vehicle replacement based on hybrid technology compliance	Energy consumption report	ST	5%	2022	JPPA, Bursary	Ongoing
					MT	20%	2025		
					LT	50%	2030		

*ST: Short Term; MT: Mid Term; LT: Long Term

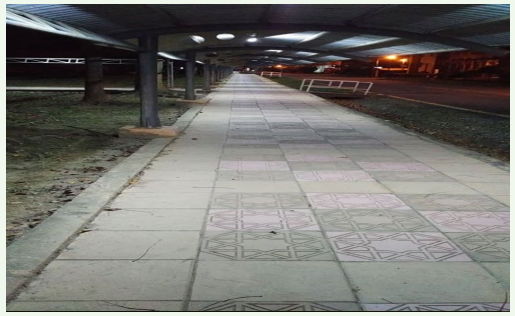
USM LCC

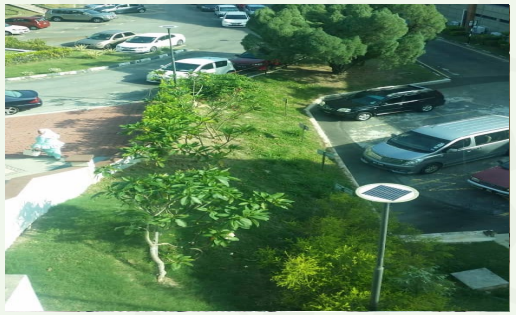
Energy

Installation of Solar PV on campus

LED lightings installed across USM campus

Smart censor lightings and solar-powered lamp post





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Mobility

Strategies		Actions		Means of verification	Target Year			Responsibility	Status
S1	Sustainable mobility awareness program for students during orientation weeks (all campuses); public engagement/ town hall; bike maintenance workshop/ bike-road safety clinic	1	Introduction to the importance of sustainable mobility to health and lifestyle. Experiencing shorter walking path in the campus. Experiencing cycling in the campus. Road safety awareness as pedestrian and cyclists in/outside campus.	CGSS, TNCKPI	ST	Starting with the cohort of students (2021/202) having awareness about sustainable mobility in the campus. In five years, 5 cohort of students already adapted with sustainable mobility.	2022	CGSS, BikeCommute@USM, Dr. Bike, Urbanice, Registrar Office, Schools, Hostels, IPS, IMCC etc.	Ongoing
S2	Walking and cycling campaigns and awareness (as medium for healthy lifestyle and combat stress) to staffs and students.	2	Emphasizing the USMFIT platform and apps. Give rewards based on 'what they need' e.g. CPD points, LPP marks, free medical check up, vouchers from Farmasi Pusat Sejahtera, vouchers for notebook, computer, claim for Article Processing Charge, etc	CGSS, TNCKPI	ST	30% of university population involved with the activities.	2022	CGSS, USM Fit, BikeCommute@USM, Pusat Sejahtera	Ongoing
					MT	50% of university population involved with the activities.	2023		
					LT	80-90% of university population involved with the activities.	2025		
S3	Walking and cycling competition and rewards; Include in SUKJAB and SUKAD	3	Competition between PTJ/ hostels/ clubs/ through walking and cycling challenge, healthy lifestyle challenge, reduce carbon footprint challenge etc. Rewards including CPD points, LPP marks, special Anugerah for individual and groups etc.	CGSS, TNCKPI	ST	30% of university population involved with the activities.	2022	CGSS, USM Fit, BikeCommute@USM, Pusat Sejahtera	Ongoing
					MT	50% of university population involved with the activities.	2023		
					LT	80-90% of university population involved with the activities.	2025		

*ST: Short Term; MT: Mid Term; LT: Long Term

CONT'D ...

