



GREEN TECHNOLOGY COMPLIANCE

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COMMERCE DEPARTMENT



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First Edition

Writer & Editor

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COMMERCE DEPARTMENT

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PREFACE

Green Technology is developing a range of methodology and material enhancements, from methods for producing energy to non-toxic cleaning supplies. Among the fields that are expanding quickly is economic development sustainability. **Green Technology Compliance** comprises fundamentals of green technology, green practices, and green compliances towards the ultimate target of sustainable living.

This **Green Technology Compliance** e-book is meant essentially for diploma level business students at local institutions of higher learning. This book explain a variety of principles and workable technologies in attaining objectives that demonstrate advancements in rapidly expanding domains including sustainability, innovation, viability, and the reduction of natural resources.

The contents of the e-book enable students to review the concepts, principles and practices of **Green Technology Compliance**. The learning outcomes are provided at the beginning of each chapter. This book would help students understands green technology concepts better and be a good guide as they prepare for examinations. We believe the approach of this book would make it a useful resource to students in Polytechnics.

Rahida Binti Ramli
Nor Zarina Binti Pitdin
Suria Binti Md Yusof

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CHAPTER 1

Introduction to Green Fundamentals



CHAPTER 1: INTRODUCTION TO GREEN FUNDAMENTALS

1.1 Explain Green Fundamentals

1.1.1 Green Goals Terms

1.1.2 Element in Green Fundamentals

1.2 Discover Needs of Green Applications

1.0 GREEN FUNDAMENTALS

Definition of Green Technologies

Green Technology is 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.

1.1.1 GREEN GOALS TERMS

The national goals of the Green Technology Policy is to provide direction and motivation for Malaysians to continuously enjoy good quality living and a healthy environment.

Short-Term Goals (10th Malaysia Plan)



- ❑ Increased public awareness and commitment for the adoption and application of Green Technology through advocacy programmes.
- ❑ Widespread availability and recognition of Green Technology in terms of products, appliances, equipment and systems in the local market through standards, rating and labelling programmes.
- ❑ Increased foreign and domestic direct investments (FDIs and DDIs) in Green Technology manufacturing and services sectors.
- ❑ Expansion of local research institutes and institutions of higher learning to expand Research, Development and Innovation activities on Green Technology towards commercialisation through appropriate mechanisms.

Mid-Term Goals (11th Malaysia Plan)



- ☐ Green Technology becomes the preferred choice in procurement of products and services.
- ☐ Green Technology has a larger local market share against other technologies, and contributes to the adoption of Green Technology in regional markets.
- ☐ Increased production of local Green Technology products.
- ☐ Increased Research Development and Innovation of Green Technology by local universities and research institutions and are commercialised in collaboration with the local industry and multi-national companies.
- ☐ Expansion of local SMEs and SMIs on Green Technology into the global market.
- ☐ Expansion of Green Technology applications to most economic sectors.

Long-Term Goals (12th Malaysia Plan and beyond)



- ☐ Inculcation of Green Technology in Malaysian culture.
- ☐ Widespread adoption of Green Technology reduces overall resource consumption while sustaining national economic growth.
- ☐ Significant reduction in national energy consumption.
- ☐ Improvement of Malaysia's ranking in environmental ratings.
- ☐ Malaysia becomes a major producer of Green Technology in the global market.
- ☐ Expansion of international collaborations between local universities and research institutions with Green Technology industries.

1.1.2 ELEMENT IN GREEN FUNDAMENTALS

1. Climate Change Impact



2. Environmental Requirements and Regulations



3. Biodiversity Preservation



4. Pollution Control



5. Natural Resources Sustainability



6. Carbon Management



7. Green Practices Policies and Legislation



1- CLIMATE CHANGE IMPACT

What Is Climate Change?

Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. Human activities have been the main driver of climate change, primarily due to the burning of fossil fuels such as coal, oil and gas which produces heat-trapping gases. The gases trap heat within the atmosphere, which can have a range of effects on ecosystem, including rising sea levels, severe weather events, and drought that render landscape more susceptible to wildfires.

The Impact of Climate Change

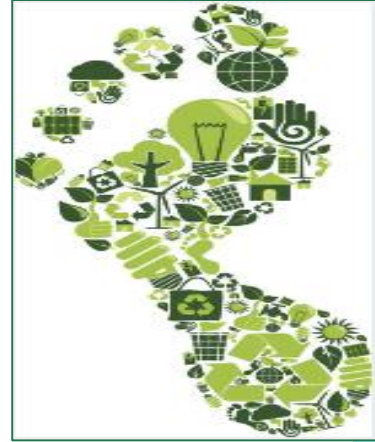
- Climate change is already beginning to transform life on earth
- Higher temperature
- Changing landscapes
- Wildlife at risk
- Rising seas, higher sea levels
- Increased risk of drought, fire and floods
- Stronger storms and hurricanes
- Heat-related illness and disease
- Economic loss and damage



2- ENVIRONMENTAL REQUIREMENTS AND REGULATIONS

a. Carbon Footprint

A carbon footprint is the total amount of greenhouse gases including carbon dioxide and methane that are generated such as person's activities or a product's manufacture and transport during a given period usually expressed in equivalent tons of carbon dioxide (CO₂).



Picture: Icon of carbon footprint

b. Water Footprint

A water footprint shows the extent of water use in relation to consumption by people. It is the total volume of fresh water used to produce the goods and services consumed by the individual or community or produced by the business.

❑ Blue Water Footprint

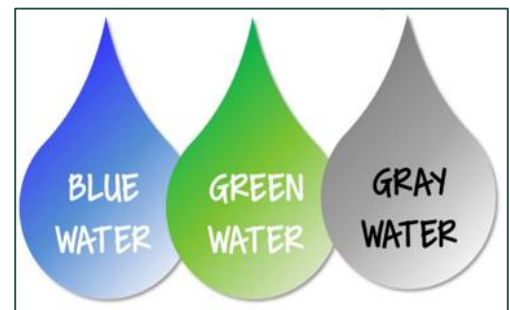
The amount of surface water and groundwater required to make a product.

❑ Green Water Footprint

The amount of rainwater required to make a product.

❑ Gray Water Footprint

The amount of freshwater required to mix and dilute pollutants enough to maintain water quality according to certain standards as a result of making a product.



Picture: Components of water footprint

c. The Carbon Cycle

i) Water and Sky

Carbon in the air: CO₂ gas stays close to ground or sea level

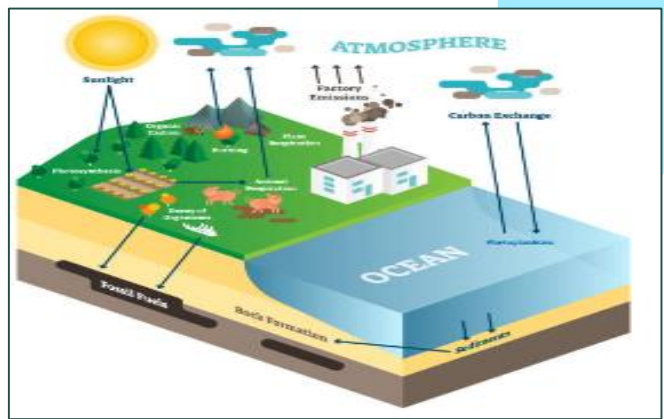
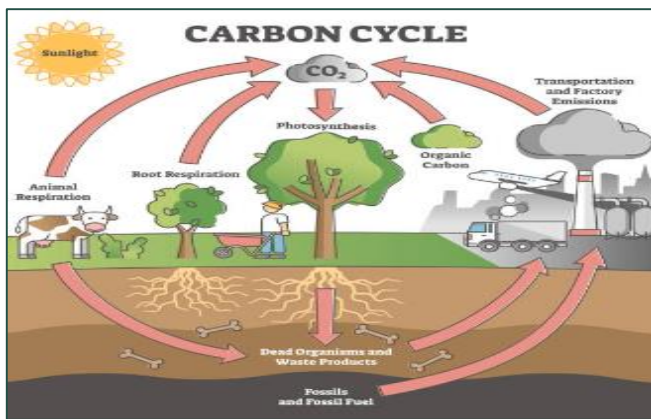
Carbon gets to the water through uptake of:

- CO₂ absorbed by bodies of water
- Colder water – more CO₂ can be absorbed

ii) Water and Sky

Carbon in the water: CO₂ gas

- trapped in bubbles in water
- It gets to the air by release. The CO₂ moves up to surface and is freed



Picture: Diagram of the carbon cycle

iii) Earth's Breathing Life

Carbon in the air: CO₂ gas

- How it gets into organisms: Photosynthesis
- Plants store carbon as sugars
- Food web: consumers eat producers, those consumers get eaten
- Organisms use sugars to form carbon compounds

iv) Earth's Breathing Life

Carbon in organisms: carbon compounds

- How it gets into the air: Respiration, Decomposition
- Exhaling release CO₂ gas into atmosphere.
- Organisms die, decompose; bacteria and fungi release CO₂ gas.

v) Fossil Fuels

Carbon in organisms: carbon compounds

- How it gets into the ground: Fossilization
- Formed from dead organisms
- Very particular conditions for dying:
 - Cannot be exposed to air
 - Submerged and/or buried shortly after death
 - Buried matter compacted by weight of soil above it
 - High temperature, pressure forms fossil fuels



Picture: Fossil Fuels

vi) Earth and Sky

Carbon in the mantle: CO₂ gas

- CO₂ gets into air through eruptions.
- Example: volcanoes release lots of CO₂ into atmosphere

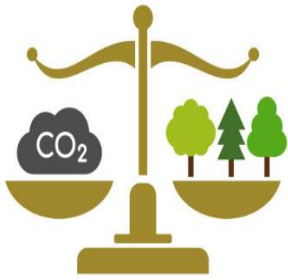
Problems With Carbon Cycle



- Ocean temperatures rising mean less CO₂ uptake and more CO₂ release.
- Human influence.
- Consuming fossil fuels changes stored carbon compounds into CO₂ gas.
- Deforestation : Less photosynthesis means less CO₂ is removed from the atmosphere and Less organisms to be fossilized.

