KEMENTERIAN SUMBER ASLI, ALAM SEKITAR DAN PERUBAHAN IKLIM

MGTC

GREEN PRACTICES GUIDELINE FOR
LIVESTOCK SECTOR

Malaysian Green Technology And Climate Change Corporation

PROJECT TEAM (MGTC)

Ts. Shamsul Bahar Mohd Nor
Kamaradzaman Mohd Bakri
Abd. Malik Atan
Azlina Hashim
Muhammad Faiz Abdul Rahman
Nur Amalina Hasanudin

TECHNICAL EXPERT & AUTHOR

Prof. Dr. Anjas Asmara Samsudin (Lead)
Ts. Raja Shazrin Shah bin Raja Ehsan Shah
Ts. Sr. Dr. Mohamad Ridzuan bin Yahya
Prof. Madya Dr. Atikah Kadri
Prof. Madya Dr. Norol Hamiza Zamzuri
Prof. Madya Dr. Rasidah Hamid
Prof. Madya Dr. Yusfida Ayu Abdullah.
Prof. Madya Ir. Dr. Nofri Yenita Dahlan
Dr. Frisco Nobilly
Prof. Madya Ir. Dr. Siti Shawalliah Idris
Dr. Marfiah Ab Wahid Dr. Natrina Mariane P. Toyong
Dr. Siti Ayu Jalil
Dr. Zadariana bt Jamil @ Osman Noor Azlin Mahat Zakiyah Hasan

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Ts. Raja Shazrin Shah bin Raja Ehsan Shah	Galaxy Tech Solutions (KL) Sdn. Bhd.
Assoc. Prof. Dr. Lokman Hakim Idris	UPM
Mrs. Isnawati Basri	MAFI
Dr. Tee Tuan Poy	UPM
Mr. Soong Keng Vee	DQS
Dr. Mohammad Razli Abdul Razak	DVS
Dr. Abu Hassan Muhammad Ali	FGV Integrated Farming Sdn. Bhd.
Dr. Nurul Huda Mohd Zairi	DVS
Mr. Azizi Ahmad Azmin	DVS
Dr. Sohayati Abd. Rahman	DVS
Dr. Mohd Hafizal Ahmad	DVS
Dr. Zawida Zahari	DVS
Mr. Bk Sinha	Habitat Enviro Sdn. Bhd.
Dr. Abdul Razak Alimon	MSAP
Dr. Ahmad Dazila Ahmad Helmi	Farm Fresh Berhad
Dr. Maya Sofia Abdul Latif	DVS
Ms. Nur Atiqah Roshidi	DVS
Ms. Rabi'atul Adawiyah Zayadi	DVS

ABBREVIATION	
AI	Artificial Intelligent
DAN 2.0	Dasar Agromakanan Negara
EM	Effective Microorganism
ENE	Energy Efficiency
FDI	Foreign Direct Investment
GAHP	Good Animal Husbandry Practices
GDP	Gross Domestic Product
GHGs	Green House Gases
GPS	Global Positioning Systems
INN	Innovation
SSL	Self-Sufficiency Level
KK	Kedah-Kelantan
LCA	Life Cycle Analysis
MAN	MManagement
MBIS	Market-Based Instruments
MyGAP	Malaysian Good Agricultural Practices
NGO	Non-Government Organisation
OECD	Organisation for Economic Co-operation and Development
RE	Renewable Energy
RWH	Rainwater Harvesting
R&D	Research and Development
UNEP	United Nations Environment Programme

TERMINOLOGY	
Livestock Industry	Comprise of domesticated ruminants and non-ruminants.
Ruminants	Sectors that consist of beef and dairy cattle, sheep and goats.
Non-ruminant	Sub-sector such as poultry (broilers and eggs) and swine productions.

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FOREWORD

The development of green practice guidelines is a continuation of the implementation of the MyHIJAU Programme under the Ministry of Environment and Water (KASA) and the Malaysian Green Technology and Climate Change Corporation (MGTC) which is a coordinating agency and secretariat for the program. This programme has been approved by the National Council for Green Technology and Climate Change (MTHPI) which was held on 23 October 2012. This is one of the Government's initiatives in the development of Green Technology in Malaysia. It is in line with the implementation of the National Green Technology Policy as well as the direction of Sustainable Consumption & Production (SCP) to encourage local manufacturers, producers and suppliers, especially to companies and Small and Medium Enterprises (SMEs). In addition, it will also focus on the Government's initiatives and direction in the development of the country's SMEs.

The development of Green Practice Guidelines is to provide guidance to the green industry in implementing green practices at the preliminary stage, during and after construction is implemented. These guidelines also have an implementation direction to ensure that these Guidelines will continue to be referred to and used by all parties, especially industry players to help achieve the government's goal of implementing green development in Malaysia. This green practice can help the industrial sector to have the potential to venture into the field of green technology, especially in the production of green products and services, as well as increase the encouragement of producers, manufacturers and suppliers to apply green technology in the premises, production process and operation. These Guidelines are more towards the requirements that need to be put into practice so that industries, companies and organisations have green practice guidelines that can be referred to as well as help companies achieve the government's goal of using green practices in line with SDG 12.6, which is to encourage the industry to use sustainable practices and integrate information sustainability into the reporting cycle.

Referring to the twelfth Malaysia plan under the eight main focus which is to accelerate green growth, where this green practice development programme is able to play a very important role in being a catalyst to ensure that these green practices are more practical and applicable to all parties in the green industry whether directly or indirectly for local companies and businesses to gain exposure to this green industry practice guide.

Therefore, increasing productivity and long-term profits through environmental, social and governance (ESG) elements should be applied in decision-making by ensuring that companies focus on reducing the negative impact on the environment. Although Malaysia only contributes 0.7 percent to greenhouse gas emissions, the Government will continue to fulfil its commitment to reduce GHG emission intensity up to 45 percent to GDP in 2030, based on emission intensity in 2005, in line with the aspiration to become a low carbon country.

It is hoped that this goal can be achieved by focusing on the industry to understand the importance of green practices in business by applying knowledge about the benefits and applications of green technology as well as the implementation strategy of the green practice monitoring mechanism in business management to obtain the recognition of the green industry.

ABOUT THE GUIDELINE

The Green Practices Guideline was officially endorsed by the Ministry of Environment and Water in 2021 as part of the Twelfth Malaysia Plan (RMKe-12) under SDG 12.6. This particular goal aims to promote the adoption of sustainable practices and the integration of sustainability information into the reporting cycle of companies.

This governmental initiative strongly aligns with Malaysia's commitment to fostering green technology policies and driving sustainable development across various industries and organisations within the country.

The initial implementation of the Guideline primarily focuses on enhancing exposure, perception, knowledge, and capacity building regarding green resources, processes, and technologies. Collectively known as "green practices," these measures are intended to drive positive changes within the industry.

The envisioned outcome of implementing green practices in the industry is the promotion of cleaner, more efficient, and environmentally-friendly operations, processes, and premises throughout Malaysia.

KEY POINTS:

Mandate : The Ministry of Environment and Water granted approval through the Twelfth Malaysia Plan (RMKe-12) in 2021.

Green Policy : The Guideline supports the advancement of green technology policies to facilitate sustainable development within industries and organisations in Malaysia.

Purpose : To provide guidance and recommendations for livestock sector industries in the implementation of green practices.

Approach : The Guideline emphasises the optimisation of natural resource consumption, energy usage, and water management, while concurrently reducing toxic emissions and waste generation.

Optimise : Focus on optimising the consumption of natural resources, including raw materials, water, energy, and land use.

Circularity : Encourage the adoption of circular economy principles by increasing the reuse, recycling, and reduction of materials, energy, and water.

Reduce : Place emphasis on reducing the emissions of toxic or hazardous waste.

Implement : Promote the utilisation of innovative green technologies to enhance processes and operations.

1

INTRODUCTION OF LIVESTOCK INDUSTRY

PART 1: INTRODUCTION

1.1 ABOUT THE SECTOR

The livestock industry in Malaysia is a vital component of the country's agricultural development, providing sustainable employment and meeting the increasing demand for meat, milk, and dairy products. However, the industry faces several challenges that need to be addressed to ensure its long-term sustainability and align with the goals set forth in the Green Technology Master Plan.

One of the key challenges in the livestock sector is the need for quality breeds to enhance productivity. Local breeds such as Kedah-Kelantan (KK) cattle and Katjang goats have relatively smaller sizes and lower meat production compared to larger breeds like Brahman cattle and Boer crosses. Addressing this challenge would involve efforts to improve breed quality and enhance the performance of local breeds through selective breeding and genetic improvement programmes.

Another significant challenge is the high cost of animal feed, which accounts for a substantial portion of production expenses. The cost of animal feeds ranges from 5.4% to 71.2% of total production costs, with raw materials like corn, often imported from other countries, being a major contributor. Finding cost-effective alternatives for animal feed and promoting sustainable feed sourcing practices will be essential in mitigating this challenge and reducing the industry's reliance on imported raw materials.

The availability of arable land for grazing reserves is also a concern in Malaysia. With competition for land use from other industries, the livestock sector faces limitations in securing adequate land for grazing livestock. Farmers often prefer to utilise their land for more profitable agricultural activities like palm oil, fruit, and vegetable cultivation. Addressing this challenge requires a comprehensive approach that considers land-use planning, optimising land utilisation, and exploring innovative livestock production systems that utilise limited land resources more efficiently.

Despite these challenges, the livestock industry in Malaysia has shown significant contributions to the country's agricultural gross domestic product (GDP). For instance, the poultry sub-sector has a substantial contribution rate of 98.9% to the livestock GDP, followed by the dairy sub-sector at 64.19%. The production of poultry meat, chicken/duck eggs, and fresh milk has remained resilient, even in the face of challenges such as the COVID-19 pandemic, which affected demand from restaurants and hotels.

To overcome these challenges and promote sustainable livestock practices, collaboration among governments, the private sector, research organisations, and other stakeholders is crucial. By implementing strategic policies, knowledge sharing, and research and development initiatives, Malaysia can enhance breed quality, optimise feed utilisation, and explore innovative land use practices. These efforts will contribute to the industry's resilience, food security, economic development, and environmental protection, aligning with the objectives of the Green Technology Master Plan.

