GREEN ECONOMY & INDUSTRY 4.0

Achieving Sustainable Development Goals

KEMENTERIAN TENAGA, SAINS, TEKNOLOGI, ALAM SEKITAR DAN PERUBAHAN IKLIM

Green Tech Malaysia

iGEM 2018

INTERNATIONAL GREENTECH & ECO PRODUCTS EXHIBITION & CONFERENCE MALAYSIA

17th - 20th OCTOBER 2018

KUALA LUMPUR CONVENTION CENTRE

GREEN ECONOMY & INDUSTRY 4.0
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LOW CARBON ISLAND MODEL

GREEN TECHNOLOGY APPLICATIONS FOR THE DEVELOPMENT OF LOW CARBON CITIES (GTALCC) INFORMATION SHARING SESSION IN CONJUNCTION WITH LCCF AWARD CEREMONY @ IGEM 2018

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GOAL DEVELOP ACHIEVE SUSTAIN

LOW CARBON ISLAND MODEL

A 3-week desktop study commissioned by SEDA to explore the feasibility of low carbon islands in the Malaysian context

KEMENTERIAN TENAGA, SAINS, TEKNOLOGI, ALAM SEKITAR DAN PERUBAHAN IKLIM

UNDP

gef

seda Sustainable Energy Development Authority MALAYSIA

UTM-LOW CARBON ASIA RESEARCH CENTRE

MALAYSIAN ISLANDS BY THE NUMBER

937
Total number of islands

4,281
Total land area (km^2)

Ranging from (Banggi Island)
440 km^2
...to unnamed rocky outcrops

Accounting for
1.3%
of Malaysia's total land area

Accounting for
5.3%
of Malaysia's total population

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GOAL DEVELOP ACHIEVE SUSTAIN

PROJECT APPROACH

Low Carbon Island Model Desktop Study

Low Carbon

CO_2 emission reduction (Kaya identity)

$$CO_2 = population \times \frac{economy}{population} \times \frac{energy}{economy} \times \frac{carbon}{energy}$$

Key CO_2 emission mitigation opportunities
- Urban spatial, transportation, building, waste, sequestration strategies
- Lifestyle / behavioural change
- Economic structural change
- Energy efficiency
- Renewable energy

Islands

Geographical definition
Traits of islands
Malaysian islands

Islands as unique geographic entities
- Higher necessity and potential for self-sustainability

Malaysian Islands quick facts
- 1.3% of Malaysia's land mass
- About 4% of Malaysian population (2010)
- Categorisation of Islands (Category A, B & C)

Major urbanised islands
- Pulau Pinang, Pulau Langkawi & Pulau Labuan

Global Policies
(Paris Agreement, SDG, NUA.)
National Emission Intensity Reduction Target
45% by 2030
National Policies
(RMK 11, NPP3, NC2, BUR, GTMP, LCCF, Island & Marine Park Physical Dev. Planning Guidelines.)

Smart, Low Carbon and Green Islands Best Practices
(Jeju, Hawaii, Maldives, Jersey, Penghu, Miyako, Samui, Isle of Eigg and Fetlar)

Potentiality/Feasibility of Low Carbon Islands in Malaysia

Potential of islands for low carbon developments
- Key and common features of low carbon islands
- Major sources of emission on islands
- Policy menu for low carbon islands (Category A, B and C)

Langkawi as the pioneer of Low Carbon Island in Malaysia
- Key functions and economics activities
- Feasibility study / Emission profile
- Mitigation measures

Low Carbon Island Model

UNDERSTANDING 'LOW CARBON'

$$CO_2 = \text{Population} \times \frac{\text{Activity}}{\text{Population}} \times \frac{\text{Energy}}{\text{Activity}} \times \frac{CO_2}{\text{Energy}}$$

Japanese energy economist Yoichi Kaya, 1993

- CO_2 emissions grow proportionately with population
- Role of population growth in use of fossil fuel and GHG emissions

UNDERSTANDING 'LOW CARBON'

$$CO_2 = \text{Population} \times \frac{\text{Activity}}{\text{Population}} \times \frac{\text{Energy}}{\text{Activity}} \times \frac{CO_2}{\text{Energy}}$$

AVOID IMPROVE SHIFT

AVOID use of energy service – reduce time for activity and cutting wasted energy

IMPROVE energy efficiency – replace to energy efficient appliances

SHIFT energy sources to less GHG emission appliances - installation of renewable energy