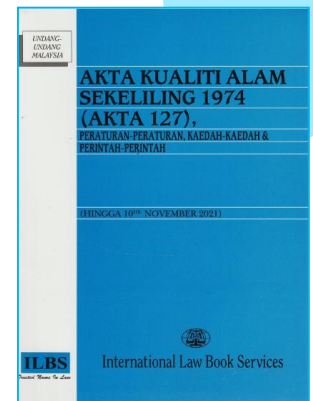
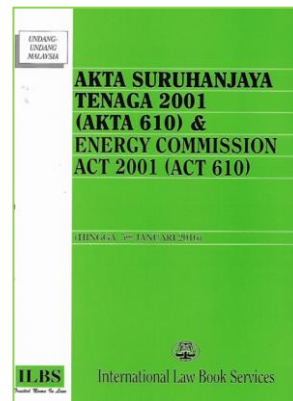


Picture : Release of CO₂ gas



Regulation Related to Environmental and Energy Requirement

- ☐ Akta Pihak Berkuasa Pembangunan Tenaga Lestari 2011 (Akta 726)
- ☐ Akta Tenaga Boleh Baharu 2011 (Akta 725)
- ☐ Akta Suruhan Jaya Tenaga 2001 (Akta 610)
- ☐ Akta Kualiti Alam Sekeliling 1974 (Akta 127)



3- BIODIVERSITY PRESERVATION

a. Definition of Biodiversity

Biodiversity is the variation among living organisms from different sources including terrestrial, marine and desert ecosystems, and the ecological complexes of which they are a part. Biodiversity is considered essential for the resilience of ecosystems and many ecosystem processes regulate conditions for life. This role provides the rationale for giving priority to rehabilitation, protection of ecosystems and land use management.



b. Biodiversity Preservation

- Biodiversity preservation is the preserving of wildlife and natural resources such as forests and water.
- Loss of biodiversity has profound implications for development. Biological resources are renewable and output can be increased under appropriate management. Natural habitats which can maintain productivity without significant management can provide means for human survival.
- Biological resources support development in virtually all sectors and affect those who live in cities as well as those in the country. Agriculture under good management is an example of the management of a modified ecosystem to yield what is perceived to be optimal productivity in order to enhance yields

4- POLLUTION CONTROL

a. Definition

Pollution is the introduction of contaminants into the natural environment that cause adverse change. Pollution can take the form of chemical substances or energy, such as noise, heat or light. Pollutants, the components of pollution, can be either foreign substance, energies or naturally occurring contaminants.

b. Classification of Pollution Control

- Point source pollution comes from a single identifiable origin, such as factory, pipe, sewage outlet or smoke stack. It includes single events, such as oil spills.
- Non-point source pollution is more diffuse and a single source is not easily identified. It includes agricultural run-off into waterways and trash blown from the land into the ocean

c. Forms of Pollution

The major forms of pollution:

- ❖ Air pollution
- ❖ Light pollution
- ❖ Littering
- ❖ Noise pollution
- ❖ Soil contamination
- ❖ Radioactive contamination
- ❖ Thermal pollution
- ❖ Visual pollution
- ❖ Water pollution
- ❖ Plastic pollution
- ❖ Sewage



Picture: Beach pollution

d. Impact of Pollution

- Human health
- Environment

f. Hierarchy of Pollution Control

- Pollution prevention
- Waste minimisation
- Pollution control

e. Methods of Pollution Control

- The methods or processes of pollution control in environmental management are emission and effluents.

g. Regulation and Monitoring

- To protect the environment from the adverse effects of pollution, many nations worldwide have enacted legislation to regulate various types of pollution as well as to mitigate the adverse effects of pollution



Picture : Environment effects of pollution

h. Pollution Control Measures

Pollution control is a term used in environmental management. It means the control of emissions and effluents into air, water or soil. Without pollution control, the waste products from consumption, heating, agriculture, mining, manufacturing, transportation and other human activities will degrade the environment.

i. Practices on Pollution Control

- Recycling
- Reusing
- Waste minimisation
- Mitigating
- Preventing
- Composting



Picture: Practices on Pollution Control

5- NATURAL RESOURCES SUSTAINABILITY

Natural resources occur naturally within environments that exist relatively undisturbed by humanity, in a natural form. A natural resource is often characterized by amounts of biodiversity and geo-diversity existent in various ecosystems. Natural resources are derived from the environment. Some of them are essential for the survival while most are used for satisfying human needs.

Classification

Natural resources divided into:

- ❑ **Biotic** resources are obtained from the biosphere (living and organic material) and the materials that can be obtained from them. Fossil fuels such as coal and petroleum are also included in this category because they are formed from decayed organic matter.
- ❑ **Abiotic** resources are those that come from non-living, non-organic material. The examples include land, fresh water, air and heavy metals including ores such as gold, iron, copper and silver.

Renewability of Natural Resources

❑ Renewable resources

Renewable resources can be replenished naturally. Resources such as sunlight, air, wind are continuously available, and their quantity is not noticeably affected by human consumption.

❑ Non-renewable resources

Non-renewable resources either form slowly or do not naturally form in the environment. Non-renewable resources from a human perspective are classified as non-renewable if the rate of consumption exceeds the rate of replenishment or recovery rate.

Stage of Development

Natural resources refer to the following:

i. **Potential resources** exists in a region and may be used in the future. Example: Petroleum.



ii. **Reserve resources** is the part of actual resources which can be developed profitably in the future.



iii. **Actual resources** exist have been surveyed, determined their quantity and quality and being used in present time. The development of actual resource is depending upon technology available and cost involved.



iv. **Stock resources** have been surveyed but cannot be used by organisms due to lack of technology. Example: hydrogen, gold and coal.



6- CARBON MANAGEMENT

Carbon management is an organized approach to gain the strategic advantages of CO₂ emissions reductions. Carbon management helps organizations stay focused on achieving their targets to reduce CO₂ emissions.

Concept of Recognising Carbon Management

The concept of recognising carbon management is important to address the phenomena of climate change and global warming issues that faced by the world.



Recognise Carbon Management

The carbon management is recognized through acknowledgement and understanding of the following subject within the context of reducing impact of climate change and global warming.

1. Carbon Footprint

The amount of carbon-containing greenhouse gases released into the environment by an activity, process, individual or group, expressed usually as the equivalent in kilograms or matrix tones of carbon dioxide.

2. Carbon Sequestrations

Carbon sequestration is the process of capture and long-term storage of atmospheric carbon dioxide (CO₂). Carbon sequestration describes long-term storage of carbon dioxide or other forms of carbon to either mitigate or defer global warming and avoid dangerous climate change.

3. Carbon Stock

Carbon stock is quantified of carbon contained in a “pool”, meaning a reservoir or system which has the capacity to accumulate or release carbon.

4. Carbon Sink

A carbon sink is a natural or artificial reservoir that accumulates and stores some carbon-containing chemical compound for an indefinite period.

5. Carbon Capture And Storage

Carbon capture and storage is the process of capturing waste carbon dioxide (CO₂) from large point sources such as fossil fuel power plants, transporting it to a storage site, and depositing it where it will not enter the atmosphere, normally an underground geological formation.

6. Carbon Off-set

A carbon offset is a reduction in emission of carbon dioxide or greenhouse gases made in order to compensate for or to offset an emission made elsewhere.

7. Carbon Trading

Emissions trading or cap and trade is a market-based approach used to control pollution by providing economic incentives for achieving reductions in the emissions of pollutants.



7- GREEN PRACTICES POLICIES AND LEGISLATION

Green Practices Policy is an action plan following a particular green policy that has been outlined to conduct green initiatives.

Malaysia Green Technology Policy 2009

The National Green Technology Policy was successfully launched on 24 July 2009. The National Green Technology Policy is built on four pillars:

- ❖ Energy
- ❖ Environment
- ❖ Economy
- ❖ Social



Malaysia Climate Change Policy 2009

Malaysia recognises the adverse effects and impacts of climate change and undertakes to mainstream national responses that consolidate economic, social and environmental development goals based on the following principles:

P1: Development on a Sustainable Path

Integrate climate change responses into national development plans to fulfil the country's aspiration for sustainable development.

P2: Conservation of Environment and Natural Resources

Strengthen implementation of climate change actions that contribute to environmental conservation and sustainable use of natural resources.

P3: Coordinated Implementation

Incorporate climate change considerations into implementation of development programmes at all levels.

P4: Effective Participation

Improve participation of stakeholders and major groups for effective implementation of climate change responses.

P5: Common but Differentiated Responsibilities and Respective Capabilities

International involvement on climate change will be based on the principle of common but differentiated responsibilities and respective capabilities.

Legislative Body

A Legislative body responsible for the planning and formulation of policies as well as to facilitate and to regulate the growth of every related sectors. It is also to provide direction and motivation for Malaysians to continuously enjoy good quality living and a healthy environment. Two main legislative bodies in Malaysia are:

➤ 1- The Ministry of Energy, Green Technology and Water Malaysia (KeTTHA)

Plan and formulate policies for energy, green technology and water sectors.



➤ 2- Malaysia Green Technology Corporation

Spearhead the implementation of projects and activities pertaining the four pillars.



Regulations

Regulations can be seen as the implementation standards for policy statements. Ministry of Natural Resources and Environment (NRE) and Ministry of Housing and Local Government (KPKT) are among efforts initiated by the government to standardise, preserve and control all aspects of technology and environment.

1.2 GREEN APPLICATIONS

1. The Purpose of Green Technology

- The main purpose of green technology is to slow down global warming and to reduce the greenhouse effect. This technology was developed and used in a way which does not disturb the environment and does not destroy natural resources.
- Green technology refers to products, equipment or system which fulfilled the following criteria:
 - a) minimizes the degradation of the environment,
 - b) zero or low greenhouse gas (GHG) emission is safe for use and promotes healthy and improved environment for all forms of life,
 - c) conserves the use of energy and natural resources,
 - d) promotes the use of renewable resources.

2. Application of Green Technology

There are four main sectors in green technology:

- a) energy** - green technology in power generation and energy supply management in the industrial and commercial sector.
- b) building** - adoption of green technology in the construction, management, maintenance and destroying of building
- c) water and waste management** - adoption of green technology in the management and use of water resources, wastewater treatment, solid waste landfill
- d) transportation** - incorporation of green technology in the transportation infrastructure and vehicles, biofuels and public road transport



REVISION



1- Give definition of green technologies :

2- Complete the information below:

No.	Green goals terms	Explanation
i.	Short- term goals	
ii.	Mid- term goals	
iii.	Long- term goals	



REVISION



2- Complete the information below:

No.	Element in green fundamentals	Explanation
i.	Climate change impact	
ii.	Environmental requirements & regulations	
iii.	Biodiversity preservation	
iv.	Pollution control	
v.	Natural resources sustainability	
vi.	Carbon management	
vii	Green practices policies and legislation	