POLICIES CURRENTLY AVAILABLE:

In Malaysia, the livestock industry is supported by various policies and initiatives aimed at promoting sustainable practices and enhancing the sector's performance. One such policy is the National Agrofood Policy 2.0 (DAN 2.0), which outlines five policy objectives and five policy thrusts to improve the country's food security agenda. DAN 2.0 emphasises the importance of sustainable consumption and production, embracing modernisation and smart agriculture, and creating an inclusive business ecosystem. This policy provides a strategic framework for addressing the challenges and opportunities in the livestock sector and guiding its future development.

Additionally, there are specific regulations in place to ensure the environmental and social sustainability of the livestock industry. The Environmental Quality Act 1974 and Poison Act 1952 govern the identification and management of waste products, including chemicals, to minimise their impact on the environment and human health. These acts require proper waste management practices and adherence to relevant guidelines.

Furthermore, efforts are being made to strengthen the knowledge and capacity of livestock producers through mentoring programs and knowledge-sharing platforms. These initiatives facilitate collaboration between national and international experts, enabling the transfer of best practices and the adoption of green technologies in the livestock sector.

CHALLENGES IN THE LIVESTOCK SECTOR:

The livestock industry in Malaysia faces several challenges that need to be addressed to ensure its long-term sustainability. One of the key challenges is the lack of quality breeds. Local cattle and goats are relatively small-sized, resulting in lower meat production compared to larger breeds. Enhancing breed quality through selective breeding and genetic improvement programmes is crucial to improve productivity and meet the increasing demand for animal products.

Another significant challenge is the high cost of animal feed. The cost of animal feeds, particularly imported raw materials like corn, constitutes a significant portion of production expenses. Finding cost-effective alternatives for animal feed and promoting sustainable feed sourcing practices are essential to reduce production costs and enhance the industry's competitiveness.

Additionally, the availability of arable land for grazing reserves poses a constraint on the livestock sector. With competition from other industries for land use, farmers face difficulties in securing adequate land for grazing livestock. This challenge requires comprehensive land-use planning and innovative livestock production systems that optimise land utilisation and maximise productivity within limited land resources.

Diseases, supply chains, environmental concerns, and policies are also significant challenges faced by the livestock industry. Managing disease outbreaks, improving supply chain efficiency, mitigating environmental impacts, and ensuring the implementation of appropriate policies are crucial for the sector's resilience and sustainable growth.

Addressing these challenges requires collaboration among stakeholders, including government agencies, research institutions, industry players, and farmers. By implementing targeted policies, providing technical support, and promoting innovation and knowledge sharing, the livestock sector can overcome these challenges and achieve sustainable development while contributing to the country's food security and economic growth.

The Livestock sector plays a crucial role in Malaysia's agricultural development, providing valuable nutritional benefits, supporting livelihoods, and contributing to the resilience of families and communities. However, the rapid growth in production and trade within the sector has also raised concerns about its environmental impact, animal welfare, and human health. In order to optimise the sector's contribution to sustainable development objectives and mitigate potential risks, there is a clear need for a comprehensive Green Practices Guideline tailored specifically for the Livestock sector. This guideline would provide a framework for adopting and implementing sustainable practices throughout the sector, including areas such as waste management, energy efficiency, responsible use of resources, animal welfare, and reduction of greenhouse gas emissions. By establishing clear guidelines and promoting the adoption of green practices, the Livestock sector can improve its environmental performance, enhance resource efficiency, and contribute to the overall sustainability goals of the country.

01 Boosting efficiency of livestock production and resources use

02 Intensifying recycling efforts and minimising losses for a circular bio-economy

03 Capitalising on nature-based solutions to ramp-up carbon offset

04 Striving for healthy and sustainable diets

05 Developing policy measures to drive change

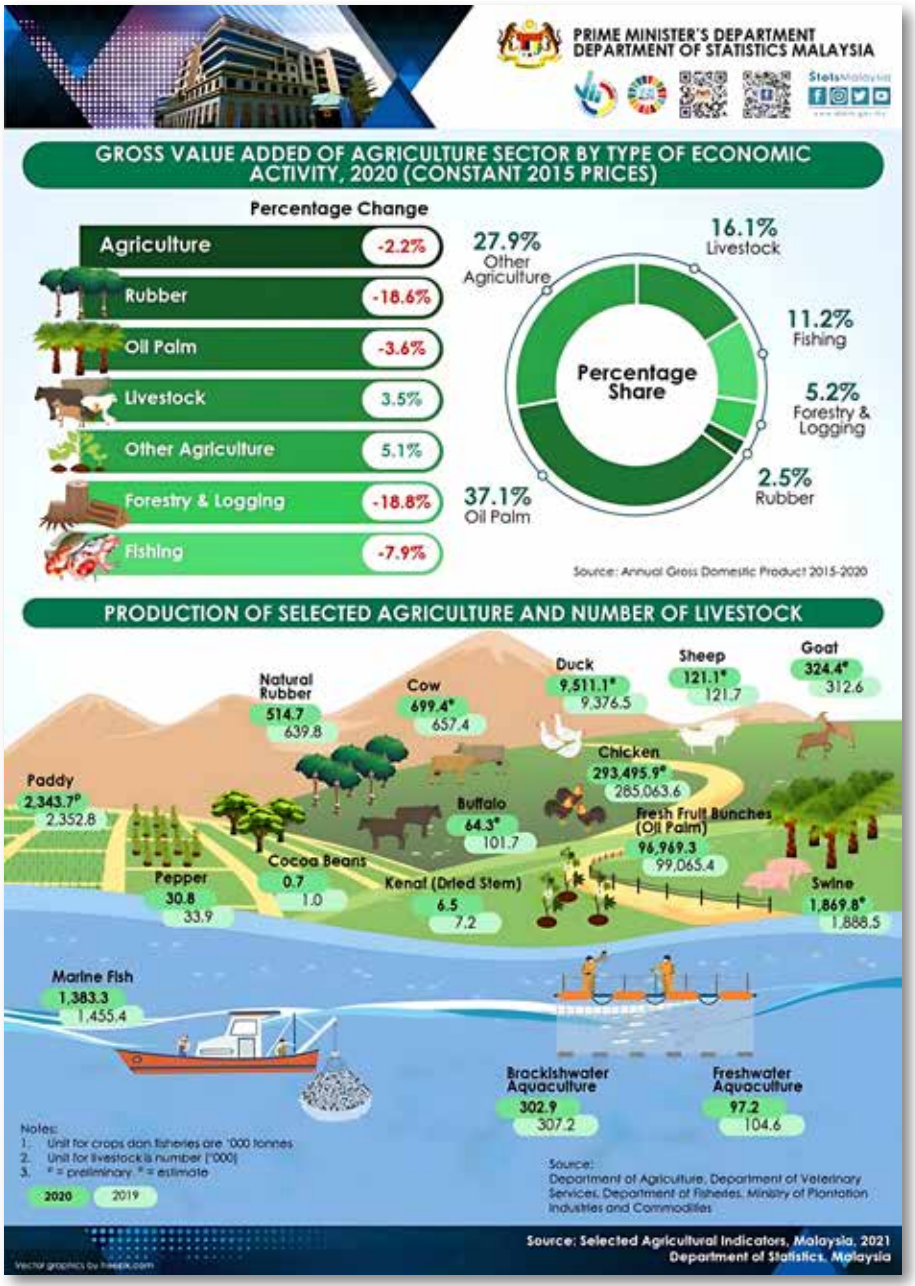


FIGURE 1.1

Malaysia GDP for 2020 shows the percentage share by kind of economic activity.

1.2 SCOPE AND APPLICATION

The livestock sector in Malaysia holds great significance, contributing to the nation's economy, providing employment opportunities, and ensuring food security. However, it is essential to address the environmental challenges posed by conventional livestock farming practices. The Green Practices Guidelines for the Livestock Sector have been specifically developed to promote sustainable practices and overcome these challenges.

These guidelines aim to guide the livestock sector towards sustainable development by addressing key issues such as animal welfare, resource management, waste management, and emissions reduction. By implementing green practices, livestock farmers can minimise their environmental impact while improving the efficiency and profitability of their operations.

Examples of green practices in the livestock sector include:

1.

RESOURCE EFFICIENCY:

Encouraging the efficient use of resources such as water and feed to minimise waste and optimise production.

2.

WASTE MANAGEMENT:

Implementing proper waste management systems to minimise the environmental impact of livestock waste. This can include composting manure, recycling agricultural by-products, and utilising anaerobic digesters to generate biogas.

3.

EMISSIONS REDUCTION:

Adopting measures to reduce greenhouse gas emissions from livestock farming, such as implementing methane capture systems, optimising feed formulations, and promoting pasture-based systems.

4.

ANIMALWELFARE:

Emphasising the well-being of livestock through proper housing, feeding, and healthcare practices, ensuring their health and minimising stress.

5.

SUSTAINABLE FEED SOURCING:

Promoting the use of sustainable and locally sourced feed ingredients, reducing the reliance on imported feed and supporting the local agricultural sector.

6.

RESPONSIBLE ANTIBIOTIC USE:

Implementing proper antibiotic stewardship practices to minimise the risk of antimicrobial resistance and promote animal health.

7.

EFFICIENT ENERGY USE:

Embracing energy-efficient technologies and renewable energy sources to reduce energy consumption and environmental impact.

By incorporating these green practices into the livestock sector, Malaysia can improve its environmental sustainability, enhance animal welfare, and contribute to the goals of the Green Technology Master Plan. The Green Practices Guidelines provide a roadmap for livestock farmers, industry stakeholders, and policymakers to adopt and implement sustainable practices, ensuring a resilient and environmentally responsible livestock sector for the future.

1.3 MOTIVATION TO SUSTAINABILITY

The livestock sector in Malaysia holds significant importance, contributing to economic growth, ensuring food security, creating employment opportunities, and improving livelihoods. However, it is crucial to address the challenges posed by conventional livestock farming practices that have had adverse effects on the environment. To overcome these challenges and promote sustainability in the livestock sector, the implementation of Green Practices Guidelines specifically tailored for livestock farming is essential.

These guidelines aim to address the social, financial, and policy barriers that hinder the adoption of sustainable practices in livestock farming. By encompassing various aspects of livestock farming, including animal welfare, resource management, waste management, and environmental conservation, these guidelines provide a comprehensive framework to promote sustainable practices throughout the livestock industry.