USM LCC

Mobility

Strategies		Actions		Means of verification	Target Year			Responsibility	Status
S4	Car & motorcycle free day	4	Introduce car & motorcycle free day or free hour every month (during working hours). Need to do survey to understand the perception, to address the challenges and obstacles, to measure readiness of the population.	CGSS, TNCKPI	ST	30% reduction of MV usage during the program.	2022	Jabatan Keselamatan, CGSS, BikeCommute@USM	Ongoing
					MT	50% reduction of MV usage during the program.	2023		
					LT	100% reduction of MV usage during the program. 30% reduction of registered motor vehicles.	2025		
S5	Active mobilty day	5	Introduce bike and pedestrian day as replacement for motor vehicles by providing bike rental program & refurbished abandoned bikes at Engineering Campus	CGSS, TNCKPI	ST	30% increase of rental and refurbished bicycles. 30% increase of university walking during office hours.	2022	Jabatan Keselamatan, CGSS, BikeCommute@USM, Dr. Bike, Urbanice,	Ongoing
					MT	50% increase of rental and refurbished bicycles. 50% increase of university walking during office hours.	2023		
					LT	70% increase of rental and refurbished bicycles. 90% increase of university walking during office hours.	2025		
S6	Work from home	6	Practical WFH timetable for staff and student. Survey to address the challenges, opportunities etc.	CGSS, TNCKPI	ST	Analysis of reduction in carbon emission (by reducing number of private vehicle entering USM, and scheduled entrance to USM). Analysis of reduction in carbon emission (by limiting number of bypass vehicles)	2022	CGSS, all PTJs	Ongoing

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CONT'D ...

USM LCC

Mobility

Strategies		Actions		Means of verification	Target Year			Responsibility	Status
S7	Infrastructure & facilites for active mode	7	Identify adequate facilities for active mode Audit for pedestrian pathway, potential cycling lane Improve and provide adequate facilities for active mode	CGSS, TNCKPI	ST	Existing pathway and potential cycling path	2022	JPPA, BikeCommute@USM	Ongoing
					MT	30% shaded pathway (including tree orientation) 30% of bicycle signs installed miles painted of bike lanesno. of self-service bike tool	2023		
					LT	50-70% shaded pathway (including tree orientation). 30-70% of bicycle signs installed miles painted of bike lanes no. of self-service bike tool.	2025		
S8	Collaboration with private sector/ external parties	8	MOU (Urbanice, Zebra Ebike, LinkBike)	CGSS, TNCKPI	ST	1 collaborator	2022	All PTJs	Ongoing
					MT	2 collaborators	2023		
					LT	3 collaborators	2025		
S9	Preparation for EV and AV (busses, buggies, bike etc.)	9	Framework for EV and AV vehicles, research and collaboration with industries	CGSS, TNCKPI	ST	10% awareness for EV and AV as alternative mode	2022	JPPA, CGSS, BikeCommute@USM, Jabatan Pembangunan, all PTJs	Ongoing

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CONT'D ...

USM LCC

Mobility

Strategies		Actions		Means of verification	Target Year			Responsibility	Status
S10	Restrict unnecessary private motor vehicle usages and traffic violation through enforcement and awareness campaign	10	Enforce Peraturan Lalu Lintas dan Parkir 2015, Increase compound rate for traffic violation including speeding, illegal parking etc.	CGSS, TNCKPI	ST	30% awareness towards traffic and safety regulation in the campus.	2022	Jabatan Keselamatan, CGSS	Ongoing
					MT	50-70% awareness towards traffic and safety regulation in the campus.	2023		
					LT	100% awareness towards traffic and safety regulation in the campus.	2025		
S11	Improve traffic circulation system to encourage walking and cycling	11	Identification of pedestrian and walking zone through simulation, modelling and GIS mapping Identify adequate traffic circulation to support car and motorcycle free day.	CGSS, TNCKPI	ST	Implementation of pedestrian and walking zone in the campus, 10% - 30% increase of walking and cycling activities at the zones.	2022	Jabatan Keselamatan, CGSS	Ongoing
					MT	Implementation of pedestrian and walking zone in the campus, 30%- 50% increase of walking and cycling activities at the zones.	2023		
					LT	Implementation of pedestrian and walking zone in the campus, 50%- 70% increase of walking and cycling activities at the zones.	2025		

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USM LCC
Mobility

Sustainable Commuting @USM

As a sustainable-led university, USM provides a number of sustainability commuting facilities within its compound. This is to accommodate the USM community and reduce the need for commuting using vehicles such as car and motorcycle, which in turn would help to reduce the amount of carbon footprints.