CASE STUDY



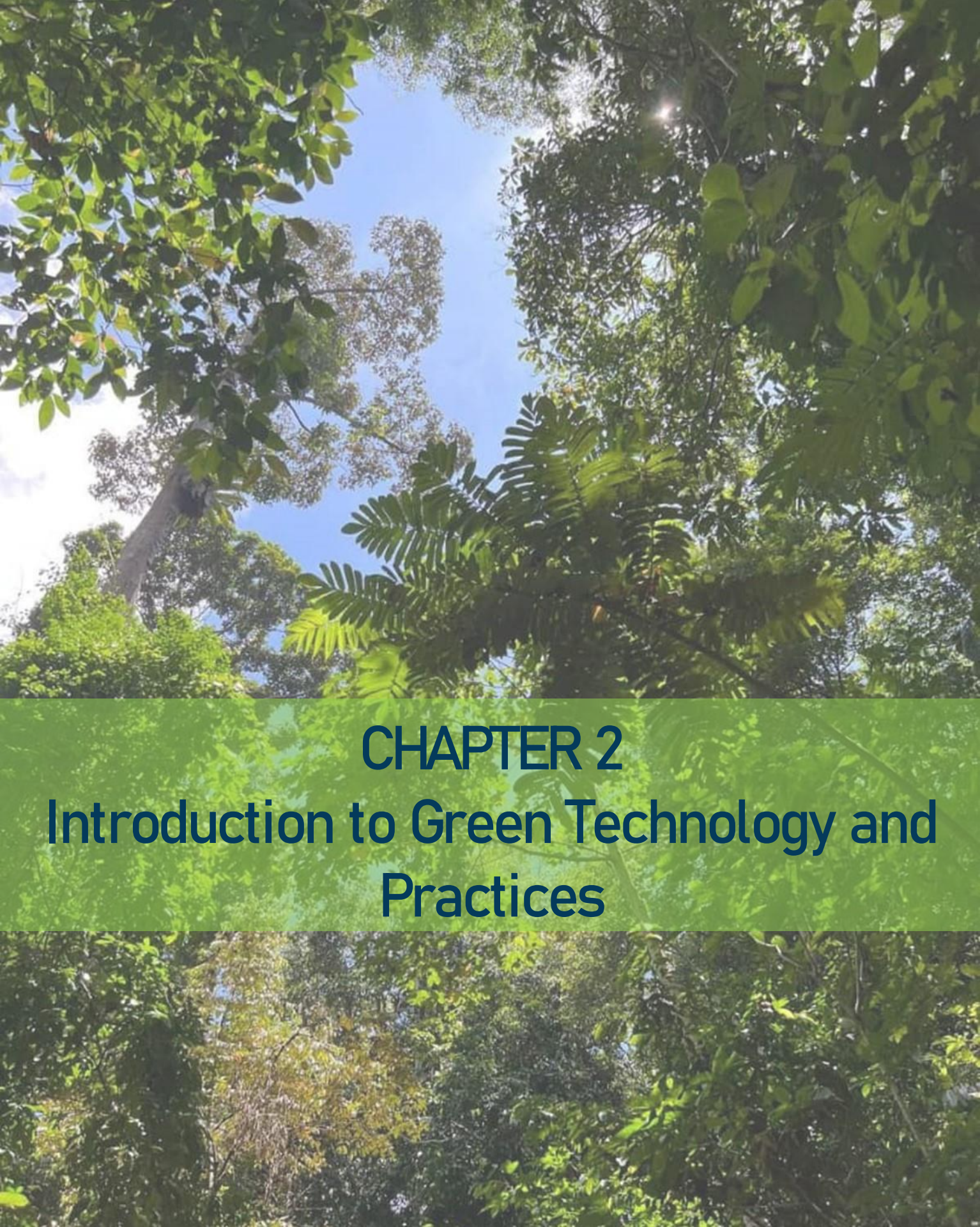
Refer to link to answer the question below;

The effects of climate change in Malaysia

<https://www.thestar.com.my/lifestyle/health/the-doctor-says/2022/07/05/the-effects-of-climate-change-in-malaysia>

Examine FIVE (5) effect climate change in Malaysia





CHAPTER 2

Introduction to Green Technology and Practices

CHAPTER 2: INTRODUCTION TO GREEN TECHNOLOGY AND PRACTICES

2.0 Introduction to Green Technology

2.1 Identify Green Technology

2.2.1 Energy

2.2.2 Green Building

2.2.3 Transportation

2.2.4 Waste, Water, and Wastewater Management

2.2.5 Agriculture and Forestry

2.0 GREEN TECHNOLOGY



- Technology that is used to lessen or undo the environmental damage caused by human activity.
- The application of technology and research to lessen human impacts on the environment is referred to as "green tech" or "green technology."
- Energy, atmospheric science, agriculture, material science, and hydrology are just a few of the many scientific disciplines that fall under the umbrella of "green technology."

2.1 Green Technology and Practices

- The technological component, on the other hand, covers a lot of ground. In general, green energy focuses on sustainable innovation, taking both immediate and long-term environmental implications into account.



2.1.1 Green Technology Characteristic

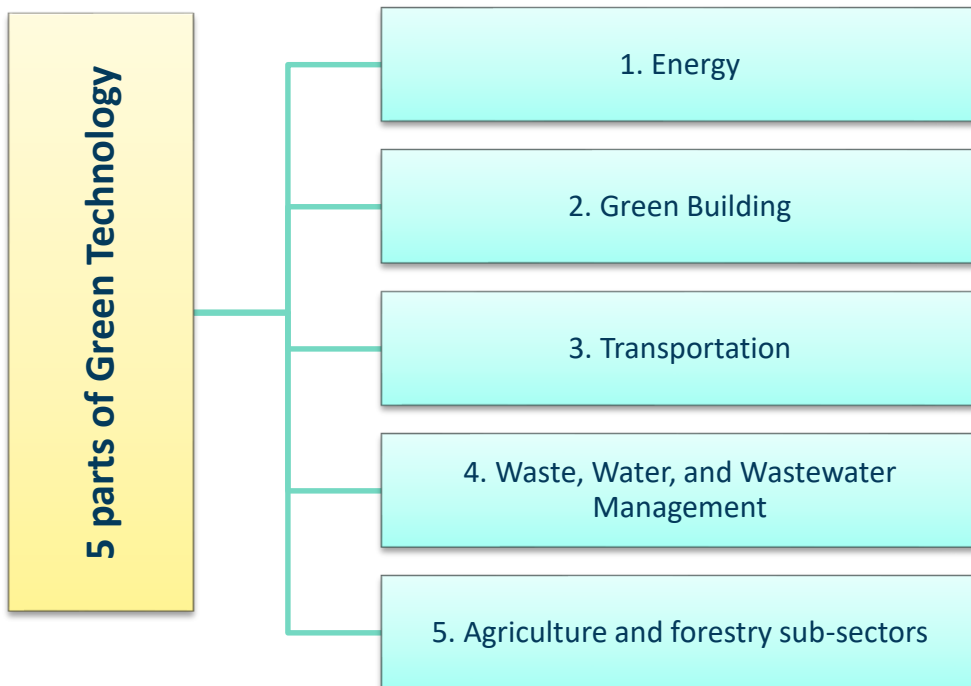
It lessens environmental deterioration

It emits no or little greenhouse gases (GHG);

It is risk-free, supports health, and creates a better environment for all living things

It reduces the consumption of energy and materials;

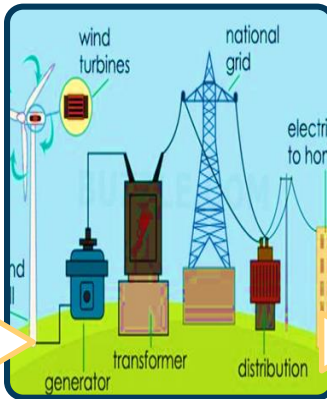
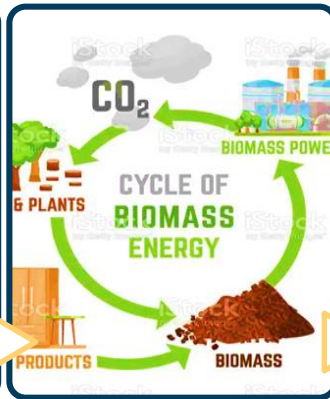
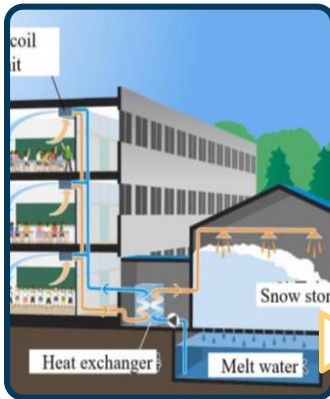
It encourages utilising renewable resources



2.2.1) ENERGY UTILIZATION

a. Snow-And-Ice Cryogenic Energy

According to Japan's Law Concerning Special Measures to Promote the Use of New Energy (revised in 2002), snow-ice-cryogenic energy is categorized as a new energy source and is increasingly being used in a variety of settings, including agricultural facilities, condominiums, and social welfare facilities.



c. Wind Power Generation

In order to produce electricity, wind turbines are mostly used in wind power or wind energy. Compared to burning fossil fuels, wind energy is a popular, environmentally friendly, renewable energy source that has a significantly smaller environmental impact.

b. Biomass Energy

Biomass energy created or generated by living or formerly living creatures is known as biomass energy. Plants like the aforementioned corn and soy are the most prevalent types of biomass that are used for energy. These energy can be used to generate electricity or be burned to produce heat.

d. Photovoltaic Power Generation

Using semiconducting materials that show the photovoltaic effect, a phenomenon researched in physics, photochemistry, and electrochemistry, photovoltaics (PV) converts light into electricity. The photovoltaic effect is used in industry to create photosensors and produce electricity. Power electronics are used to manage the power system.

2.2.1.1 ENERGY USED IN INDUSTRY

a) Energy Efficiency

- energy efficiency is the elimination of energy waste by utilizing less energy to complete the same work.

b) Fuel switching

- Fuel switching swaps out inefficient fuels for more cost-effective and environmentally friendly ones, for as switching natural gas for coal or kerosene.

c) Energy Recovery

- Any approach or method for decreasing the energy input to a larger system by exchanging energy from one subsystem with another is considered energy recovery.

d) Renewable Energy

- Although there are several sub-sectors of renewable energy, three dominate the industry: photovoltaic solar (which accounted for 47% of new worldwide capacity installed in 2016), wind power (34%) and hydropower (12%). (15.5 percent).

e) Material Efficiency

- When compared to prior measurements, material efficiency reveals how much raw materials are used, incorporated, or squandered in physical processes or construction projects.

f) Carbon sequestration

- The most often produced greenhouse gas is carbon dioxide. The method of removing and storing atmospheric carbon dioxide is known as carbon sequestration (CCS).

2.2.2) GREEN BUILDING

- ❑ When compared to conventional buildings, green buildings have less of an influence on the environment. Green building is the efficient use of resources, such as electricity, water, and materials, while minimizing the impact of the building on human health and the environment throughout the course of its life. In today's cities, buildings are the main energy consumers, accounting for 30 to 40% of overall energy consumption and 70% of total electricity usage.
- ❑ A green building may cost more up front, but over its lifetime, it will cost less to operate. Reduced expenses for energy, trash removal, and water use, reduced costs for emissions and the environment, reduced costs for operations and maintenance, and cost savings from improved productivity and health are just a few of the financial advantages of green buildings.
- ❑ Below is the Green Building Tools Developed in Malaysia:
 1. Green Building Index (GBI)
 2. GreenRE (REHDA)
 3. Melaka Green Seal (Melaka)
 4. CIS20 – GreenPASS (CIDB)
 5. Penarafan Hijau (PH-JKR)
 6. MyCREST (CIDB-JKR)
 7. CASBEE Iskandar (IRDA-Japan)
- ❑ Buildings will be awarded the GBI rating based on 6 Key criteria:
 1. Energy Efficiency (EE)
 2. Indoor Environmental Quality (EQ)
 3. Sustainable Site Planning & Management (SM)
 4. Material and Resource (MR)
 5. Water Efficiency (WE)
 6. Innovation (IN)



Picture : Malaysia's largest trade and exhibition centre has been conferred the Green Building Index (GBI) certification by the GBI Accreditation Panel.