ENVIRONMENTAL STEWARDSHIP:	COST SAVINGS AND EFFICIENCY:	MARKET DEMAND AND REPUTATION:	REGULATORY COMPLIANCE AND MARKET ACCESS:	INNOVATION AND COMPETITIVENESS:	EMPLOYEE ENGAGEMENT AND PRODUCTIVITY:	RESILIENCE TO CLIMATE RISKS:
Implementing sustainable practices in livestock farming minimises ecological impact, preserves biodiversity, and safeguards natural resources. Examples include adopting responsible water management, implementing soil conservation techniques, and promoting sustainable grazing practices.	Sustainable practices in livestock farming lead to cost savings and improved efficiency. Utilising precision farming techniques, optimising feed utilisation, and implementing energy-efficient systems reduce input costs and enhance resource efficiency, resulting in increased profitability.	Consumers are increasingly seeking sustainably produced livestock products. Embracing sustainable practices such as animal welfare standards, responsible antibiotic use, and efficient feed management allows companies to meet market demands for ethically produced and environmentally friendly livestock products.	Adhering to sustainability regulations and standards ensures compliance and facilitates market access. Following environmental regulations, managing waste responsibly, and adopting sustainable feed sourcing practices enable livestock companies to meet regulatory requirements and access markets with stringent sustainability criteria.	Sustainability drives innovation in the livestock sector, leading to the development and adoption of new technologies and practices. Examples include precision livestock farming technologies, renewable energy applications, and sustainable packaging solutions. Investing in sustainability enhances competitiveness and positions companies as leaders in the industry.	Commitment to sustainability in the livestock sector fosters employee engagement and productivity. Creating a work environment that values sustainability and supports responsible livestock practices boosts employee morale and satisfaction. Offering training and educational programmes on sustainable livestock farming empowers employees to contribute to environmental goals.	Incorporating sustainable practices in livestock farming builds resilience to climate-related risks. This involves implementing climate-smart livestock management practices, such as heat stress mitigation, manure management, and carbon sequestration. By adapting to climate change and mitigating its impacts, the livestock sector ensures long-term viability and supports the resilience of farming communities.

By embracing sustainable practices, the livestock sector can contribute to environmental preservation, ensure the sustainable use of resources, enhance food security, and support the livelihoods of farming communities. Sustainable livestock farming is essential for meeting global sustainability goals and ensuring a resilient and thriving livestock sector for the future.

1.3.1 CLIMATE CHANGE

Climate change poses a significant challenge for the livestock sector in Malaysia. As the sector contributes to greenhouse gas (GHG) emissions, it must recognise its role in addressing climate change and adopting sustainable practices. Malaysia's commitment to becoming a low-carbon nation by 2050 provides an opportunity for the livestock industry to contribute to this goal while ensuring its long-term viability and resilience.

Examples of initiatives and actions that can be taken by the livestock sector in Malaysia include:

1.

SUSTAINABLE LIVESTOCK MANAGEMENT:

Implementing sustainable livestock practices such as improving feed efficiency, adopting methane capture technologies from manure, and practicing responsible grazing management can reduce GHG emissions from the livestock sector.

2.

ENERGY EFFICIENCY:

Adopting energy-efficient technologies and practices in livestock facilities, such as energy-efficient lighting, ventilation systems, and water heating, can reduce energy consumption and associated GHG emissions.

3.

MANURE MANAGEMENT:

Developing efficient and environmentally friendly manure management systems, such as anaerobic digesters or composting facilities, can help capture and utilise methane and reduce emissions from manure storage and application.

4.

FEED SOURCING:

Promoting sustainable feed sourcing practices, such as utilising locally grown and environmentally friendly feed ingredients, can reduce the environmental footprint of the livestock sector.

5.

CONSERVATION AND RESTORATION OF NATURAL RESOURCES:

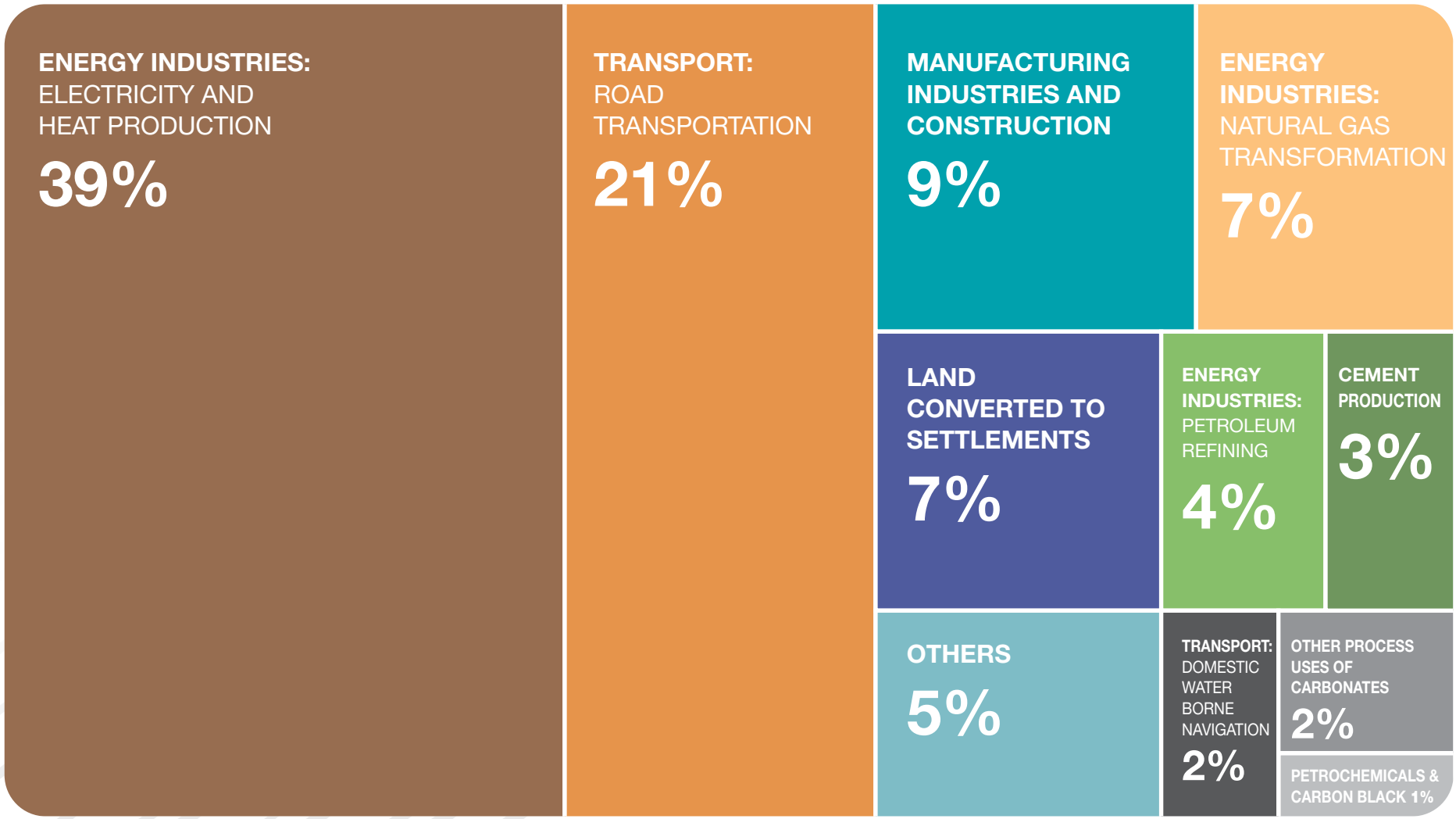
Protecting and restoring natural resources, such as forests and wetlands, can contribute to carbon sequestration, enhance biodiversity, and mitigate the impacts of climate change.

6.

KNOWLEDGE SHARING AND CAPACITY BUILDING:

Promoting education and training programs on sustainable livestock practices, climate-smart farming techniques, and climate change adaptation can empower livestock farmers to make informed decisions and drive sustainable agricultural development.

By embracing these sustainable practices, the livestock sector in Malaysia can play a crucial role in addressing climate change, minimising environmental impacts, and ensuring the long-term viability of the industry. These actions align with Malaysia's commitment to sustainable development, attract environmentally conscious consumers, and position the livestock industry as a responsible and forward-thinking sector in the global marketplace.



RENEWABLE ENERGY (RE)

FIT-IN-TARIFF

Mechanism under the Renewable Energy Policy & Action Plan to catalyse generation of Renewable Energy (RE) up to 30MW in size.

Emission avoidance:

460.52 Gg CO_2 eq

HYDROPOWER

Hydropower is poised to play an increasingly important role in meeting Malaysia's energy and climate goals.

Emission avoidance:

6,535.99 Gg CO_2 eq

NATIONAL ENERGY EFFICIENCY ACTION PLAN (NEEAP)

This plan was introduced targeting the residential, commercial and industrial sectors. Key initiatives under NEEAP:

- 5 star rated appliances
- Minimum Energy Performance Standard (MEPS)
- Co-generation
- Energy audits and energy management in buildings and industries
- Energy Efficient Building Design

Emission avoidance:

458.02 Gg CO_2 eq

ENERGY EFFICIENT VEHICLES (EEVs)

Malaysia aims to become a regional hub for energy efficient vehicles (EEVs) through strategic investments and adoption of high technology. The EEVs include fuel-efficient internal combustion engines (ICE) vehicles, electric vehicles, hybrid & alternative-fueled vehicles.

Related policy:

The National Automotive Policy 2014

Emission avoidance:

90.65 Gg CO_2 eq

GREEN BUILDING RATING SCHEME

Focus on promoting natural-gas vehicles in the public transport sector, in particular for taxis and buses.

EXISTING STANDARD:

- Malaysian Carbon Reduction & Environmental Sustainability Tools (MyCREST)
- Green Performance Assessment System (PASS)

GREEN CERTIFICATION:

- Green Building Index (GBI)
- GreenRE

URBAN RAILED-PUBLIC TRANSPORT

The implementation of public transport initiatives is important to reduce the use of private vehicles on the road.

Existing plan:

- National Land Public Transport Master Plan
- The Tenth and Eleventh Malaysia Plan

Emission avoidance:

212.93 Gg CO_2 eq

NATURAL GAS VEHICLES (NGVs)

Focus on promoting natural-gas vehicles in the public transport sector, in particular for taxis and buses.