UNDERSTANDING 'ISLAND'

"a naturally formed area of land, surrounded by water, which is above water at high tide"

United Nations Convention on the Law of the Sea (UNCLOS)

Finite landmass with well-defined natural boundaries

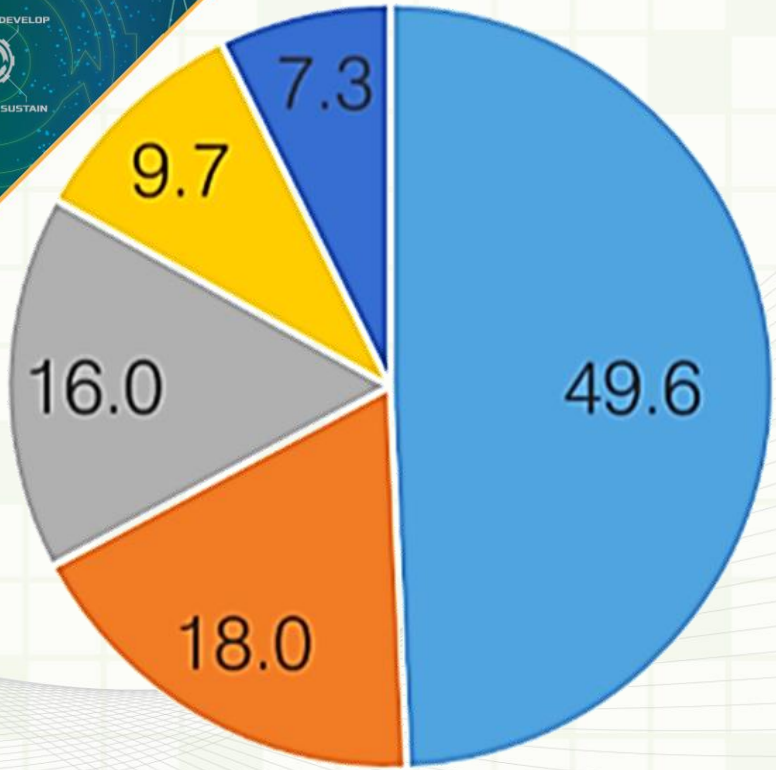
Isolated / separated from other landmasses

Entirely surrounded by water

ISLANDS & GHG MITIGATION

Geographic Nature of Islands	Developmental Opportunities / Constraints	Implications on GHG Emissions / Mitigation
Entirely surrounded **water**	**Coastal and marine resources**: tourism, fishery, bio-diversity, coastline and marine ecosystems management & protection	**Alternative renewable resources** (waves, tides, winds, floating solar PV); **marine-based and eco-tourism** as significant emissions sector
Finite landmass with well defined natural boundaries (i.e. the sea)	**Carrying capacity** of available resources: **food, energy and water (FEW)** supplies	**Local production and consumption** (e.g. urban farming, local food markets); **preservation of forests** (water catchments) and **agricultural land; urban growth boundaries (UGBs)**
	Environmental load absorption capacity: air pollution control, solid wastes management, sewage treatment	Necessity and higher potential **for self-**application of **Circular Economy** (waste to wealth, potentials)
Isolated from other landmasses (e.g. a mainland)	**External links** with other settlements: **water-based and air transportation** of people and freight	Significance of **cross-boundary air and water-**emissions
	Importation of utilities : electricity, oil, gas, water	**Undersea supply conduits** (installation, maintenance, upgrading issues)