GREEN BUILDING CHARACTERISTIC

A. Thermal Envelope

B. Indoor Environmental Quality (IEQ)

C. Cooling And Cooling Loads

D. Heating, Ventilation, And Air Conditioning (HVAC) Systems

E. Building Energy Management Systems

F. Active Collection And Transformation Of Renewable Energy

G. Domestic Water

H. Lighting Systems

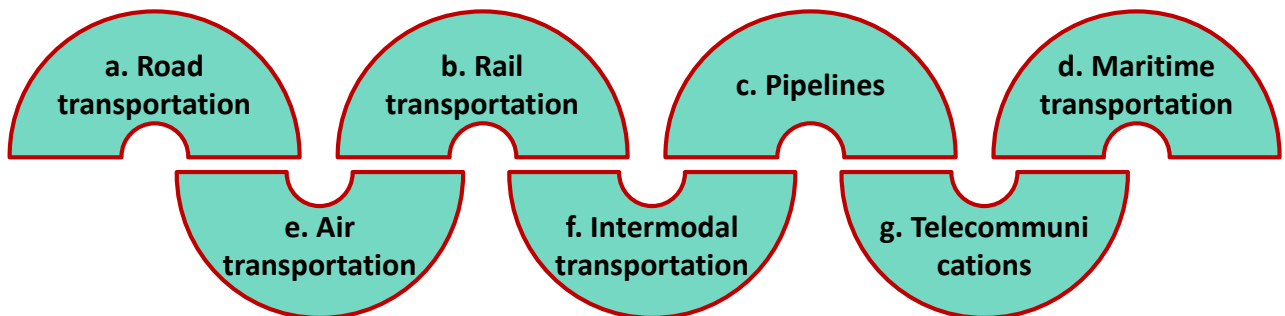
I. Daylighting

J. Household Appliances, Consumer Electronics And Office Equipment

2.2.3) GREEN TRANSPORTATION

- ❑ Transportation that doesn't rely on finite natural resources, such as fossil fuels, is referred to as green or sustainable transportation. These types of transportation rely on renewable energy. As these modes emit little to no greenhouse gases, they also have a very low environmental impact.
- ❑ Utilizing resources wisely and effectively, changing the way that transportation is organized, and choosing healthier modes of transportation are all key to green transportation. The management of privately owned automobiles, innovation, and production of vehicles that use renewable sources of energy like wind, sun, biofuels, and hydroelectricity are all necessary for this to have any chance of success.

MODE OF TRANSPORTATION



MODE OF GREEN TRANSPORTATION

- ❑ The current modes of transportation consume a tremendous amount of energy, for instance, the fossil fuels used to power on-road vehicles (natural gas, coal, and oil). Many people are aware that the pollution produced by these cars has an adverse effect on the environment and causes health problems.
- ❑ The ultimate solution may lie in promising novel technology, but in the interim, the globe can make a big difference by embracing the eco-friendly transportation options that are currently available. The green transportation options accessible today are shown below.



1. Bicycle



2. Electric bike



3. Electric vehicles



4. Green trains



5. Electric motorcycles



6. Multiple occupant vehicles



7. Service and freight vehicles



8. Hybrid cars



9. The new hybrid buses (Public Transportation)

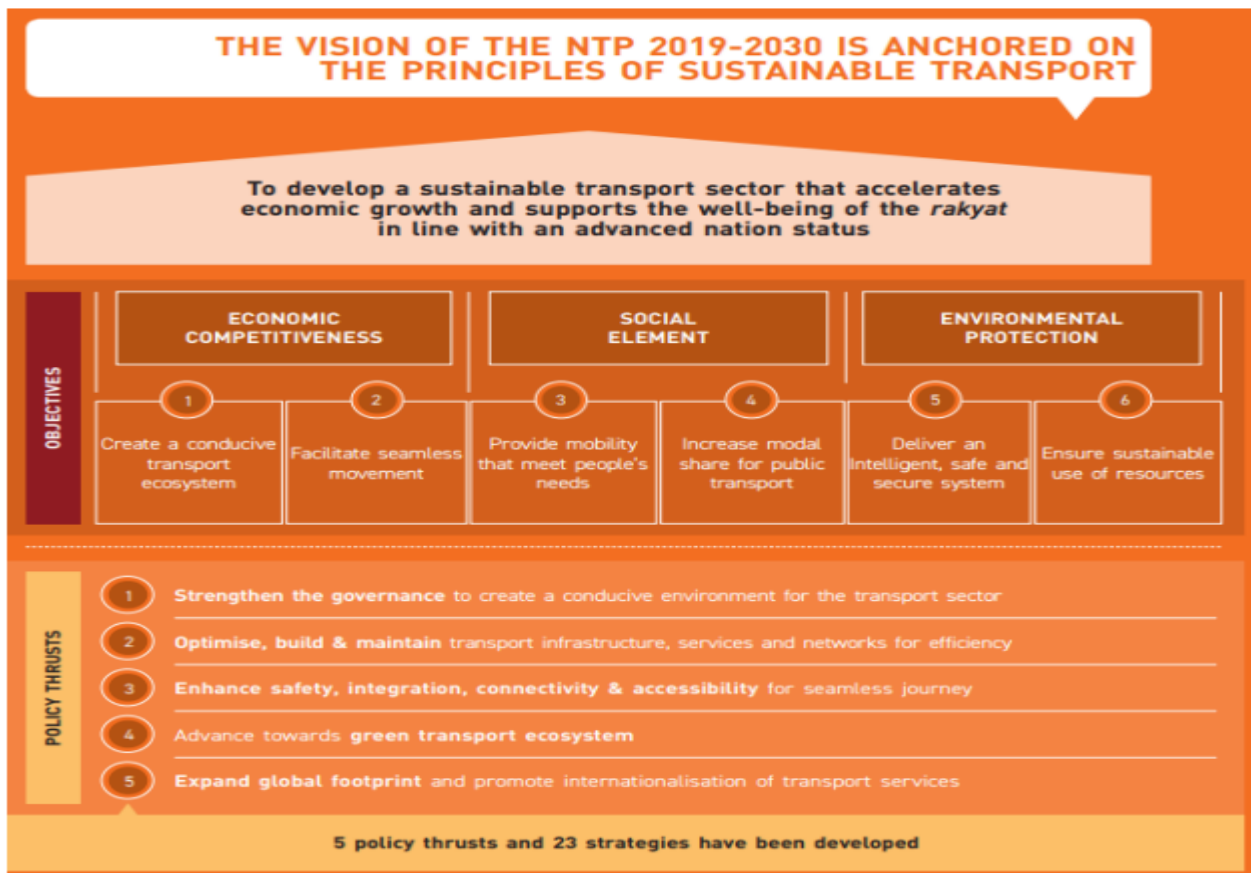


10. Pedestrians

THE BENEFIT OF GREEN TRANSPORTATION

1. Fewer to no environmental pollution
2. Saves money
4. Improved Health
3. Contribute to the building of a sustainable economy
4. Reduces Fossil Fuel Consumption
5. Increased Reliance on Indigenous, Clean Energy Sources
6. Minimized Impacts on the Global and Local Environment
7. Improved Balance of Trade and Energy Security
8. Reduced Road Congestion

NATIONAL TRANSPORT POLICY (2019-2030)



2.2.4) WASTE, WATER & WASTEWATER MANAGEMENT



Waste is any material or item that the holder discards, plans to discard, or is forced to trash.

Any garbage or refuse, sludge from wastewater treatment facilities, water supply treatment facilities, or air pollution control facilities, as well as other discarded materials, resulting from commercial, industrial, mining, and agricultural operations, as well as from community activities, are considered solid waste.

Trash management specifically refers to the collection, transportation, disposal, or recycling of waste as well as its ongoing supervision.

CATEGORIES OF WASTE

Municipal Solid Waste

- The everyday materials we use and subsequently discard—commonly referred to as trash or garbage—include product packaging, lawn clippings, furniture, clothing, bottles, food remnants, newspapers, appliances, paint, and batteries.

Industrial Solid Waste

- Industrial solid waste means solid waste generated by manufacturing or industrial processes that is not a hazardous waste.

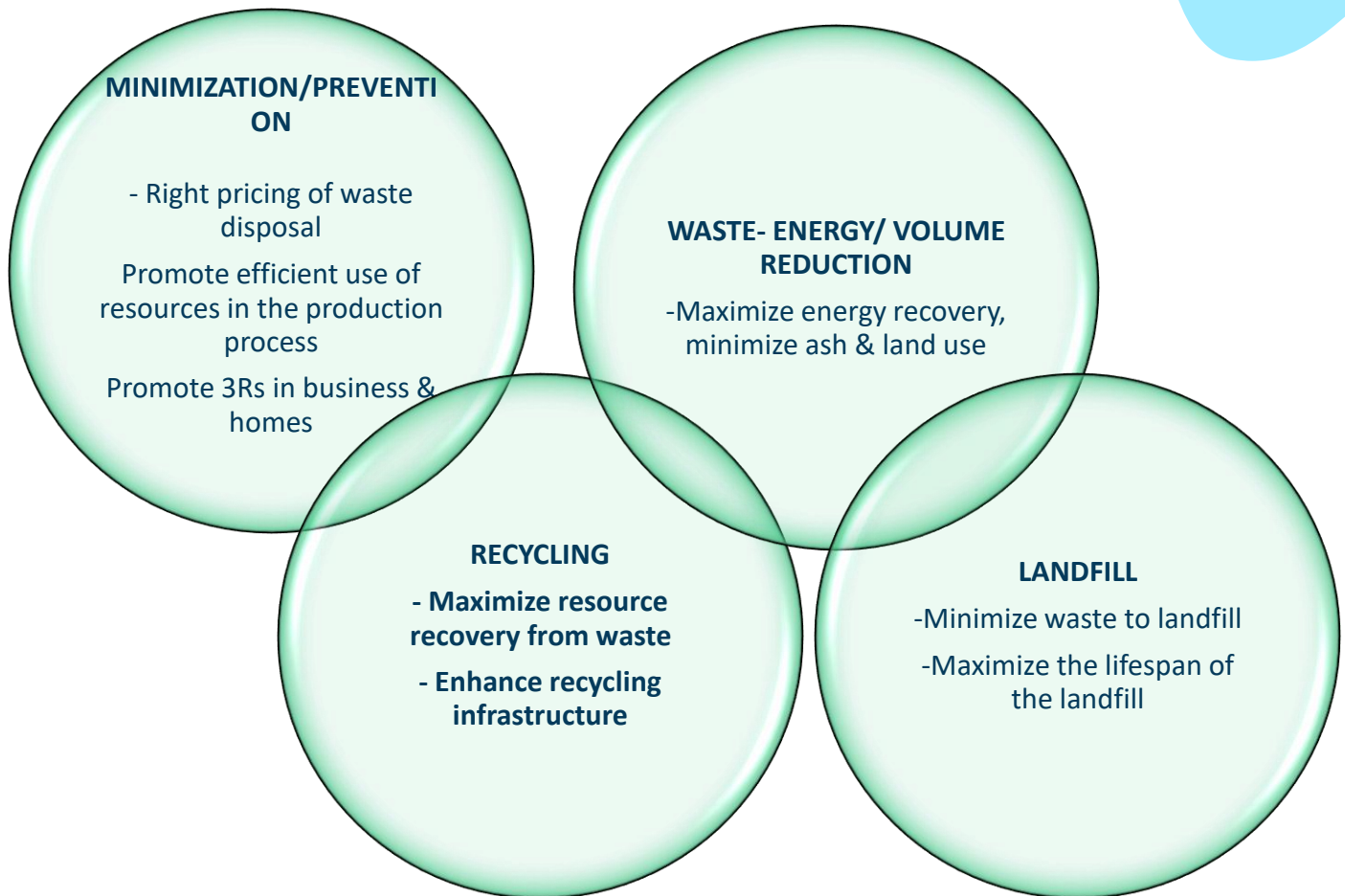
Hazardous Waste

- Hazardous and non-hazardous waste can both be produced by industrial sources, with non-hazardous waste typically making up most of the amount. This waste's hazardous component makes up a modest volume.