Benefits of programme:

- Lower retail prices
- Incentives
- Road tax reduction
- Import duty and sale tax exemption

Emission avoidance:

114.77 Gg CO_2 eq

BIODIESEL

Biodiesel has received great attention as an alternative fuel, considering its abundant resources and environmental benefits.

Related policies and Acts:

- The National Biofuel Policy
- Malaysian Biofuel Industry Act

Emission avoidance:

1,127.34 Gg CO_2 eq

OIL & GAS OPERATIONS

PETRONAS, as the national oil and gas company of Malaysia is committed towards a loer carbon footprint.

Emission reduction in oil & gas operations can be achieved through:

- Zero continuous flaring and venting in all operations for fugitive emissions
- Continuous improvement and plant efficiency in natural gas transformation
- Enhance improvement in plant efficiency of oil refining industries

WASTE PAPER RECYCLING

Target of 40% waste redirection from waste disposal sites:

- 22% through recycling
- 18% through waste treatment

IMPACT:

Increase of recycling rate materials from 17% in 2015 to 21% in 2017.

RELATED POLICY:

- National Solid Waste Management Policy 2006
- Eleventh Malaysia Plan

Emission avoidance:

3,937.76 Gg CO_2 eq

BIOGAS RECOVERY FROM PALM OIL MILL EFFLUENT (POME)

- Biogas plays a crucial role in driving Malaysia that is moving towards adopting renewable energy and environmental sustainability.
- Target include equipping mills with biogas entrapment facilities to generate electricity for supply to the grid or for self-consumption.

IMPACT:

As of 2017, out of 454 palm oil mills, 104 of them were fully equipped with biogas capture facilities.

RELATED POLICY:

Entry Point Project – Developing Biogas Facilities at Palm Oil Mills

RELATED PROGRAMME:

Economic Transformation Programme 2010

AGRICULTURE

Malaysian Organic Scheme (SOM) or Malaysia Organic (MyOrganic) is a certification that recognises farms that practice good agricultural practices and organic farming based on Malaysian Standard MS 1529:2015.

IMPACT:

253 farms have been certified with MyOrganic certification with an area of 2,045.60 ha as for now.

SUSTAINABLE MANAGEMENT OF FOREST

Forest certification scheme that allow the annual allowable cut in the Permanent Reserved Forest (PRF) is capped at 85 m^3/ha for the period of tenth & eleventh Malaysia Plan.

IMPACT:

Malaysian Criteria and indicators for Forest Management Certification 2001.

Emission avoidance:

20,307.50 Gg CO_2 eq

CONSERVATION OF BIODIVERSITY AND ECOSYSTEM SERVICES

RELEVANT INITIATIVE:

Malaysia's Protected Area (PA) Network

TARGET:

Increase the Protected Area to at least 20% by 2025.

IMPACT:

Protected Area increased from 2.757 to 3.171 million ha between 2014 and 2016

FOREST ENRICHMENT PROGRAMMES

AIMS:

- Improve degraded forests sequestration capacity
- Enhance connectivity between forests through two distinct initatives

EXAMPLES:

- Central Forest Spine (CFS) Programme in Peninsular Malaysia
- Heart of Borneo (HoB) Programme in Sabah and Sarawak

1.3.2 CIRCULAR ECONOMY

The livestock sector has a crucial role to play in transitioning to a circular economy, which promotes resource efficiency, waste reduction, and sustainable growth. By adopting circular economy principles, livestock operators can contribute to climate change mitigation, cost-effectiveness, and the conservation of natural resources. Here are key aspects and initiatives relevant to the livestock sector in Malaysia:

1

POLICY AND REGULATORY FRAMEWORK:

The Malaysian government has implemented policies and regulations to support the shift towards a circular economy in the livestock sector. These policies aim to transform the linear economy model into a sustainable circular model, reducing environmental impacts associated with livestock operations.

2

WASTE MANAGEMENT AND RECYCLING:

Efficient waste management and recycling systems are essential for achieving a circular economy in the livestock sector. Livestock operators can adopt waste reduction strategies, promote the recycling of animal waste and by-products, and explore innovative methods for managing livestock waste.

3

PRODUCT DESIGN AND EXTENDED PRODUCER RESPONSIBILITY (EPR):

Promoting sustainable product design and implementing extended producer responsibility schemes are crucial in the transition to a circular economy. Guidelines integrating eco-design principles into livestock products and animal husbandry practices are being established to minimise waste and optimise resource use. Exploring EPR policies ensures that producers take responsibility for the entire lifecycle of livestock products, including their disposal and recycling.

4

SUSTAINABLE CONSUMPTION AND PRODUCTION:

Encouraging sustainable consumption and production patterns is essential for advancing the circular economy in the livestock sector. Livestock operators can adopt sustainable livestock management practices, promote the use of certified feed and animal welfare standards, and explore ways to minimise resource consumption and waste generation during livestock operations.

5

INNOVATION AND TECHNOLOGY:

Innovation and the adoption of advanced technologies play a significant role in the transition to a circular economy. Research and development efforts in Malaysia focus on sustainable livestock management practices, eco-friendly animal feed technologies, and the utilisation of livestock biomass for renewable energy. Collaborating with research institutions and industry partners facilitates the adoption of innovative solutions in the livestock sector.

6

COLLABORATION AND STAKEHOLDER ENGAGEMENT:

Collaboration among stakeholders is essential for the successful implementation of a circular economy in the livestock sector. Livestock operators can engage with government agencies, livestock associations, local communities, and veterinary experts to foster partnerships, share knowledge and best practices, and promote sustainable livestock management initiatives.

By embracing circular economy principles, the livestock sector in Malaysia can optimise resource utilisation, minimise waste generation, and promote sustainable practices throughout the livestock value chain. This transition will contribute to Malaysia's climate goals, enhance the economic viability of the sector, and ensure the long-term resilience of livestock production systems.

1.3.3 IMPACTS OF ESG TOWARDS THE INDUSTRY

ESG

ESG (Environmental, Social, and Governance) criteria play a vital role in assessing the ethical and sustainability impacts of investments in the livestock sector. In Malaysia, the consideration of ESG factors is crucial for the long-term sustainability and success of livestock businesses. Here are some specific examples of how ESG principles can be applied in the livestock sector:

ENVIRONMENTAL RESPONSIBILITY:

Livestock companies can prioritise environmental responsibility by implementing sustainable livestock management practices that minimise the impact on ecosystems. This includes promoting sustainable feed sourcing, reducing the use of antibiotics and growth hormones, and implementing manure management systems to minimise pollution and promote nutrient recycling. Investing in renewable energy sources, such as solar panels for powering livestock facilities, can also contribute to environmental sustainability.

SOCIAL RESPONSIBILITY:

ESG principles in the livestock sector encompass social responsibility, which involves ensuring fair labor practices, supporting the well-being of livestock farmers and workers, and respecting human rights. This can be achieved by providing safe and humane working conditions for employees, promoting animal welfare practices, and supporting local communities through initiatives that enhance their social and economic development. Engaging with stakeholders such as farmers' associations, veterinary experts, and community organisations can further enhance social sustainability in the livestock sector.

GOVERNANCE PRACTICES:

Good governance practices are essential for the sustainable management of livestock operations. This includes transparent and accountable decision-making processes, compliance with regulations and animal welfare standards, and effective monitoring and reporting systems. Implementing traceability systems to track the origin and quality of livestock products can enhance governance practices and ensure responsible sourcing. Engaging with relevant stakeholders, such as industry associations and government agencies, can strengthen governance mechanisms and promote sustainable livestock practices.

SUSTAINABLE FINANCING:

Access to sustainable financing is crucial for the growth and development of the livestock sector. Companies can explore funding options aligned with ESG principles, such as impact investment funds that specifically support sustainable livestock projects. Green bonds and loans can be utilised to finance initiatives that promote sustainable feed production, animal welfare improvements, and renewable energy integration in livestock operations. Investing in research and innovation for sustainable livestock practices can also attract financing and contribute to the sector's long-term viability.

STAKEHOLDER ENGAGEMENT:

Engaging stakeholders is key to the successful implementation of ESG principles in the livestock sector. This includes collaborating with livestock farmers, local communities, NGOs, government agencies, and consumers. Stakeholder engagement can foster knowledge sharing, capacity building, and the development of collaborative initiatives that promote sustainable livestock management practices, responsible sourcing, and support for rural development. Engaging with consumers and providing transparent information about the environmental and social impact of livestock products can build trust and support sustainable consumption patterns.

By embracing ESG principles, livestock companies in Malaysia can enhance their environmental performance, social responsibility, and governance practices. This not only contributes to the sector's long-term sustainability but also aligns with global sustainability goals and meets the expectations of responsible investors and consumers. Embracing ESG principles ensures the livestock sector's resilience and competitiveness in a sustainable-focused global landscape while safeguarding animal welfare, supporting rural communities, and addressing the challenges of food security and climate change.

1.3.4 SUSTAINABLE DEVELOPMENTS GOALS

The livestock sector in Malaysia also plays a significant role in contributing to the achievement of the United Nations Sustainable Development Goals (SDGs). By embracing sustainable practices, the livestock sector can actively contribute to several SDGs, ensuring a more sustainable and resilient future. Here are specific examples of how the livestock sector in Malaysia can align with and support the SDGs:

SDG 2:
ZERO HUNGER -
The livestock sector can contribute to eradicating hunger by promoting sustainable livestock farming practices. This includes implementing efficient feed management, improving animal health and productivity, and supporting small-scale livestock farmers to enhance food security and nutrition for all.

SDG 15:
LIFE ON LAND -
Sustainable land management practices in the livestock sector can contribute to SDG 15. This involves implementing responsible grazing management, preserving natural habitats for livestock, and reducing land degradation. By promoting biodiversity conservation and sustainable land use, the sector can contribute to preserving terrestrial ecosystems.

SDG 6:
CLEAN WATER AND SANITATION -
The livestock sector plays a role in water resource management. By adopting water-efficient livestock watering systems, implementing proper manure management to prevent water pollution, and promoting best practices in water use, the sector can contribute to SDG 6 and ensure the availability and sustainable management of water resources.

SDG 12:
RESPONSIBLE CONSUMPTION AND PRODUCTION -
The livestock sector can contribute to SDG 12 by promoting responsible livestock production practices. This includes reducing the use of antibiotics and growth hormones, implementing animal welfare standards, and adopting sustainable feed sourcing practices. Promoting responsible consumption of livestock products and educating consumers about sustainable choices can further enhance the sector's contribution to this goal.