ISLANDS KEY EMISSIONS SECTORS



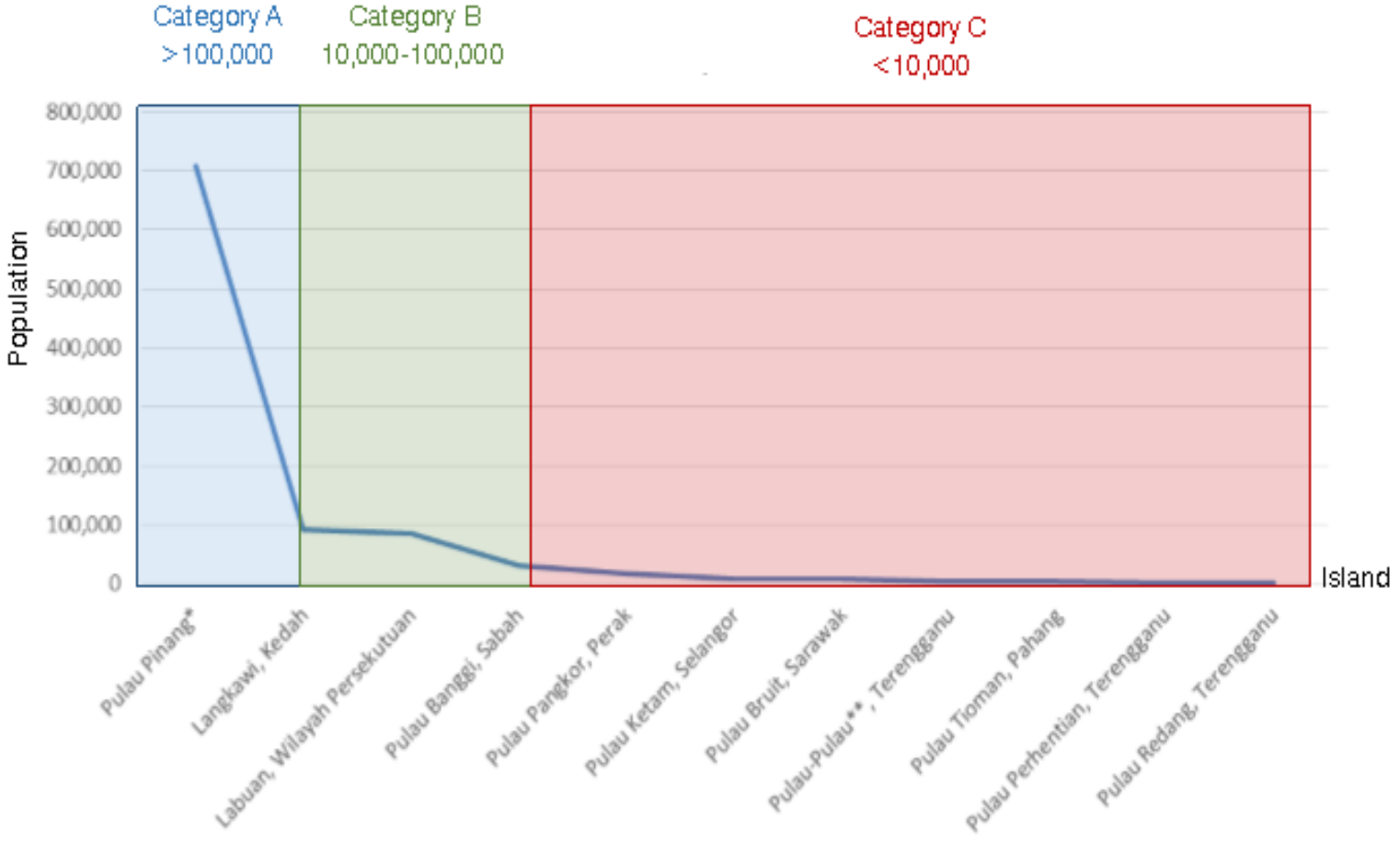
- Energy (includes electricity/heat, manufacturing/construction, transportation, other field combustion, fugitive emission)
- Land use change and forestry
- Waste
- Agriculture
- Industrial processes

Based on 13 selected island states from the World Resourcecs Institute (WRI) 2014 database

MAJOR INHABITED ISLANDS IN MALAYSIA

No.	Island/State	Population	Land Area* (sq. km)	Density (pop/sq. km)
1	Penang Island	708,127	306	2,314
2	Langkawi, Kedah	92,784	482	192
3	Labuan	83,920	92	912
4	Banggi Island, Sabah	30,000	440	68
5	Pangkor Island, Perak	17,000	22	773
6	Ketam Island, Selangor	9,000	23	391
7	Bruit Island, Sarawak	8,000	417	19
8	Pulau-Pulau, Terengganu	3,945	7	564
9	Tioman Island, Pahang	3,440	136	25
10	Perhentian Island, Terengganu	2,023	15	135
11	Redang Island, Terengganu	2,013	27	75
Total		960,252	2,080 (49%)	-