WASTE REDUCTION

- ❑ The goal of waste minimization is to keep waste production and disposal as low as is practically possible. Currently, this method is used throughout the entire nuclear processing chain, from the design of a power plant through its operation and decommissioning.
- ❑ It entails lowering waste. generation, recycling, reuse, and treatment, with adequate regard for both primary and secondary primary nuclear cycle wastes as well as secondary wastes produced by reprocessing and clean increase activity.

WASTE REDUCTION STRATEGY



2.2.5) AGRICULTURE & FORESTRY



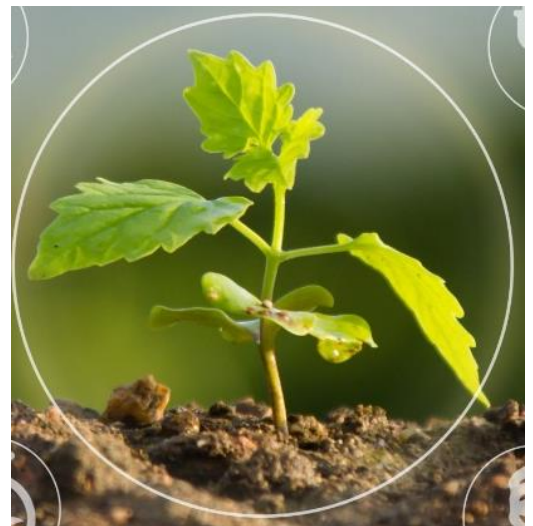
1. CROPLAND MANAGEMENT :

- ❑ Areas used for the cultivation of harvestable crops are referred to as cropland. Cropland is divided into two subcategories: cultivated and non-cultivated.
- ❑ Row crops and close-grown crops are examples of cultivated farmland.
- ❑ Other cultivated cropland includes pastureland or hay land that is rotated with a row or close-grown crops. Permanent hay fields and cropland used for horticulture are examples of non-cultivated cropland.

i. NATURAL FARMING:

- ❑ Natural farming practices follow the natural world's laws and make use of natural resources and goods.
- ❑ It is founded on the idea that all living things are interdependent. In stark contrast to the unfavorable impacts that frequently go along with modernized and commercialized agriculture, it seeks to have a nourishing effect on the environment.
- ❑ Strength of natural farming

○ Environment- Friendly	○ Higher Yield
○ Low Cost	○ High Quality
○ Adoptable	○ Farmer / User Friendly
○ Respect For Life	





2. GRAZING LAND MANAGEMENT AND PASTURE IMPROVEMENT

- ❑ Any area of vegetation that is used for grazing by animals or has the capacity to do so (domestic and wild). This phrase is all-inclusive and refers to all sorts of grazing land.
- ❑ a field covered with grass or herbage and suitable for grazing by livestock
- ❑ Grazing lands are areas used primarily to produce livestock where grass or grass-like vegetation predominates as the dominant form of plant life.
- ❑ The importance of grazing land

○ Energy Savings	○ Food, medicine, and other products	○ Water storage and release
○ Water quality	○ Wildlife	○ Waste utilization
○ Carbon sequestration		○ Biomass





3. MANAGEMENT OF ORGANIC & PEATY SOILS

- ❑ Peat is the top layer of organic matter in soil that is largely made up of partially decomposed plant matter that has accumulated due to waterlogging, oxygen shortage, excessive acidity, and nutrient deficit.
- ❑ Peats are organic soils that contain a minimum of 75% organic material. Since organic soils and peats are significantly more fragile and compressible than inorganic (mineral) soils, it is crucial to identify them.
- ❑ Organic soil is one that has a considerable percentage of recently decomposed organic material.
- ❑ Some soils contain carbon but are not considered organic in this context since they were not recently formed by plants.
- ❑ The importance of peatland

○ providing habitat for rare species	○ reducing fire risk
○ purifying water	○ providing food
○ having recreational value	





4. FORESTRY

- ❑ The science and art of forestry include the creation, management, use, conservation, and repair of forests, woodlands, and related resources for the benefit of people and the environment.
- ❑ Forestry is carried out in natural stands and plantations.
- ❑ Forests offer more than just a habitat for animals and a means of subsistence for people. They also protect watersheds, stop soil erosion, and lessen climate change.
- ❑ The importance of forests

○ Over 2 billion people rely on forests	○ Habitats for biodiversity and livelihood for humans
○ Forests provide jobs for more than 13 million people across the world	○ After oceans, forests are the world's largest storehouses of carbon

i. FOREST MANAGEMENT:

- ❑ Forest management is a subfield of forestry that focuses on silviculture, protection, and forest regulation as well as general administrative, legal, economic, and social issues.
- ❑ Government, nongovernmental organizations, and the general public can work together to conserve forest resources by implementing an effective management system.
- ❑ In Peninsular Malaysia, the Forest Management Certification is based on PEFC that is carried out by the Malaysian Timber Certification Scheme (MTCS) using standard Malaysian Criteria and Indicators for Forest Management Certification (Natural Forest) [MC&I (Natural Forest)]



REVISION



Instruction: Choose the correct answer

1. One of the most important aspects of the design of a Green Building is the implementation of low-impact, renewable and sustainable energy sources. Which of the following is not an ideal energy source for Green Building?
 - A. Natural gas
 - B. Solar
 - C. Wind
 - D. Biomass

2. Which of the following is not a benefit of Green Building?
 - A. Reduces or eliminates negative impact on the natural environment
 - B. Preserves natural resources
 - C. Improve quality of life
 - D. Increase the carbon footprint of buildings

3. A Solar cell is an electrical device that converts the energy of light directly into electricity by the _____.
 - A. Photovoltaic effect
 - B. Chemical effect
 - C. Atmospheric effect
 - D. Physical effect

4. Which of the statements is correct about Solar Energy?
 - A. It is a renewable and conventional source of energy
 - B. It is a non-renewable and non-conventional source of energy
 - C. It is a renewable and non-conventional source of energy
 - D. It is a non-renewable source of energy

5. What is the primary greenhouse gas emitted by burning the fuels we most commonly use in our vehicles?
 - A. Carbon monoxide
 - B. Carbon dioxide
 - C. Sulfur oxide
 - D. Methane

CASE STUDY

Can Malaysia achieve 40 per cent recycling rate by 2025?

By **Reinema** - March 10, 2022 @ 12:11pm



Alam Flora's contractor segregates waste at the Recycling Innovation Facility (FIKS) Precinct 5, Putrajaya. - NSTP/MOHAD FADLI HAMZAH (for illustration purposes only)

Refer to link to answer the question below;

Waste Management issues in Malaysia

<https://www.nst.com.my/news/nation/2022/03/778625/can-malaysia-achieve-40-cent-recycling-rate-2025>

Demonstrate solution by suggesting TWO (2) product to solve the above issue





CHAPTER 3

Implementation of Green Economy

CHAPTER 3: Implementation of Green Economy

3.0 Implementation of Green Economy

3.1 Identify Green Economy

3.2 Discuss The Implementation of
Green Economy

3.1 GREEN ECONOMY

❑ *“one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It is low carbon, resource efficient, and socially inclusive. In a green economy, growth in income and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services” (UNEP, 2011)*

❑ *“an economy that results in improved human well-being and reduced inequalities, while not exposing future generations to significant environmental risks and ecological scarcities. It seeks to bring long term societal benefits to short term activities aimed at mitigating environmental risks. A green economy is an enabling component of the overarching goal of sustainable development.” (UNCTAD,2011)*

❑ In short, green economy is an economy that aims for sustainable development and keeping the environment safe from human activities.



Green Economy Cluster (Malaysia)

Renewable Energies : Solar, wind, geothermal, wave, bio-Gas and fuel cells

Green Buildings : Residential and commercial building, energy and water efficiency, green materials, green design

Clean Transportation : Bio fuels and other fuels of the future, electric and hybrid cars, public transportation, ride sharing

Water Management : Water recycling, minimization of water use, grey/rainwater systems

Waste Management : Reuse-reduce-recycle-rethink, minimization of environmental pollutants and municipal waste, toxic and hazardous waste, sustainable products, sustainable packaging

Land Management : Organic agriculture, habitat / biodiversity conservation / restoration, forestry / parks, reforestation / afforestation, soil stabilization

Sustainable Economy : Eco-efficiency, eco-effectiveness (energy and resource efficiency), sustainable economy

Sustainable Management in Industries and Service Sectors : Sustainable tourism, palm oil related products, financial services, wholesale and retail, information and communication technology, education, electrical and electronics, business services, private healthcare, and topics related to “sustainable cities”

Green Economy Principles

The Principle	How it works
The Wellbeing Principle	✓ green economy is people-centred. Its purpose is to create genuine and shared prosperity. ✓ focuses on growing wealth that will support wellbeing. ✓ prioritizes investment and access to the sustainable natural systems, infrastructure, knowledge and education . ✓ offers opportunities for green and decent livelihoods, enterprises and jobs. ✓ built on collective action for public goods
The Justice Principles	✓ inclusive and non-discriminatory ✓ promotes the equitable distribution of opportunity and outcome. ✓ long-term perspective on the economy, creating wealth and resilience that serve the interests of future citizens. ✓ based on solidarity and social justice. ✓ promotes empowerment of Micro, Small and Medium Enterprises, social enterprises, and sustainable livelihoods.
The Planetary Boundaries Principle	✓ recognizes and nurtures nature's diverse values – functional values of providing goods and services that support the economy, nature's cultural values that nurture societies, and nature's ecological values that stimulate all of life. ✓ acknowledges the limited substitutability of natural capital with other capitals. ✓ invests in protecting, growing and restoring biodiversity, soil, water, air, and natural systems. ✓ innovative in managing natural systems.
The Efficiency and Sufficiency Principle	✓ inclusive green economy is low-carbon, resource-conserving, diverse and circular. ✓ recognises significant global shift to limit consumption of natural resources to physically sustainable levels. ✓ recognizes basic goods and services consumption that is essential to meet people's wellbeing and dignity. ✓ aligns prices, subsidies and incentives with true costs to society.
The Good Governance Principle	✓ inclusive green economy is evidence-based. ✓ supported by institutions that are integrated, collaborative and coherent ✓ requires public participation. ✓ promotes devolved decision-making for local economies and management of natural systems ✓ builds a financial system with the purpose of delivering wellbeing and sustainability

3.2 Discuss the Implementation of Green Economy

3.2.1 Sustainable Consumption And Production

“the use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations” (Oslo Symposium, 1994)



“effort by various stakeholders in achieving environmental quality through efficient utilisation of natural resources, products and services. ” (The World Business Council)

Sustainability Consumption and Production

Sustainable Consumption and production is the 12th SDG that aims at meeting human basic needs whether socially, environmentally and financially by increasing efficiency and preventing unnecessary wastage of resources in producing or consuming the product/service.