SDG 13:
CLIMATE ACTION -
The livestock sector is both impacted by and contributes to climate change. By adopting climate-smart livestock management practices, such as improving feed efficiency, implementing methane capture systems from manure, and exploring renewable energy options for livestock operations, the sector can reduce greenhouse gas emissions and build resilience to climate change impacts.

SDG 17:
PARTNERSHIPS FOR THE GOALS -
Collaboration among stakeholders is vital for achieving the SDGs in the livestock sector. By fostering partnerships with government agencies, research institutions, veterinary experts, and local communities, the sector can share knowledge, leverage resources, and develop innovative solutions to address sustainability challenges and promote sustainable livestock practices.

By aligning with the SDGs, the livestock sector in Malaysia can contribute to the country's progress in achieving sustainable development, addressing social and environmental challenges, and ensuring the long-term viability of livestock farming. Embracing sustainable practices, promoting responsible production and consumption, and fostering partnerships will enable the livestock sector to play a crucial role in conserving natural resources, supporting rural livelihoods, and building a sustainable future for all.

1.4 THE NEED FOR GREEN PRACTICES

1.4.1 WHAT ARE GREEN PRACTICES (GP)?

Green Practices are any target or initiative set out by industries that is in line with target outlined in Green Technology Master Plan (GTMP).

Examples of green practices in services sector are:

- Adoption of water treatment technology to treat effluent before discharge
- To convert waste (manure and urine) into biofertiliser, biogas and other resources
- Installation of technologies such as solar panel as source of renewable energy
- Processing of used bedding material as compost
- Use of nature-based solution for pest and odour control
- Use of organic waste such as feed residue for production of black soldier fly (BSF)

1.4.2 GP IN THE SERVICES SECTOR

The livestock sector in Malaysia recognises the importance of adopting green practices to ensure the sustainability of its operations and contribute to global conservation efforts. In addition to the previously mentioned cleaner production, lean manufacturing, and circular economy principles, several other renowned approaches are being implemented in the livestock sector. These approaches further exemplify the commitment of Malaysia's livestock industry to environmental stewardship. Here are some notable examples:

1

SUSTAINABLE LIVESTOCK CERTIFICATION:

Malaysia's livestock sector is embracing internationally recognised certification programmes that ensure responsible and sustainable livestock production. These certifications focus on animal welfare, environmental impact, and responsible use of resources. By obtaining certifications such as Animal Welfare Approved or Global Animal Partnership, livestock farmers demonstrate their commitment to ethical practices and gain access to markets that prioritise animal welfare and sustainability.

2

AGROFORESTRY INTEGRATION:

Livestock farming can be combined with agroforestry practices, where trees and shrubs are integrated into grazing lands. This approach provides shade for livestock, improves soil health, and contributes to carbon sequestration. Agroforestry systems offer multiple benefits, including enhanced biodiversity, reduced soil erosion, and improved water management.

3

PRECISION LIVESTOCK FARMING:

Precision farming technologies can also be applied in the livestock sector to optimise resource use and reduce environmental impact. Sensors, data analytics, and automation can monitor and manage aspects such as feed consumption, water usage, and animal health. Precision livestock farming enables more efficient resource allocation, reduces waste, and minimises the environmental footprint of livestock operations.

4

MANURE MANAGEMENT AND BIOGAS PRODUCTION:

Livestock manure management is a critical aspect of sustainable livestock farming. Implementing anaerobic digestion systems can convert manure into biogas, a renewable energy source. This reduces greenhouse gas emissions, improves waste management, and provides an additional source of income through the generation of biogas for on-farm energy use or for sale to the grid.

5

GRAZING MANAGEMENT AND ROTATIONAL GRAZING:

Effective grazing management practices can optimise livestock grazing patterns to improve soil health, prevent overgrazing, and promote vegetation regrowth. Rotational grazing systems involve moving livestock between different grazing areas, allowing for better pasture management, nutrient distribution, and the regeneration of vegetation.

6

FARMER EDUCATION AND KNOWLEDGE EXCHANGE:

Farmer education programs and knowledge exchange platforms facilitate the adoption of sustainable livestock practices. These initiatives provide training on animal welfare, responsible antibiotic use, feed management, and sustainable land management. Farmers learn from experts and share experiences, fostering the dissemination of sustainable livestock techniques and promoting continuous improvement in the sector.

By incorporating these various approaches alongside cleaner production, lean manufacturing, circular economy principles, and sustainable supply chain practices, Malaysia's livestock sector is striving to achieve the objectives outlined in the Green Technology Master Plan (GTMP). These efforts not only contribute to environmental conservation but also enhance the sector's long-term viability, promote market access for sustainably produced livestock products, and support the well-being of livestock farmers and the broader economy.

1.4.3 EXISTING NATIONAL POLICIES & GUIDELINES

The livestock sector in Malaysia operates within a framework of national policies and guidelines that promote sustainable development and ensure the protection of animal welfare and the environment. These regulations and standards provide a regulatory foundation for responsible livestock management practices. Here are some key policies and guidelines relevant to the sector:

1. **LIVESTOCK WASTE MANAGEMENT:** The Department of Environment has introduced statutes and subsidiary legislations to regulate livestock waste management. The Environmental Quality Act 1974 and Environmental Quality Regulation 1979 set standards and requirements for the proper handling and disposal of animal waste to minimise its impact on water and air quality. These regulations aim to prevent pollution and promote sustainable waste management practices.

2. **ECONOMIC CONTRIBUTION:** The livestock sector, as part of the agriculture industry, plays a significant role in Malaysia's economy. It contributes to the country's Gross Domestic Product (GDP) and provides employment opportunities, particularly in rural areas. The sector's contributions to employment, export earnings, and GDP highlight its importance in sustaining livelihoods and driving economic growth.

3. **RURAL DEVELOPMENT FOCUS:** Recognising that the majority of farmers in the livestock sector reside in rural areas, policies and initiatives are needed to uplift sustainability and economic well-being in these regions. By directing resources and support to rural communities, the government can enhance the socio-economic conditions of farmers, improve infrastructure, and promote sustainable practices in the livestock sector.

4. **GOOD ANIMAL HUSBANDRY PRACTICES:** Livestock farmers are encouraged to follow Good Animal Husbandry Practices (GAHP) as outlined in the MS 2027:2018 standard. These practices focus on animal welfare, health management, and responsible use of resources. By adhering to GAHP, farmers ensure the well-being of their livestock and minimise environmental impacts.

5. **MALAYSIA GOOD AGRICULTURAL PRACTICES (MYGAP):** The livestock sector is also covered under the Malaysia Good Agricultural Practices (MyGAP) scheme. MyGAP recognises farms that adhere to best practices in agriculture, including those related to livestock management. The scheme provides guidelines and certifications that demonstrate compliance with sustainable and responsible practices in the livestock sector.

6. **SUPPLY CHAIN SUPERVISION:** The Department of Veterinary Services oversees the supply chain of livestock commodities in Malaysia. This includes monitoring the quality and safety of livestock products, ensuring compliance with regulations, and promoting responsible sourcing and distribution practices. Supervision of the supply chain contributes to the overall sustainability and traceability of livestock commodities.

By adhering to these regulations, standards, and guidelines, the livestock sector in Malaysia can ensure responsible livestock management, minimise environmental impacts, and promote animal welfare. These policies and initiatives support the sector's long-term viability, contribute to rural development, and align with global sustainability goals. Through sustainable livestock practices, Malaysia can strengthen its position as a responsible producer of livestock commodities and meet the expectations of environmentally conscious consumers.

1.4.4 BENEFITS OF GREEN PRACTICES

Green practices in the livestock sector in Malaysia offer numerous benefits that contribute to improved efficiency, reduced resource consumption, and enhanced sustainability. By adopting these practices, the industry can achieve the following advantages:

1. **EFFICIENT FEED MANAGEMENT:** Green practices in livestock farming focus on optimising feed utilisation. Implementing precision feeding techniques, utilising balanced diets, and incorporating alternative protein sources can improve feed efficiency, reduce waste, and minimise the environmental impact associated with feed production and consumption. For example, incorporating locally sourced and sustainable feed ingredients can reduce the carbon footprint of livestock production.

2. **SUSTAINABLE MANURE MANAGEMENT:** Livestock waste management is a crucial aspect of green practices. Implementing sustainable manure management techniques, such as anaerobic digestion or composting, can minimise the release of greenhouse gases and nutrient runoff into water bodies. These practices contribute to reducing environmental pollution and promoting nutrient recycling for soil health improvement. Additionally, capturing methane gas from livestock manure can be used as a renewable energy source.

3. **ANIMAL HEALTH AND WELFARE:** Green practices prioritise the health and welfare of livestock. Implementing proper animal housing and handling systems, providing access to clean water and nutritious feed, and minimising stressors contribute to healthier animals and improved productivity. Practices such as pasture-based grazing systems or rotational grazing promote natural behaviors and enhance animal well-being. Animal welfare certifications, such as the Farm Animal Welfare Council (FAWC) Five Freedoms or animal welfare auditing programmes, demonstrate a commitment to responsible livestock management.

4. **ENERGY EFFICIENCY:** Green practices in the livestock sector focus on reducing energy consumption. Employing energy-efficient lighting, utilising renewable energy sources such as solar or wind power for farm operations, and optimising heating and ventilation systems can minimise the sector's carbon footprint and operational costs. Utilising energy-efficient equipment, such as water pumps or ventilation systems, also contributes to energy savings.

5. **RESPONSIBLE WATER MANAGEMENT:** Efficient water management practices are essential in livestock farming. Implementing water-saving technologies, such as automated watering systems or water recycling systems, can reduce water usage and minimise the impact on local water resources. Responsible water management contributes to water conservation and supports sustainable agriculture practices. Proper drainage systems can also prevent water pollution from livestock operations.

6. **COLLABORATION AND STAKEHOLDER ENGAGEMENT:** The livestock sector can benefit from collaboration among stakeholders. Engaging with farmers, government agencies, research institutions, and consumers fosters knowledge sharing, best practice exchange, and the development of joint initiatives that promote sustainable livestock management. Collaboration enhances the sector's environmental and social performance while addressing common challenges.