MAJOR ISLANDS RANK-SIZE



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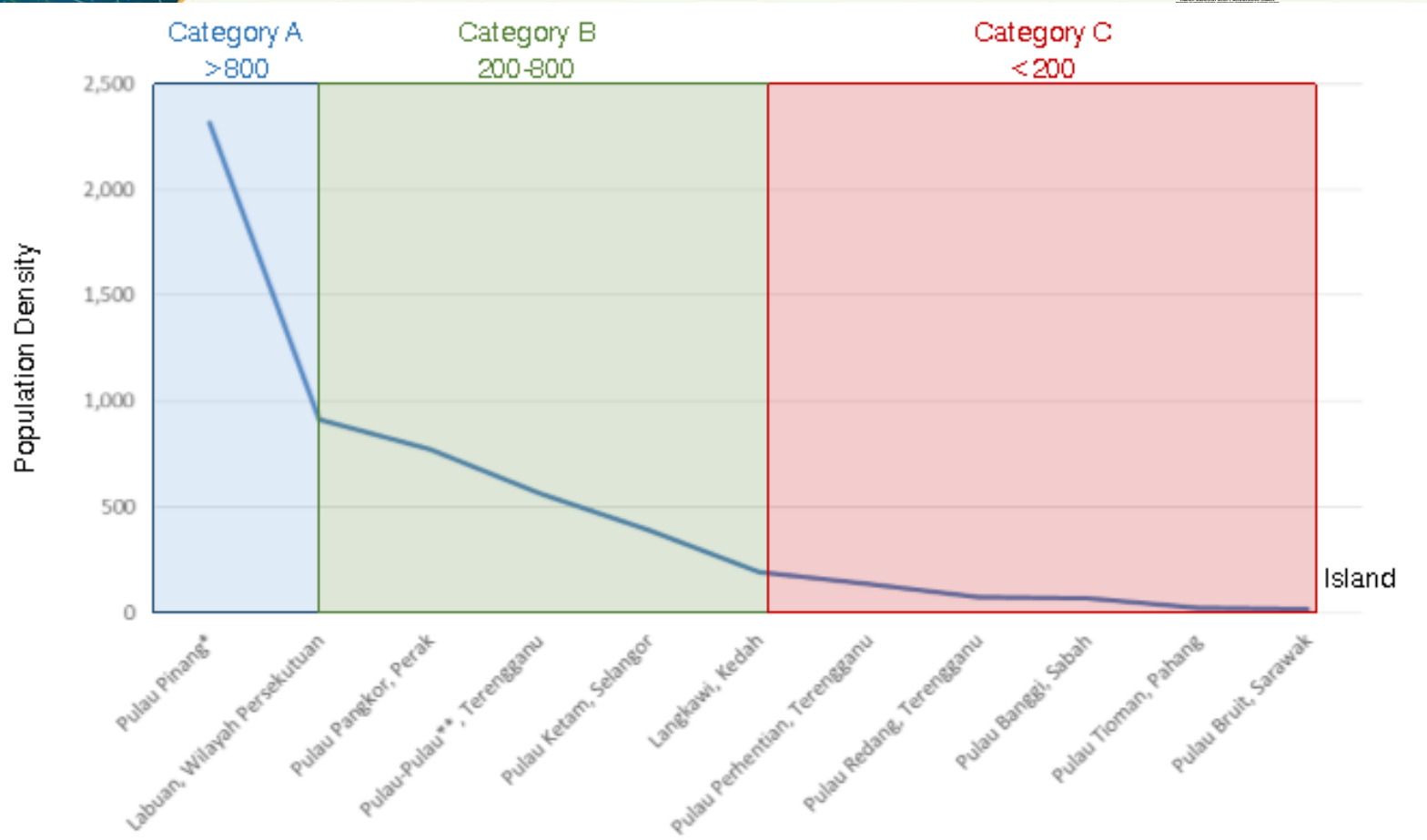

ISLANDS BY CATEGORY

Characteristics	Category A	Category B	Category C
Population	More than 100,000	10,000-100,000	Below 10,000
Density (people per km^2)	More than 800	400-800	Below 400
Main Functions	Major urban growth centre, economic hub	Tourism spot	Tourism spot
Economic Activities	Secondary · Manufacturing · Processing · Construction Most tertiary sectors	Primary · Fishing · Farming Secondary · Light/medium · Manufacturing (food products/wood products) Tertiary · Tourism · Wholesale and retail	Primary · Fishing Secondary · Light manufacturing Tertiary · Tourism
Examples	Penang	Labuan, Pangkor, Pulau-pulau Terengganu, Ketam, Langkawi	Bruit, Tioman, Perhentian, Redang, Banggi