In order to achieve sustainability consumption and production, circular economy can be adapted since it based on Three (3) principles :

- i. Design out waste and pollution
- ii. Keep products and materials in use
- iii. Regenerate natural system.

Among the pattern that can be applied to encourage development and diffusion of green product and services are as below:

- i. Using alternative energy sources such as renewable energy.
- ii. Providing environmentally related products.
- iii. Reducing waste through 4R practices.
- iv. Raising consumers' awareness through education and public awareness programme



3.2 Discuss the Implementation of Green Economy

3.2.2 Green Procurement

Green procurement (GP) is the purchase of environmentally friendly products and services, the selection of contractors and the setting of environmental requirements in a contract.

Environmentally products and services is refer to products, services, equipment or systems that minimize degradation to the environment, have zero or low green house gas (GHG) emission, safe for use and promote health and improve environment for all form of life, conserve the use of energy and natural resources, and promote the use of renewable resources.

Environmentally products and services is refer to products, services, equipment or systems that **safe to use, minimize degradation to the environment, have zero or low green house gas (GHG) emission, safe for use and promote health and improve environment for all form of life, conserve the use of energy and natural resources, conserve the forest, reduce air and water pollution and promote the use of renewable resources.**



Source : MyHijau E-Book 12th Edition 2018

3.2.2 Green Procurement

Green Procurement Principles

In implementing Green Procurement, the principles listed below must be observed:

- i. Emphasize pollution prevention early in the procurement process
- ii. Include environmental criteria as part of the normal procurement process
- iii. Examine multiple environmental attributes throughout a product's or service's life cycle
- iv. Compare relevant economic and environmental impacts when selecting products and services
- v. Collect and base procurement decisions on accurate and meaningful information about economic and environmental performance

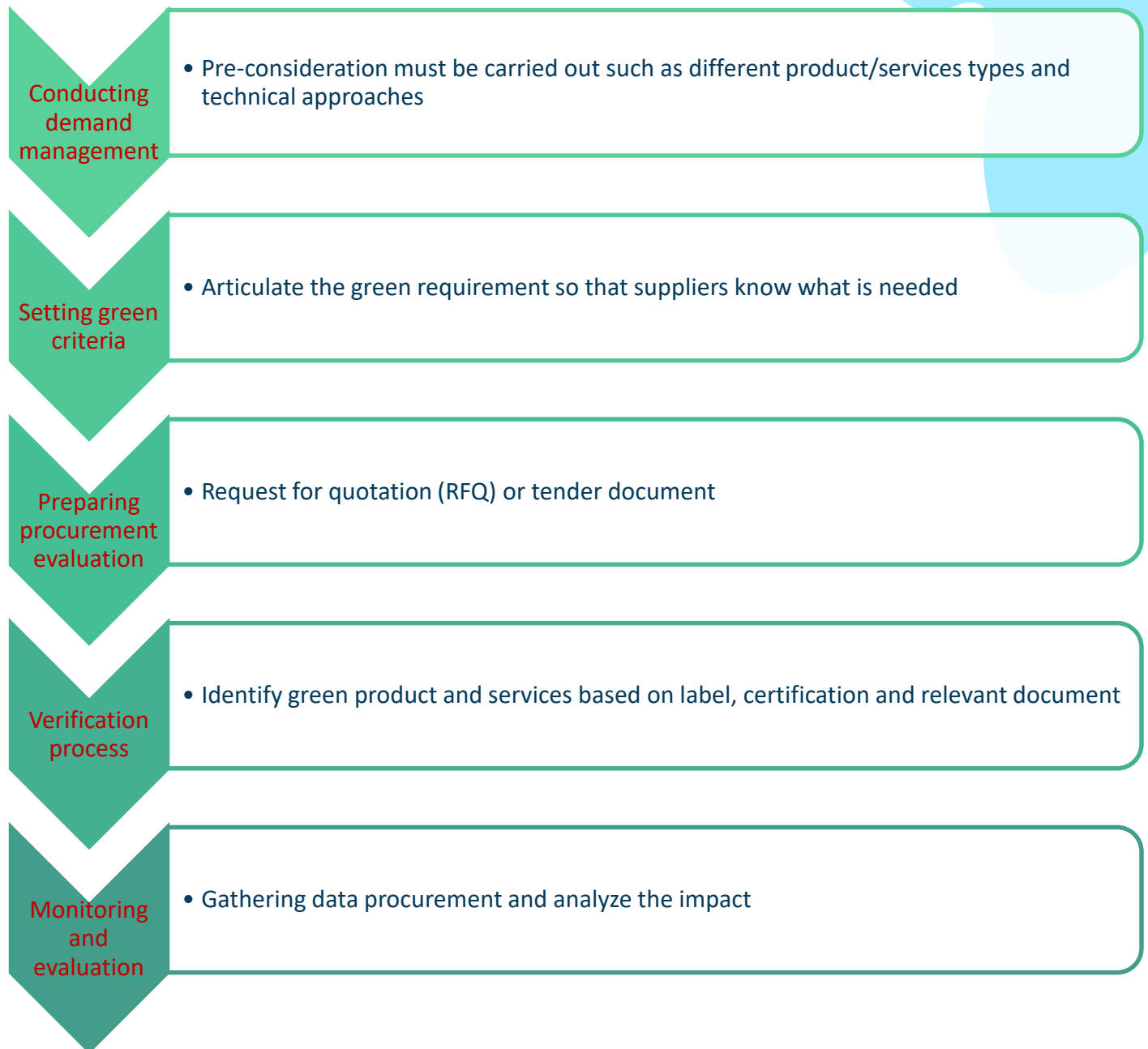
Benefit of green procurement

The benefits of GP to an organization are as follow:

- i. **Brand Image:** seen as a good corporate citizen therefore increases its image.
- ii. **Customer Satisfaction:** increases its levels of customer satisfaction as the organization response to the concern of the customer regarding green products.
- iii. **Reduced Risk:** green purchasing can offset financial and environmental risk and can avoid lawsuit.
- iv. **Cost Reduction:** saves money when the new products use less energy, generate less waste, and last longer. Going green can reduce hazardous material management costs, operational costs, repair and replacement costs, disposal costs and health & safety costs.
- v. **Increased Shareholder Value:** better brand with good brand image can retained customes and resulting in significant ROI and EPS.

3.2.2 Green Procurement

Green Procurement Processes

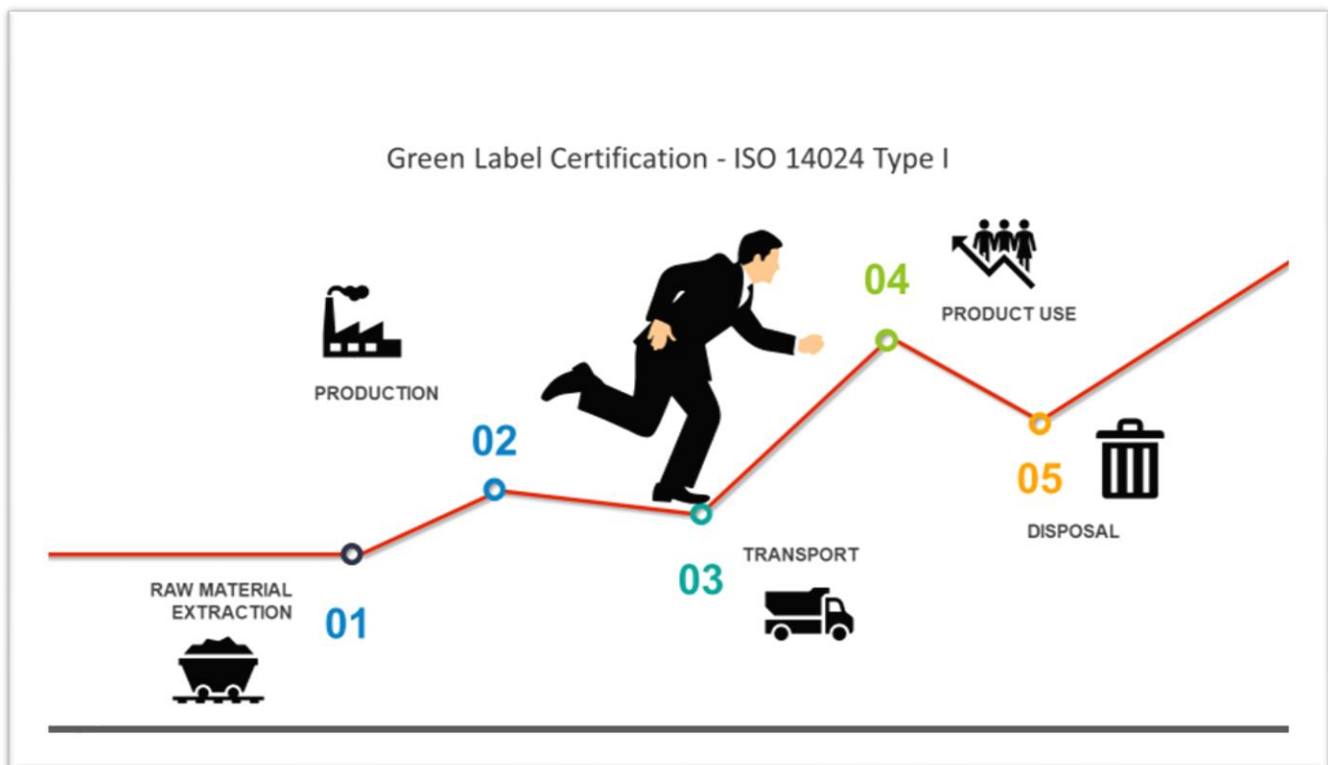


3.2.3 Eco Labelling

- ❑ Ecolabels are marks placed on product packaging that can help consumers and institutional purchasers quickly and easily identify those products as green products that meet specific environmental performance criteria laid down by the government, association, or standards certifications bodies and are therefore deemed “environmentally preferable”
- ❑ Products awarded an eco-label have been assessed and verified by an independent third body and are guaranteed to meet certain environmental performance requirements. It is different from green symbols or environmental created by manufacturers.