By embracing green practices, the livestock sector in Malaysia can enhance resource efficiency, reduce environmental impacts, and contribute to a more sustainable and resilient industry. These practices align with global sustainability goals, such as the United Nations' Sustainable Development Goals (SDGs) and meet the expectations of responsible consumers and investors. Emphasising environmental stewardship, animal welfare, and resource efficiency ensures the sector's long-term viability and supports a sustainable future for the livestock industry in Malaysia.

	FINANCIAL RESOURCES	HUMAN RESOURCES	TIME RESOURCES
CHALLENGES	May require high capital investment Longer rate of return may have to be expected May increase cost of operation	Specific expertise may be needed New 'green' jobs New SOP may have to be implemented at various stages of the production process	Additional time may be required to implement options that involves equipment, structure or systems modification
EVALUATION	Payback period Return on investment	Competency of staffs Labour cost Trainings Green technology experts	Maximum downtime

Yet, by implementing green options, companies can expect:

BENEFITS	Increased productivity and quality of processes and products	Reduction of environmental impacts	Overall cost reduction through energy and materials saving
	Reduced health and occupational safety risks	Reputation and branding	Enhance confidence of staffs

1.5 OUTCOME FROM GREEN PRACTICES

In order to determined level of GP implemented in an organisation, the initiatives related to GP shall be assessed according to the method described in Chapter 2 in the guideline and results from the assessment shall be translated into the following Star-Rating System:

(60% - 70%)

Comply to all regulatory requirements

Demonstrate leadership in developing systematic environmental reporting practical

(71% - 80%)

Exhibit characteristics of being resource efficient

Demonstrating positive impacts from green practices

Incorporate and implement continuous quality improvement initiatives throughout business operations

(81% - 100%)

Demonstrate integration of governance framework related to sustainability and circular economy

Demonstrate capacity in contributing towards achieving national decarbonisation targets

Demonstrates leadership in developing, expanding and applying new tech related to green practices

2

ASSESSMENT

PART II: ASSESSMENT

2.1 ABOUT THE ASSESSMENT OF GREEN PRACTICES

Green practices in the livestock sector in Malaysia aim to foster innovation, minimise resource usage, eliminate or minimise toxic substances, reduce waste generation, and achieve sustainable farming practices throughout the entire livestock production cycle. While facing certain constraints, the industry recognises the importance of embracing sustainable practices to ensure long-term viability and environmental stewardship.

This guideline has been specifically developed considering the unique capacities, operations, and environmental impacts of the livestock sector. It provides a framework for implementing green practices that are applicable and beneficial across various livestock operations in Malaysia.

The goals of green practices in the livestock sector include:

RESOURCE CONSERVATION:

The industry aims to conserve valuable resources such as water, land, and energy. By implementing sustainable farming practices, including efficient water management, responsible land use, and energy-efficient facilities, livestock farmers can minimise resource waste, protect natural habitats, and reduce the environmental footprint of their operations.

REDUCTION OF HARMFUL PRACTICES:

Green practices focus on minimising the use of harmful practices that can negatively impact animal welfare, environmental health, and public safety. This includes measures such as implementing proper waste management systems to minimise pollution, reducing the use of antibiotics and other chemicals, and promoting responsible animal husbandry practices that prioritise animal welfare and health.

SUSTAINABLE FEED AND NUTRITION:

The livestock sector can embrace sustainable feed and nutrition practices to reduce its environmental impact. This includes promoting the use of locally sourced feed ingredients, reducing reliance on imported feed, and exploring alternative protein sources. Sustainable feed practices aim to minimise deforestation, promote responsible agricultural practices, and reduce greenhouse gas emissions associated with feed production.

The guideline provides general recommendations that can be applied across different livestock sectors within the industry. It emphasises the importance of adopting and implementing green practices in Malaysia's livestock sector. These recommendations enable farmers, ranchers, and livestock producers to develop action plans and implementation strategies tailored to their specific capabilities, operations, and long-term sustainability goals.

By following the outlined steps, livestock companies and farmers can develop comprehensive action plans for integrating green practices into their existing and future livestock operations. The approach takes into account the sector's current capabilities and strategies, ensuring a practical and achievable transition towards sustainability and responsible resource management.

Overall, embracing green practices in the livestock sector in Malaysia is crucial for conserving natural resources, protecting the environment, reducing environmental impacts, and promoting the sector's long-term viability in alignment with global sustainability goals. By adopting sustainable farming practices, the livestock sector can contribute to the sustainable management of resources and ensure a thriving and resilient industry for future generations.

2.2 GUIDELINE IMPLEMENTATION

To successfully integrate green practices into existing operations and processes, manufacturers in the livestock sector are recommended to follow the following three steps:

STAGE 1:
ASSESSMENT

Understanding the Assessment Requirements: Familiarise yourself with the assessment criteria outlined in the Green Practices Data Collection Form (Appendix 2) for the six indicators described in Section 2.3. For the livestock sector, these indicators may include sustainable animal husbandry, resource conservation, waste management, community engagement, traceability, and responsible land use. Refer to the Indicator Instrument Factsheet (Appendix 3) for detailed information on each indicator, including goals, targets, terminologies, data sources, and collection methods specific to the livestock sector.

Gathering Relevant Documents: Collect the necessary documents and records as evidence of green practices implementation in the livestock sector. These may include animal welfare protocols, feed and nutrition plans, waste management records, community engagement initiatives, traceability documentation, and certifications such as animal welfare or sustainable livestock certifications. These documents serve as proof of compliance with responsible livestock practices.

Conducting the Assessment: Evaluate green practices according to the criteria established for each sub-indicator specific to the livestock sector. Present the relevant documents as evidence of implementation during the assessment process. Assign scores based on the criteria and calculate the overall mark for each indicator by multiplying the sum of sub-indicator scores with their assigned weightage. The weightage reflects the applicability and importance of the indicator to the livestock sector. The total score can be translated into a rating system, such as a star rating or a certification label, to communicate the level of sustainability achieved.

STAGE 2:
SET TARGETS FOR IMPROVEMENT

Defining Clear Objectives: Based on the assessment conducted in Stage 1, establish clear objectives that describe the desired outcomes of implementing green practices in the livestock sector. These objectives may include improving animal welfare, reducing environmental impacts, promoting efficient resource use, and enhancing community relationships. Identify areas of improvement required to achieve the objectives based on the assessment results and stakeholder input.

Setting Realistic and Attainable Targets: Align targets for each sub-indicator with the goals and targets outlined in the Indicator Instrument Factsheet and the scoring criteria in the Green Practices Data Collection Form specific to the livestock sector. Assign deadlines or timelines to each target to ensure progress can be measured effectively. These targets may include reducing water and feed usage, implementing responsible breeding practices, or adopting sustainable waste management systems.

STAGE 3:
IMPLEMENT GREEN PRACTICES

Formulating an Action Plan: Develop a detailed action plan that outlines the necessary steps and timelines for implementing green practices in the livestock sector. Refer to the examples provided in Section 2.3 for guidance. Break down the goals into smaller, manageable tasks and assign responsibilities to individuals or teams. Include milestones and performance indicators to track progress effectively. Allocate resources, such as budgets and personnel, to support the implementation efforts, such as investing in animal welfare improvements, optimising feed and nutrition strategies, or adopting sustainable manure management practices.

Engaging Livestock Farmers and Stakeholders: Foster engagement and collaboration with livestock farmers, local communities, and other stakeholders in the sector to drive successful implementation of green practices. Raise awareness about the importance of sustainability in livestock farming and provide training and education on responsible animal husbandry techniques. Encourage farmers to contribute ideas and suggestions for improving sustainability efforts, such as implementing rotational grazing systems or participating in community-supported agriculture initiatives. Recognise and reward environmentally conscious behaviors and achievements to cultivate a culture of sustainability within the livestock sector.

Collaborating with Suppliers and Buyers: Engage with suppliers, buyers, and retailers to promote sustainable practices throughout the livestock supply chain. Encourage them to source from farms that follow responsible farming practices and prioritise suppliers with strong sustainability credentials, such as animal welfare certifications. Collaborate on initiatives such as sharing best practices, supporting traceability systems, and promoting consumer education on sustainable meat and dairy choices.

Measuring, Evaluating, and Improving: as Establish a system for measuring and evaluating the effectiveness of green practices in the livestock sector. Monitor key performance indicators (KPIs) specific to responsible livestock farming, such as animal welfare indices, feed conversion ratios, waste management efficiency, and farmer satisfaction surveys. Regularly review and analyse data to identify areas for improvement and track progress towards sustainability goals. Use this information to refine strategies and adjust implementation plans as needed, ensuring continuous improvement in the livestock sector's green practices.

By following these steps, livestock companies, farmers, and stakeholders can effectively integrate green practices into their operations, promoting sustainability, minimising environmental impact, and contributing to the long-term viability of the livestock sector in Malaysia. Through responsible animal husbandry practices and engagement with stakeholders, the livestock sector can support animal welfare, conserve resources, and ensure a sustainable future for farmers and rural communities.