USM LCC

Waste

Strategies		Actions		Means of verification	Target Year			Responsibility	Status
S1	Waste management and income generation	1	Identify storage, segregation, and develop management SOP for organic waste, garden waste, disposal furniture, electronic waste, and others. Generate income.	Waste disposal bills and reports	ST	30-40% of waste generation go to concept zero waste. Income generation.	2022	All PTJs	Ongoing
					MT	60-70% of waste generation go to concept zero waste. Income generation	2023		
					LT	100% of waste generation go to concept zero waste. Income generation.	2025		

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USM LCC

Waste

Used chemical bins and plastic bottles are repurposed

Campus health centre recycling program

Trash segregations being practiced across campus

Students' activities in reinventing using used products

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Water

Strategies		Actions		Means of verification	Target Year				Responsibility	Status
S1	Metering and monitoring (dashboard system)	1	Reduce 30% of water bill.	Water bill and water consumption report	ST	20%	2022	Jabatan Pembangunan, CGSS, TNCKPI	Ongoing
					MT	70%	2025		
					LT	100%	2030		
S2	Retrofitting and replacements	2	Reduce 20% of wastage water	Water bill and water consumption report	ST	30%	2022	Jabatan Pembangunan	Ongoing
					MT	70%	2025		
					LT	100%	2030		
S3	Awareness education	3	50% students and staffs aware of saving water	Water bill and water consumption report	ST	20%	2022	Staffs and students	Ongoing
					MT	70%	2025		
					LT	100%	2030		
S4	Water Harvesting systems	4	Reduce 30% of water bill.	Water bill and water consumption report	ST	20%	2022	Jabatan Pembangunan, TNCKPI	Ongoing
					MT	70%	2025		
					LT	100%	2030		
S5	Involved consultant expert - water audit (Wyeth Water Consultant)	5	Reduce 70% missing water in the campuses	Water bill and water consumption report	ST	30%	2022	Consultants, Jabatan Pembangunan, TNCKPI	Ongoing
					MT	70%	2025		
					LT	100%	2030		

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Water

Rain harvesting system installed in campus

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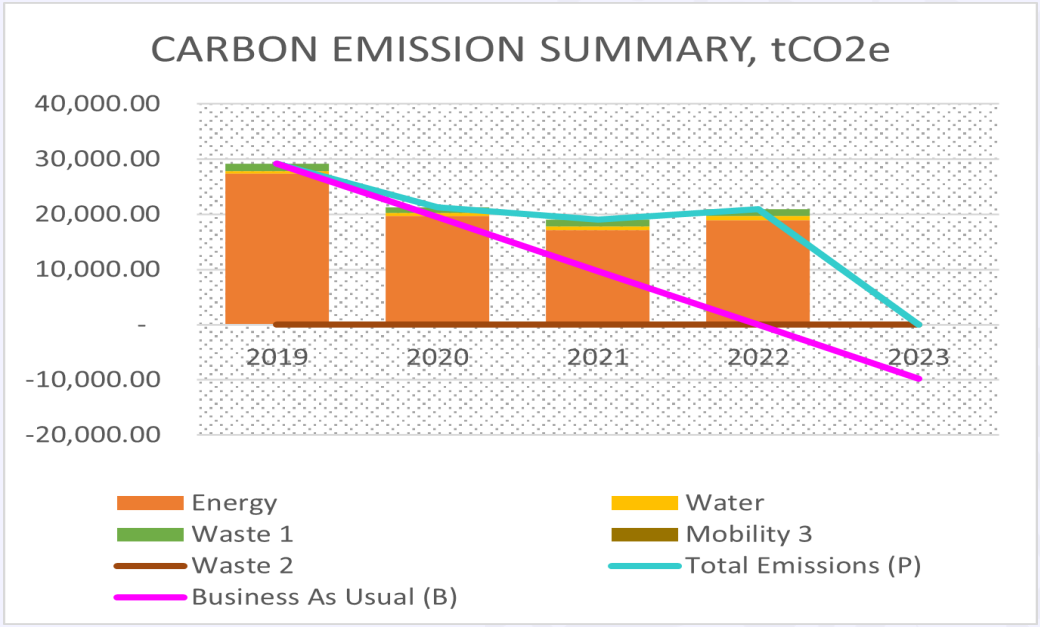
Summary - Conclusions

Current assessment (2019-2022, USM main campus):



USM LOW CARBON CITY BLUEPRINT IMPLEMETATION DOCUMENT (2019-2025) was compiled objectively to achieve sustainable developments that will subsequently **reduce carbon emissions in campus**. The document serves as a guide that will propel stakeholders for the university and even cities, townships and neighborhoods to re-assess the priorities in planning and developing of new projects, as well as strategies that can be taken by existing management in reducing their carbon emission levels.

Transforming
Higher Education for a
Sustainable Tomorrow

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