LOW CARBON ISLANDS BENCHMARKING

Benchmarking Islands

Categories	A			B				C	
Islands	Jeju	Hawaii	Maldives	Samui	Jersey	Penghu	Miyako	Eiigg	Fetlar
Population	604,670 (2014)	185,079	427,756	62,500 (2012)	100,080	101.758 (2014)	54,908	105	61 (2011)
Land area (km^2)	1,848	10,430	298	228.7	819	141	204.5	30.49	40.78
Density (persons/km^2)	316	17.7	1,102.5	270	2,121	720 (2016)	268.4	3.4	1.5
Emission Reduction	Carbon neutral 2030	12% by	Carbon by 2020	49.6% by 2030	80% by	60% compared to in 2015	70% by	*Not*	*Not*
Key Economic Activity	Tourism, Fishery	Tourism Agriculture Services	Tourism, Agriculture ery	Tourism	Finance	Fishery Tourism	Agriculture Tourism	Tourism	Fishery Tourism

LOW CARBON ISLANDS BENCH-MARKING

Key Policies Aspects

Category	A			Total	B				Total	C		Total	GRAND TOTAL
Cities	JJ	HW	MV		SM	JS	PG	MY		IE	FT		
Green Production				-		●			1	●		1	2
Green Jobs				-		●			1			-	1
Smart Tourism	●		●	2	●	●		●	3			-	5
Smart Agriculture	●		●	2	●	●	●	●	3		●	1	7
Active Mobility	●	●	●	3	●	●	●		3	●	●	2	8
Green Freight Transport	●	●	●	3	●	●	●		3	●	●	2	8
Renewable Energy	●	●	●	3	●	●	●	●	4	●	●	2	9
Energy Efficiency	●	●	●	3	●	●	●	●	4	●	●	2	9
Spatial	●			1		●		●	2			-	3
Green Buildings			●	1	●	●	●		3	●	●	2	6
Commercial			●	1	●	●	●		3			-	4
Residential			●	1	●	●	●		3	●	●	2	6
Industry				-	●	●			2			-	2
Green Network/ Forestry				-	●				1			-	1
Smart Water Management				-	●			●	2			-	2
Sustainable Waste Management				-	●	●	●	●	4	●	●	2	6
Low Carbon Smart Community/ Education				-	●	●	●	●	4	●	●	2	6
Lifestyle			●	1	●	●	●	●	4	●	●	2	7
Green Urban Governance		●		1			●		1			-	2

LOW CARBON ISLAND POLICY OPTIONS

(Category A)

Sectors	Measures	Projects/Programmes
Energy	Utilise renewable energy	Construction of solar farm as a major source of renewable energy
		Individual unit solar PV on each buildings
		Energy storage system to store electricity from renewable energy
		FiT scheme for solar PV
		Solar PV system on public infrastructure
	Energy efficiency	Usage of energy efficient appliances within households, commercial premises, industry premises
		Energy management system for building (BEMRS)
		Voluntarily energy monitoring system for building
		Building retrofitting
		Construction of city-scale smart grid
Transportation	Improvement of public transport	Bus route network expansion
		Improve existing bus lane network
		Usage of electric/hybrid buses throughout the island
	Freight transport	Modal shift to greener freight transport mode which use biofuel
		Freight demand management
	Active mobility	Promote walking and cycling on short medium trips
		Designate pedestrian zones in key activity centres
Community and lifestyle	Low carbon lifestyle	Foster sustainable consumption behaviour
	Awareness towards going low carbon	Public community awareness
		Community engagement and involvement in Low Carbon

LOW CARBON ISLAND POLICY OPTIONS (Category A)

Sectors	Measures	Projects/Programmes
Green Network	Green cover protection	Enhance forest/parks protection
		Improve urban parks health
	Promote tree planting	Develop a tree establishment programme
		Establish diversity in tree planting
Spatial	Compact development	Implementing transit oriented development on major areas of the island
		Implementing urban growth boundary for the city's centre of the island
Waste	Sustainable solid waste management	Nurturing zero waste culture
		Promoting sustainable consumption and production
Water	Water supply management	Minimising the use of drinking quality water for non-potable functions
		Reduction of non-revenue water
Governance	Funding and incentives	Provide funding and incentives for any development that related to low carbon
	Setting up regulations	Planning control process, procedures and mechanism for materialising LCS on island
Tourism	Low carbon smart tourism	Provision of low carbon tourism accommodation and facilities
		Sustainable transport options for tourists
		Use of web based tourist information system