2.3 INDICATORS

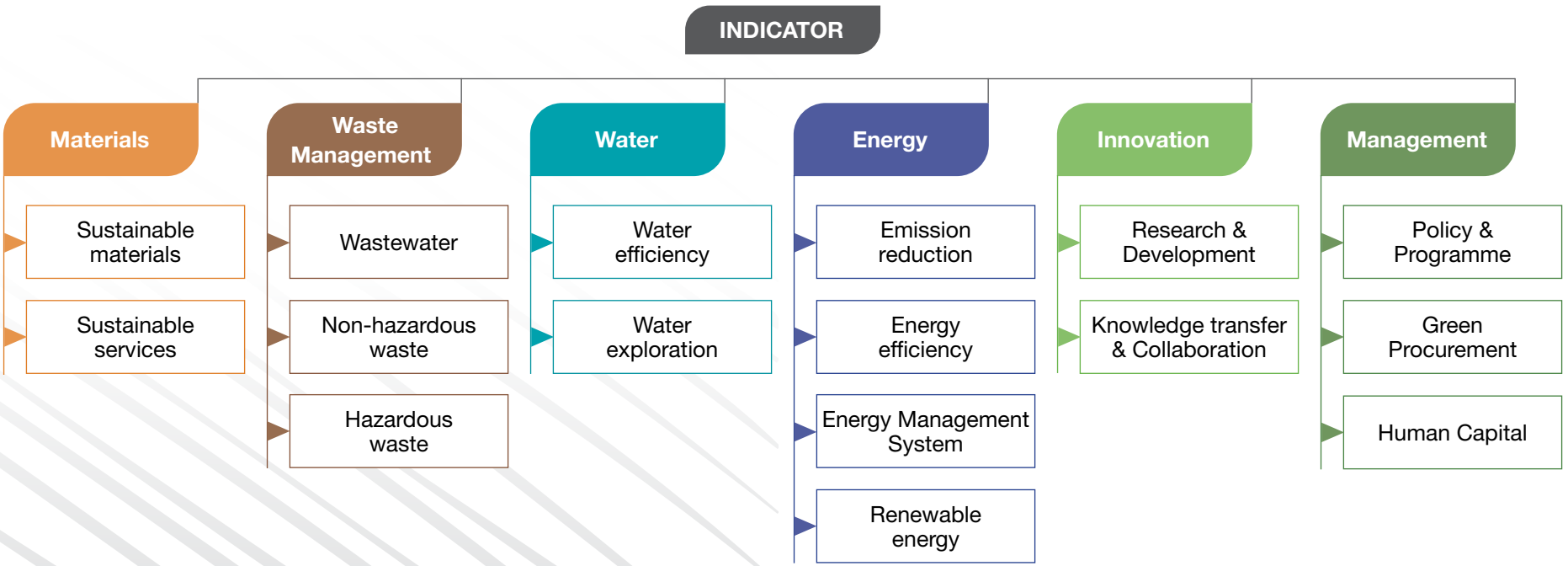
Indicators are crucial for evaluating and comparing the performance of industries in adopting green practices. These indicators provide a standardised framework for assessing the environmental sustainability efforts across various sectors. In order to ensure a comprehensive and meaningful evaluation, a set of six indicators and sixteen sub-indicators have been identified based on three key requirements: applicability, measurability, and representativeness.

The selected indicators and sub-indicators were carefully chosen to capture the key aspects of green practices and their impact on sustainability. Applicability ensures that the indicators are relevant and applicable to a wide range of industries, allowing for consistent evaluation across different sectors. Measurability ensures that the indicators can be quantified or assessed using objective criteria, enabling meaningful comparisons between industries. Representativeness ensures that the indicators encompass a comprehensive set of factors that reflect the overall performance of green practices.

By utilising these indicators, stakeholders can effectively gauge the extent to which industries are implementing green practices and contributing to sustainable development. The indicators provide a structured approach to measure and monitor progress in key areas such as resource conservation, emissions reduction, waste management, and sustainable operations.

These indicators serve as a valuable tool for decision-making, enabling industries to identify areas for improvement, set targets, and track their performance over time. Furthermore, they facilitate benchmarking exercises, allowing industries to compare their performance against sector peers and best practices.

The use of indicators promotes transparency and accountability, enabling stakeholders to assess the environmental performance of industries and make informed choices. It also provides an opportunity for recognition and incentives, as industries that demonstrate strong performance in adopting green practices can be acknowledged and rewarded for their efforts.



2.3.1 MATERIALS

The Material Indicator for Green Practices focuses on the responsible and sustainable management of materials utilised across industries. Industries use various types of materials in their processes, with some relying exclusively on virgin materials while others incorporate recycled materials. The efficient consumption of materials is essential for the long-term survival and success of industries, as it directly impacts resource availability and overall material efficiency.

The Material Indicator within the Green Practices framework encompasses two sub-indicators: Sustainable Materials and Sustainable Services.

SUSTAINABLE MATERIALS:

This sub-indicator assesses the demonstration of purchasing and utilisation practices related to sustainable materials within industries. It requires industries to showcase a clear direction and vision towards sustainable materia utilisation, along with the implementation of self-regulation measures that align with sustainability goals. Additionally, recognition or certification from reputable third-party entities or certification bodies further validates the commitment to sustainable material practices.

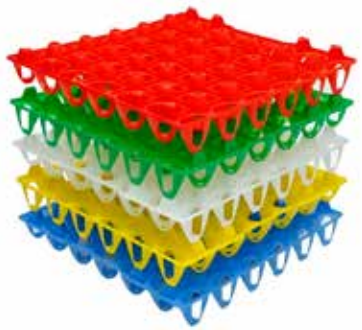
SUSTAINABLE SERVICES:

This sub-indicator evaluates the purchase and utilisation of sustainable services within industry operations. It encourages industries to demonstrate a specific direction and vision regarding the use of sustainable services. The implementation of self-regulation measures that align with sustainability goals should be evident, and recognition or certification from reputable third-party entities or certification bodies can further validate the adherence to sustainable service practices.

By addressing the Material Indicator and its sub-indicators, industries can enhance their material management practices, promoting the use of sustainable materials and services. This not only supports environmental conservation and resource preservation but also aligns with industry-wide sustainability goals. It demonstrates a commitment to responsible material utilisation and contributes to the long-term viability and success of industries across diverse sectors.

The scope for Material in Livestock sector includes two (2) sub-indicators; Sustainable Materials and Sustainable Services.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	EXAMPLE GREEN PRACTICES
SUSTAINABLE MATERIALS	Demonstration on purchase or use of sustainable materials	• Company sustainability report • Organisation sustainability policies • Sustainability monitoring activity • Certification or recognition of sustainable material	• Waste from other sectors can be converted into animal feed. Biological odour repellents like effective microorganisms (EM) can replace chemical odour repellents.
SUSTAINABLE SERVICES	Demonstration on purchase or use of sustainable services	• Company sustainability report • Organisation sustainability policies • Sustainability monitoring activity • Certification or recognition of sustainable material	• Use precision farming to minimise waste, optimise resource use, and increase productivity in livestock operations. Practice sustainable grazing and pasture management to preserve soil health, biodiversity, and carbon sequestration.



2.3.2 WASTE

Waste refers to any material that is discarded or released by the generator or holder, posing various environmental risks based on its chemical composition and physical state. In green practices, the focus is on prevention or reduction of waste at its source, employing strategies and approaches distinct from end-of-pipe treatment.

The definition of industrial waste, as stated in Section 2 of the Environmental Quality Act 1974 (Act 127) and Regulations, encompasses matter prescribed as scheduled wastes or any solid, semi-solid, liquid, gas, or vapor emitted, discharged, or deposited in the environment in quantities, compositions, or manners that cause pollution.

Implementing an effective waste management plan necessitates strategic measures that encompass all stages of waste management. Manufacturers should conduct a thorough analysis of the current collection, handling, treatment, and disposal processes to identify existing or potential issues. Based on this assessment, specific goals and action plans can be developed and implemented, with regular monitoring and review to ensure progress.

The waste management plan should also prioritise the enhancement of stakeholders' knowledge through the effective dissemination of technical information and research findings concerning the environmental impacts of the waste generated. By promoting awareness and understanding, stakeholders can actively participate in waste reduction and proper waste management practices.

To guide waste management efforts, the following goals and targets have been established:

- By 2030, achieve 100% recycling of sludge.
- By 2030, recycle 33% of treated effluent.
- By 2025, achieve a 40% recycling rate of solid waste from total non-hazardous waste generated.
- By 2030, achieve a 50% recycling rate of hazardous waste from the total hazardous waste generated.
- By 2025, completely eliminate waste disposal in landfills.
- By 2030, establish 180 biogas capture facilities.

These goals provide clear targets for waste reduction, recycling, and resource recovery, contributing to the overall objective of sustainable waste management. By striving to meet these targets, manufacturers can significantly reduce their environmental impact, conserve resources, and promote a circular economy approach in the handling of waste.

The scope for Waste in Livestock sector includes three (3) sub-indicators; Wastewater, Non-hazardous and Hazardous waste.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	EXAMPLE GREEN PRACTICES
WASTEWATER	Targeted percentage of water recycling achieved by the organisation Targeted percentage of wastewater sludge recovery achieved by the organisation	Records on monitoring effluent discharge flow, recycling flow, and sludge recovered	• Use effective microorganisms (EM) in water treatment ponds to enhance denaturation. • Monitor and increase the production of recovered water for internal use. Utilise sludge as fertiliser and monitor its application to prevent landfill disposal.
NON-HAZARDOUS	Targeted percentage of non-hazardous waste recycled achieved by the organisation Number of biogas capture facility within the organisation	Records on monitoring non-hazardous waste generated and recycled in the organisation Number of biogas facility	• Use precision farming to minimise waste, optimise resource use, and increase productivity in livestock operations. Practice sustainable grazing and pasture management to preserve soil health, biodiversity, and carbon sequestration.
HAZARDOUS WASTE	Targeted percentage of hazardous waste recycled achieved by the organisation	Records on monitoring hazardous waste generated and recycled in the organisation	• Implement an effective air filtering system to capture and remove toxic materials such as NH3, H2S gas, and dust. Prioritise the use of less hazardous chemical processes, such as phyto-based detergents and bio-based pesticides, whenever possible.



2.3.3 WATER

Water scarcity and quality issues are prevalent despite water covering over two-thirds of the Earth's surface and being renewable on a global scale. Local shortages and degradation of water bodies occur frequently, posing significant challenges. With increasing demand, the withdrawal of water for industrial processes without returning it to the same water source in its original quantity and quality can lead to severe depletion of rivers, lakes, and groundwater tables.

Certain industrial processes and products necessitate the use of water, which may vary in quality requirements. While water may not be directly consumed in the production process, it is often indirectly utilised for cooling, heating, or washing purposes. Enhancing the rate of recirculation and minimising evaporation can substantially reduce the overall water consumption, lessening the reliance on municipal water supplies, groundwater sources, or surface waters. It is recommended that facilities accurately measure and monitor the amount of water being recycled or recirculated within their operations.

By prioritising water conservation measures, industries can mitigate the impact on local water resources and contribute to sustainable water management. Implementing efficient water usage practices, such as optimising recirculation systems, reducing water losses, and implementing technologies that minimise water requirements, can help decrease water consumption and preserve water resources. Additionally, adopting water management strategies that prioritise water reuse and recycling can further contribute to sustainable water practices.

Considering the finite nature of freshwater resources, industries play a crucial role in promoting responsible water stewardship. By implementing measures to reduce water demand, enhance recycling and recirculation, and monitor water usage, industries can contribute to the conservation and sustainable management of this vital resource, ensuring its availability for future generations.