Green Label Certification (ISO 14024 Type I Eco-Labels)

- ✓ Voluntary
- ✓ Third-party certification
- ✓ Multiple criteria (based on the life cycle of the products considerations)

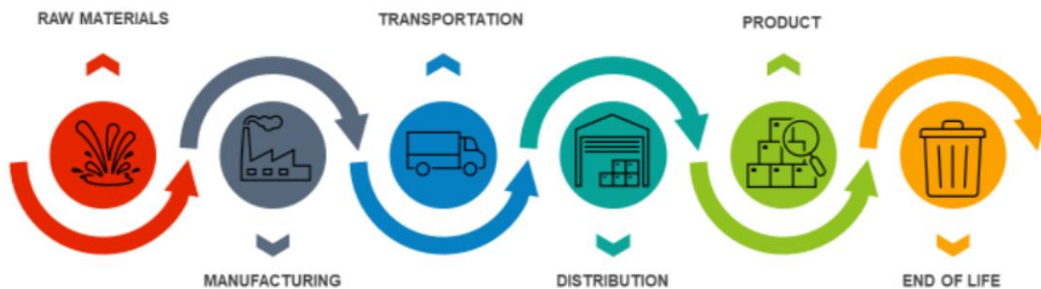


3.2.3 Eco Labelling

Green Label Certification (ISO 14024 Type III Eco-Labels)

- ✓ Voluntary
- ✓ Third-party certification
- ✓ Present quantified environmental information
- ✓ Primarily intended for business to business communication

Green Label Certification - ISO 14024 Type III



MyHijau Mark

- ✓ official label/logo that recognises certified green products and services verified by Malaysian Green Technology and Climate Change Centre (MGTC) formerly known as Green Technology Malaysia to meet local and international environmental standards.
- ✓ Registered green products and services will be listed in MyHIJAU directory which as a reference for green procurement, green incentives and green income tax exemption.



REVISION

1. List Down **(3) Three** benefits of implementing Green Procurement?

- a) _____
- b) _____
- c) _____

2. List Down **(3) Three** green criteria which green products and services need to comply?

- a) _____
- b) _____
- c) _____

3. Explain the standards that SIRIM Eco Label needs to comply ?

CASE STUDY

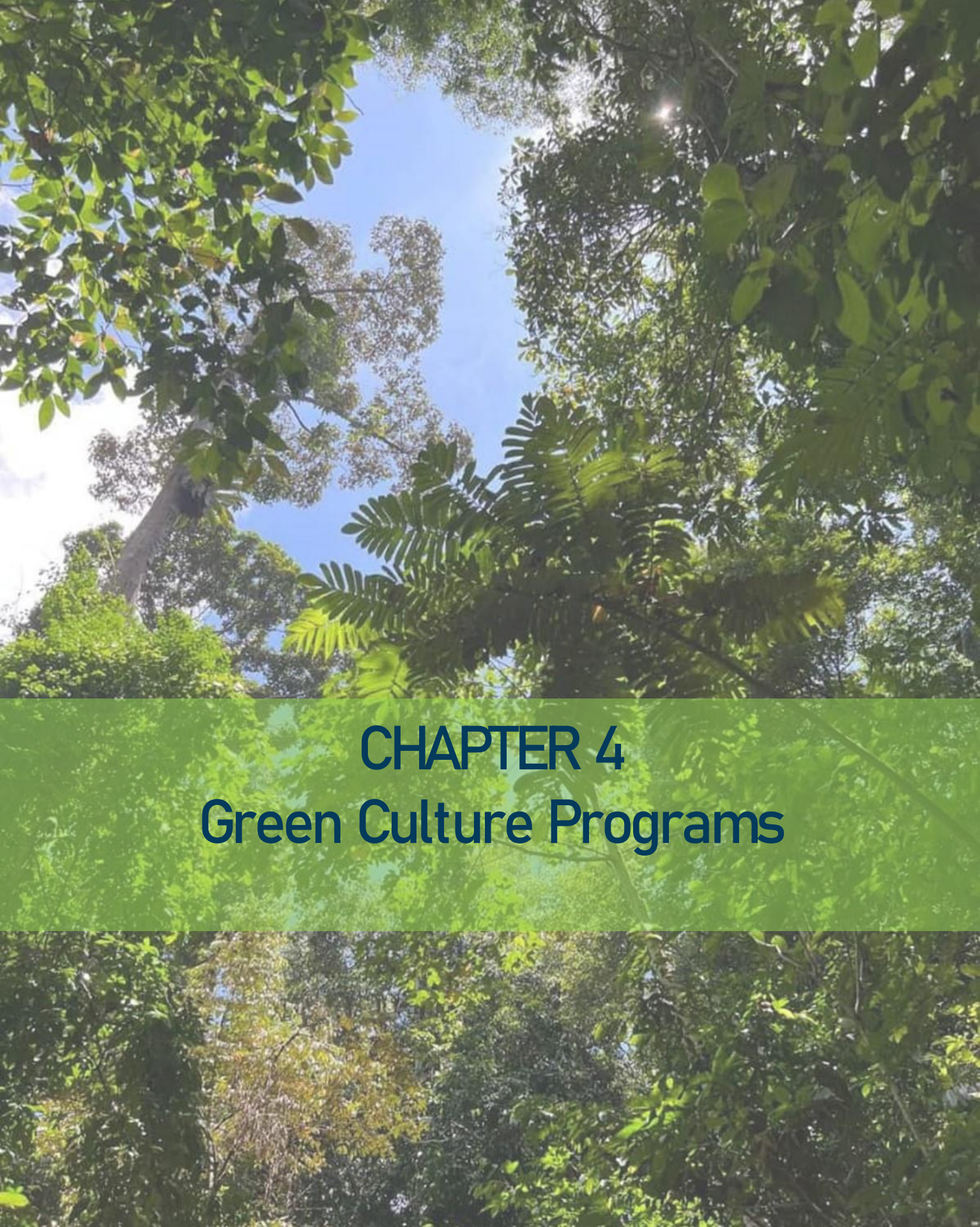


Refer to link to answer the question below;

Malaysia at 23% renewable energy installation to date, aims to hit 40% by 2035 — deputy minister

<https://www.theedgemarkets.com/article/malaysia-23-renewable-energy-installation-date-aims-hit-40-2035-%E2%80%94-deputy-minister>

Relate the above issue with Green Economy Principles

A low-angle photograph looking up at a dense forest canopy. The image shows various types of green leaves and branches, with sunlight filtering through the foliage, creating a bright, dappled light effect. The sky is visible in the upper center, a clear blue color.

CHAPTER 4

Green Culture Programs

CHAPTER 4: Green Culture Programme

4.0 Green Culture Programme

4.1 Discuss Green Culture

4.1.1 Green Culture Programme

4.1.2 Challenges to implement green

4.1 Discuss Green Culture

Green Culture

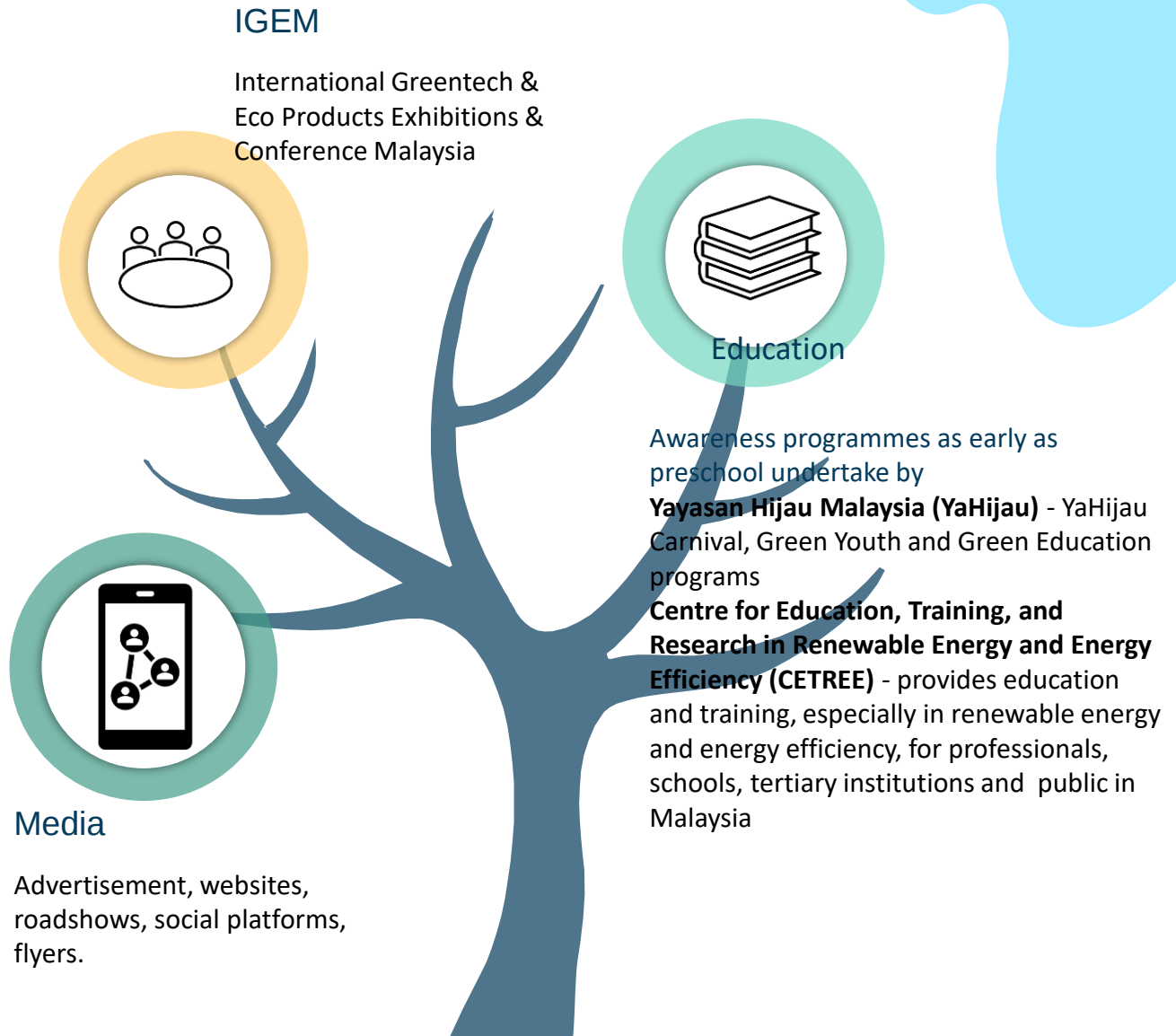
“Green culture is defined as a lifestyle of making deliberate choices and decisions regarding the resources used for daily living for the purpose of minimizing resources used.”