LOW CARBON ISLAND POLICY OPTIONS

(Category B)

Sectors	Measures	Projects/Programmes
Spatial Planning	Low carbon urban planning	Introducing urban growth boundary in island to protect natural resources and greenery
		To encourage compact and mixed –used development in order to increase active mobility
		Integrating all utility services (electricity, water, wastewater and solid waste disposal) for the community within one location.
Transportation Planning	Mobility management	Road and connectivity improvements inside the island as well as between island and outside world
	Shifting into low carbon mobility	Introducing the use of low carbon transportation options (e.g. electric cars, electric scooters, bicycle)
		Setting up and upgrading public transportation inside the island
Building	Low carbon building	Green building certifications for all new buildings
		Using appropriate material on building material
		Low carbon building guideline for islands
Energy	Energy management	To introduced smart grid system to increase energy efficiency.
		To install smart metering in all households in the island
	Renewable energy	Utilisation of solar energy (e.g. solar PV farm and solar PV rooftop)
		Installation of mini hydroelectric power station along the rivers and canals in the island
		Solar water heaters in households

LOW CARBON ISLAND POLICY OPTIONS

(Category B)

Sectors	Measures	Projects/Programmes
Waste	Sustainable waste management	Heat recovery from waste incineration to be convert into energy
		Kitchen waste to biogas
Community and Lifestyle	Low carbon lifestyle	Promotion of low carbon lifestyle among local communities
		To promote sustainable consumption and production among communities in the island
		To promote 3R programme
Tourism	Low carbon smart tourism	Supports and facilitate eco-activities
		Low carbon tourism accomodation and facilities
		Providing appropriate sightseeing information system to ensure smooth travelling inside island
		To create low carbon branding and eco-labels for tourism certification
Water	Sustainable water management	Implementation of rainwater harvesting
		Implementation of greywater recycling
		Reducing potable water consumption
		improving water efficiency in exisiting building
Governance	Green governance	To setup low carbon monitoring unit in island to monitor and coordinate low carbon efforts in islands
Agriculture	Smart agriculture	to promote sustainable island-scale agriculture that offers high quality local products
		Sustainable energy for agriculture

LOW CARBON ISLAND POLICY OPTIONS (Category C)

Sectors	Measures	Projects/Programmes
Agriculture	Smart and sustainable agriculture management	Introduce green farming management especially the management of organic soils
	Accessing financing and investment	Formulate national policies on investment and financing that ensure appropriate access to smart agriculture
	Implementation of regulations	Promote the sustainable agriculture practices and regulations
Energy	Utilise renewable energy	Promote PV and solar thermal systems on buildings
		Encourage the use of PV system on public infrastructure
	Energy storage system	Promote energy storage for efficient energy consumption
	RE and EE Funding and incentives	Introduce funding and incentives support
Transportation	Active mobility	Provide bicycle facilities
		Establish bike rental programmes
	Public transport improvement	Provide high occupancy tourist transportation for island beyond comfortable walking distances

LOW CARBON ISLAND POLICY OPTIONS (Category C)

Sectors	Measures	Projects/Programmes
Waste	Sustainable solid waste Management	Nurturing zero-waste culture
		Promote 'Love Food, Hate Waste' programme
		Encourage waste separation at source premises
		Promote education and awareness on waste reduction
Community and Lifestyle	Low carbon lifestyle	Foster sustainable consumption behaviour
		Promote 'Produce Local, Consume Local' programme to reduce food miles
		Usage of energy efficient appliances
		Promote 'Stop Open Burning' campaign
Tourism	Low carbon smart tourism	Encourage low carbon tourism accommodation and facilities
		Create low carbon tourism products
		Promotion of green low carbon consumption pattern among tourists

LOW CARBON ISLANDS & THE SDGs

LOW CARBON ISLANDS MALAYSIA - OPPORTUNITIES

- Opportunity to explore **green growth**, **low carbon smart technologies**
- Enhance **tourism potential** and economic opportunities related to **waterfront development**
- Potential **alternative coastal related sources of energy** (tidal, wave, wind)
- Enhance **biodiversity** (flora and fauna)
- Potentiality for **self-containment**

LOW CARBON ISLANDS MALAYSIA - CHALLENGES

- Carrying capacity (e.g. food, energy, water)
- Environmental protection (e.g. waste, pollution control, biodiversity)
- Human capital (e.g. awareness, mindset)
- Governance and institutions

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THANK YOU

Please contact us

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