Howard-Grenville, Golden-Biddle and Mao (2011)

“Green culture linked human and environmental harmony together so as to achieve sustainable development of human culture, which include sustainable businesses, sustainable agriculture, sustainable forestry, among others.

Lloyd and Andrew (2002)

Three (3) key platforms for promoting green technology and green programmes awareness



Target Audience For Awareness Green Programme

It is important to cultivate green culture at a young age, in order to equip future generations with the knowledge and the benefit of green technology whereby will drive changes in behavior.

Target Audience for Green Awareness Programme



Integrating Green Culture

Green culture discourages the use of plastics and encourages the use of reusable ones, recycled paper, and biodegradable products.

Differences Between Normal Plastics and Green Plastics

NORMAL PLASTICS

Made from non-renewable resources such as oil, coal or natural gas

Non-biodegradable

A significant source of environmental pollution

Less time to break down (decompose)

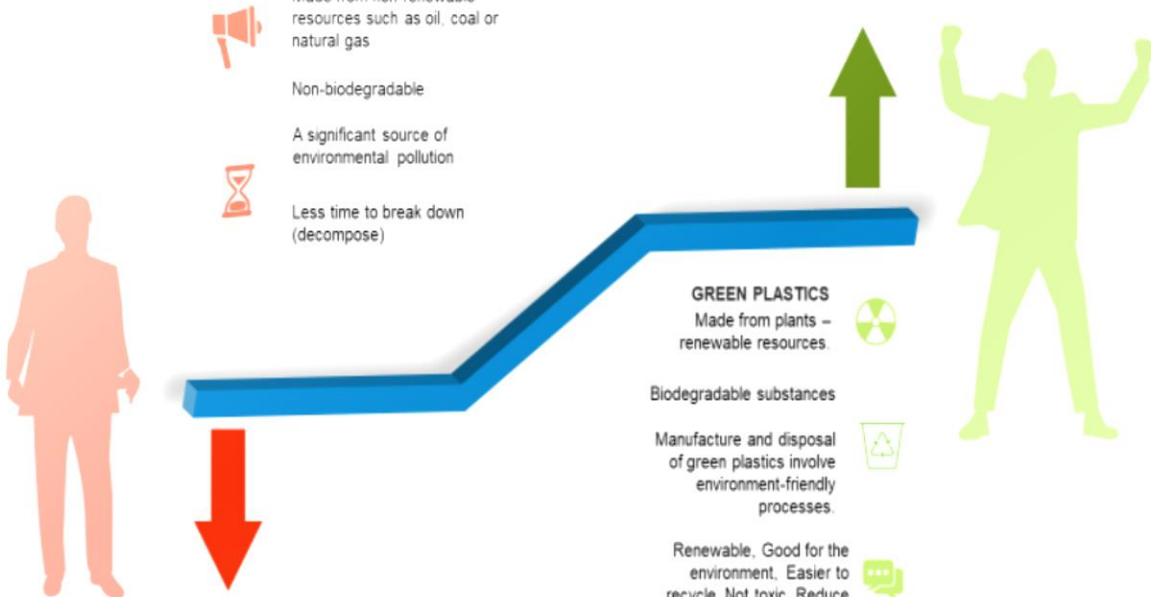
GREEN PLASTICS

Made from plants – renewable resources

Biodegradable substances

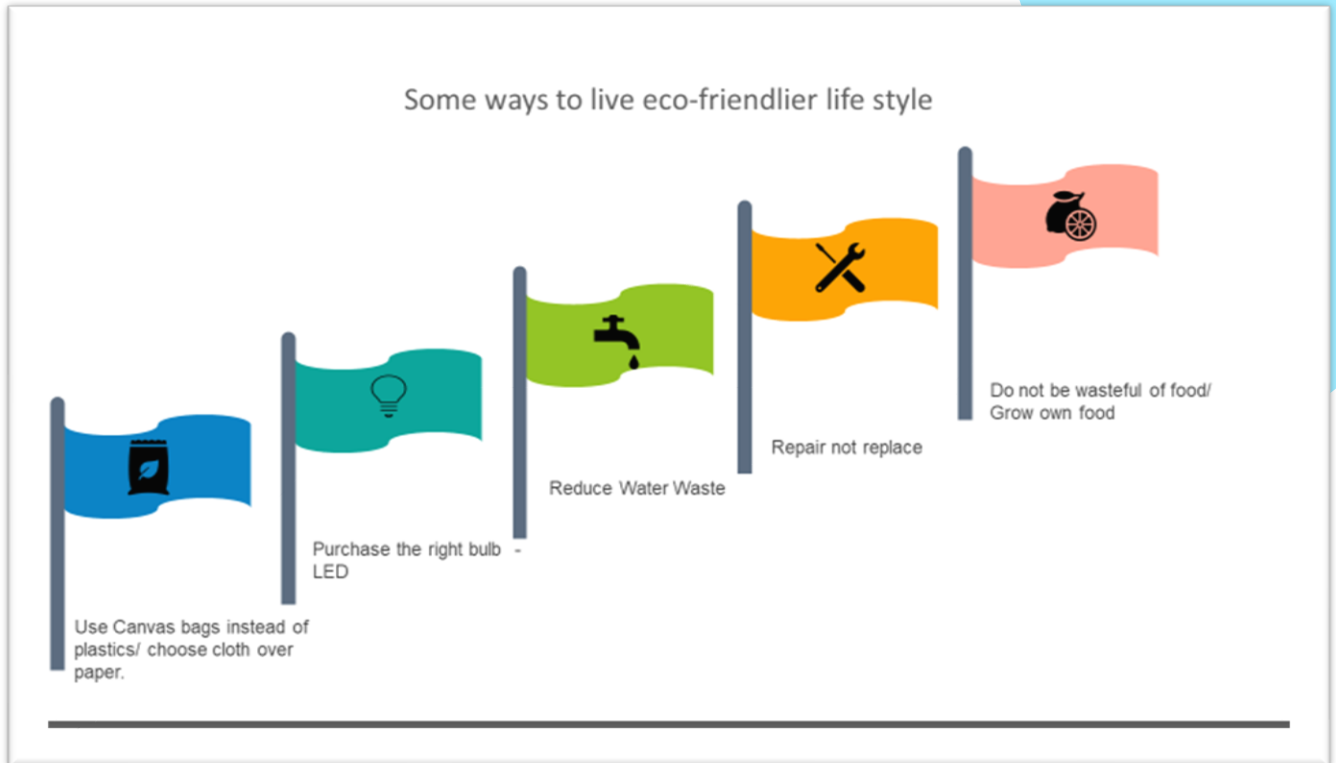
Manufacture and disposal of green plastics involve environment-friendly processes.

Renewable, Good for the environment, Easier to recycle, Not toxic, Reduce dependence on foreign oil



Integrating Green Culture

Ways to live eco-friendlier life style



Integrating Green Culture

Organic Farming - safe sustainable farming system, producing healthy crops without damaging the environment.

Advantages of Organic Farming



Differences Between Conventional and Organic Farming

Conventional

01

Used Chemical Fertilizer

02

Spray crop with insecticides and pesticides

03

Use herbicides to stop the growth of weeds

Organic

01

Build soil with natural fertilizer

02

Rely on natural enemies of pest

03

Pull out weeds by hand

4.1.1 Explain Green Culture Programmes and Challenges

Green Awareness and Campaign

Environmental awareness is understanding the fragility of environment and the vitality of its protection. By promoting environmental awareness is an easy way to be environmental agent and participate in creating a better place for future generations.

Green Community

One that implements environmentally friendly practices to meet the needs of its members and to create sustainable lifestyle incorporated into daily life.

The purpose of engaging communities to carry out green projects is to raise awareness, aim for collective effort and impact and educate the different on the importance and benefits of developing green culture.

Green Practices

Green practices is adopting daily life choices with basic principles of

- ✓ Reducing pollution
- ✓ Conserving resources
- ✓ Conserving energy
- ✓ Reducing consumption and waste
- ✓ Protecting earth's ecological balance

Examples of Green Practices Programme

Examples of Green Practices within Communities



www.free-powerpoint-templates-design.com

4.1.2 Challenges to Implement Green Programme

Challenges to Implement Green Culture



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REVISION

1. List **(3) Three** examples of recycling?

- a) _____
- b) _____
- c) _____

2. Explain Simple practices for transportation that you can adopt in daily life?

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____

3. How to save water usage?

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____

CASE STUDY



Refer to link to answer the question below;

The Green Guardian Programme

<http://yahijau.com/green-guardian/>

Explain THREE (3) challenges of Green Programme

SUGGESTED ANSWER FOR REVISION**Chapter 1**

1- Green Technology is 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.

2a) Green goals terms can refer to the notes of:

Short- term goals (10th Malaysia Plan), Mid- term goals (11th Malaysia Plan) and Long- term goals (12th Malaysia Plan and beyond).

2b) Element in green fundamentals can refer to the notes of:

Climate change impact, environmental requirements and regulations, biodiversity preservation, pollution control, natural resources sustainability, carbon management and green practices policies and legislation.

Chapter 2

1. A. Natural Gas
2. D. Increase the carbon footprint of buildings
3. A. Photovoltaic Effect
4. B. It is a renewable and non-conventional source of energy
5. B. Carbon Dioxide

SUGGESTED ANSWER FOR REVISION

Chapter 3

1. List Down **(3) Three** benefits of implementing Green Procurement?
 - a) Driving local innovation and supporting the local economy
 - b) Improving the environment
 - c) Incalculating better lifestyles
2. List Down **(3) Three** green criteria which green products and services need to comply?
 - a) Safe to use
 - b) Using energy effeciently
 - c)Using recycled materials
3. Explain the standards that SIRIM Eco Label needs to comply ?

SIRIM Eco lable scheme is guided by the guidelines principles of ISO 14024

Type I	• Voluntary • Multiple based criteria • Third party awards licences that authorised the use of environmental labels on product indicating overall environmental preferability
Type II	• Informative environmental self declarations claims
Type III	• Voluntary • Provide quantified environmental data of product • Under pre-set categories by qualified third party • Based on life cycle assessment and verify by that or another third party

Chapter 4

1. List **(3) Three** examples of recycling?
 - a) Used glass bottles as a vase
 - b) Using used tyre as flower pot for gardening
 - c)Used jeans can be made into children shirt
2. Explain Simple practices for green transportation that you can adopt in daily life?
 - a) drive at constatnt speed
 - b) Check tyre pressure as recomended
 - c) Apply car pool
 - d) Used biodiesel for diesel powered vehicle
 - e) Use EEV
3. How to save water usage?
 - a) Turn off tap while brushing teeth or applying cleanser
 - b) Plan the washing
 - c) Check leakage
 - d) Save rainwater for gardening
 - e) Install dualpurpose sink

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