The scope for Water in Livestock sector includes two (2) sub-indicators; Water Efficiency and Water Exploration

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	EXAMPLE GREEN PRACTICES
WATER EXPLORATION	Targeted percentage of alternative water used by the organisation	Records on monitoring city water and alternative water use	• Implement rainwater harvesting to conserve water. Install facilities for alternative water sources utilisation (e.g., wells, rivers).
WATER EFFICIENCY	Targeted percentage of water consumption reduction achieved by the organisation	Records on monitoring city water use	• Implement rainwater harvesting to reduce water usage. • Use precision water feeding for animals to minimise water consumption. Employ dry cleaning technique for livestock manure to conserve water.

2.3.4 ENERGY

Energy consumption plays a pivotal role in achieving decarbonisation and driving green practices in industries. Globally, electricity and power generation continue to be major contributors to greenhouse gas (GHG) emissions. Therefore, focusing on energy efficiency and transitioning to low-carbon energy sources is crucial for sustainable development.

The adoption of electrification is gaining momentum in numerous decarbonisation efforts. By shifting from traditional fossil fuel-powered systems to electric alternatives, industries can significantly reduce their carbon footprint. Electric vehicles (EVs), for instance, offer a greener transportation solution compared to internal combustion engine (ICE) vehicles. Furthermore, integrating renewable energy sources such as solar, wind, hydro, and geothermal power into electricity generation is essential for reducing reliance on fossil fuels and achieving a cleaner energy mix.

In Malaysia, the planned National Energy Policy includes ambitious targets to increase the generation of renewable energy from sources like solar, biomass, and biogas. This renewable energy capacity expansion aligns with the nation's commitment to reducing carbon intensity and achieving sustainable energy practices.

To drive decarbonisation and achieve long-term environmental sustainability, industries must prioritise energy-saving measures and the adoption of energy-efficient technologies. This includes optimising manufacturing processes, implementing smart energy management systems, and investing in energy-efficient equipment. Additionally, exploring innovative solutions like energy recovery systems, waste heat utilisation, and energy conservation initiatives can contribute to significant energy savings and emissions reduction.

By setting clear goals and targets, such as those outlined in the Nationally Determined Contribution (NDC), industries can actively contribute to the national and global efforts of reducing carbon intensity. Meeting the NDC target of carbon intensity reduction by a certain percentage compared to a baseline year demonstrates the commitment to sustainable practices and aligns with the broader goals of the Paris Agreement.

Energy plays a critical role in decarbonisation and achieving green practices in industries. By embracing electrification, adopting renewable energy sources, and implementing energy-saving measures, industries can drive the transition to a low-carbon economy, reduce GHG emissions, and contribute to a sustainable and resilient future.

The scope for Energy in Livestock sector includes four (4) sub-indicators; Energy Efficiency, Renewable Energy, Energy Management System and Emission Reduction.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	EXAMPLE GREEN PRACTICES
ENERGY EFFICIENCY	Targeted percentage of electricity and fuel consumption reduction achieved by the organisation	• Meter energy usage readings • Bills of quantities for fuels • COA for fuels	• Implement greenhouse gas inventory for fuel use in plantations. • Install electricity control system for reduced consumption. Decrease fuel usage in heating and vehicles.
RENEWABLE ENERGY	Targeted percentage of renewable energy used by the organisation	• Meter energy usage readings • Bills of quantities for fuels • COA for fuels	• Install solar panels to reduce electricity consumption • Utilise biomass waste as an alternative energy source
ENERGY MANAGEMENT SYSTEM	Demonstration of an Energy Management System setup within the organisation	Records supporting the setup, operation, and performance achieved by the Energy Management System	• Develop systematic energy management procedures to identify and adopt energy-saving technologies.
EMISSION REDUCTION	Targeted percentage of emissions reduction achieved by the organisation	GHG Inventory reports	• Utilise biofuels or electric vehicles for transportation to reduce emissions. • Implement greenhouse gas inventory for fuel use

2.3.5 INNOVATION

Innovation plays a crucial role in driving green practices within the industry as manufacturers strive to adapt their business processes and activities to meet the demands of a competitive global market. By prioritising innovation, businesses can develop marketable, viable, and effective products that align with sustainability objectives.

One of the key indicators of innovation in green practices is research and development (R&D) efforts focused on green technology. Manufacturers invest in R&D to explore and develop innovative solutions that improve environmental performance and reduce the ecological footprint of their operations. This includes advancements in energy-efficient processes, waste reduction techniques, sustainable materials, and eco-friendly manufacturing methods.

Additionally, innovation in green practices encompasses the product development phase, which involves incorporating green product design principles. Manufacturers aim to create products that have minimal environmental impact throughout their lifecycle, from sourcing and production to use and disposal. This involves considering factors such as energy efficiency, recyclability, reduced resource consumption, and the use of environmentally friendly materials.

Setting goals and targets for innovation in green practices can drive organisational progress. Establishing robust research and development processes, output, and policies enables organisations to streamline their innovation efforts and focus on sustainable solutions. Increasing investment and incentives to support innovation in green practices further promotes the commercialisation of environmentally friendly products. This can involve securing intellectual property rights, receiving awards and recognition, and fostering a culture of innovation within the organisation.

Strategic partnerships, collaborations, joint ventures, and knowledge transfer programmes are also vital for fostering innovation in green practices. By collaborating with other organisations, sharing knowledge and expertise, and leveraging collective resources, manufacturers can accelerate the development and implementation of sustainable solutions. These partnerships can lead to the commercialisation of innovative green products, technologies, and practices.

In conclusion, innovation is a critical measure of green practices in the industry. By prioritising research and development efforts, incorporating green product design principles, and establishing strategic partnerships, manufacturers can drive the adoption of sustainable solutions, reduce their environmental impact, and contribute to a greener and more sustainable future.

The scope for Innovation in Livestock sector includes two (2) sub-indicators; Knowledge Transfer and Collaboration and Research and Development (R&D).

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	EXAMPLE GREEN PRACTICES
KNOWLEDGE TRANSFER AND COLLABORATION	Demonstration of knowledge transfer and strategic collaboration occurring in the organisation	Records and documentations such as MOUs, MOAs, IPs, etc.	• Establish mentoring system with national and international experts. • Create knowledge sharing platforms through forums and workshops.
RESEARCH AND DEVELOPMENT (R&D)	Demonstration of R&D activities occurring in the organisation	Records and documentations such as organisation chart, procedures, blueprints, proposals, etc.	• Implement regenerative agriculture techniques for improved soil health and biodiversity. • Utilise methane digesters to convert livestock manure into renewable energy. • Apply precision livestock farming (PLF) techniques for optimised animal health and productivity. • Use alternative protein sources in animal feed to reduce reliance on resource-intensive crops. Practice grass-fed livestock farming for sustainable and eco-friendly production.

2.3.6 MANAGEMENT

Management plays a crucial role in driving and implementing green practices within the industry. The administration of an organisation, company, or business is responsible for creating forward-thinking policies and strategies that support the development of a more sustainable form of business. By embracing environmentally responsible practices, businesses can minimise the negative impacts of their manufacturing processes on the environment and contribute to a greener future.

Going beyond compliance with legal requirements, being environmentally responsible means investing in human capital and adopting management practices that actively contribute to the industry's green initiatives. This involves fostering a culture of sustainability within the organisation, where all stakeholders, including employees and customers, are engaged in reducing environmental impacts. Effective management practices focus on integrating sustainable principles into decision-making processes, resource allocation, and operational strategies.

The global shift towards a green economy, driven by ESG frameworks and investment systems, is transforming the landscape of job creation, skills development, and job quality. Businesses that prioritise green practices and demonstrate commitment to environmental sustainability are better positioned to thrive in this evolving economic landscape. By proactively adopting green manufacturing principles, manufacturers can align their initiatives with the goal of achieving a greener future.

Manufacturers have the flexibility to choose and prioritise their initiatives within the realm of green manufacturing based on their level of readiness and business objectives. This includes focusing on green energy solutions, developing green products, and implementing green processes. By incorporating renewable energy sources, reducing carbon emissions, and optimising resource usage, manufacturers can enhance their environmental performance while improving operational efficiency.

The government has developed various initiatives to support and propel the adoption of green practices in the industry. Programmes such as the MyHijau SME & Entrepreneur Development Programme, Energy Audit Grant for the industrial sector, Energy Management Gold Standard (EMGS), Enhanced Time of Use tariff (EToU), and ISO14001 certification provide valuable resources and incentives for businesses to embrace sustainability. These initiatives encourage manufacturers to actively engage in green practices, implement energy-saving measures, adopt environmentally friendly technologies, and strive for continuous improvement in their environmental performance.

In conclusion, effective management practices are essential for driving green practices within the industry. By adopting forward-thinking policies, fostering a culture of sustainability, and embracing green initiatives, businesses can minimise their environmental footprint, meet the demands of a changing economic landscape, and contribute to a more sustainable future.

The scope for Management in Livestock sector includes three (3) sub-indicators; Green Procurement, Policy & Programme and Human Capital.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	EXAMPLE GREEN PRACTICES
GREEN PROCUREMENT	Demonstration of green procurement practices occurring in the organisation	Records and documentations such as policies and standards, agreements, purchase records, etc.	• Implement return policy for green procurement. • Purchase and retain documents for environmentally friendly products. • Include environmental requirements in contracts with suppliers. • Establish mechanism to measure suppliers' greenhouse gas emissions.
POLICY AND PROGRAMME	Demonstration of policies and programmes practices occurring in the organisation that support Green Practices	Records and documentations such as MOUs, MOAs, IPs, etc.	• Promote recycling and reuse practices for responsible consumption. • Develop green policies and standards to integrate sustainability. • Implement return policy for sustainable livestock practices. • Maintain proper documentation on sustainable livestock practices.
HUMAN CAPITAL	Demonstration of a human capital development programme in the organisation that support Green Practices	Records and documentations such as policies and standards, records of training, etc.	• Enable workforce to become competent in environmental management and green practices. • Stimulate creation of green jobs through policies and systems. • Integrate green practices into human resource functions and management. • Establish career paths for environmental protection and climate action roles.

3

IMPLEMENTATION OF GREEN PRACTICES

3.1 INDICATOR ALIGNMENT

In this section, a framework is introduced to help industries in recognising the various certificates, recognitions and benefits that exists within Malaysia. Using this framework, the forest operation sector can refer to the specific guidelines and best practices that support the application of green practices in the industry. Forest Operation sector can also refer to the indicators that align with the various existing initiatives.

EXISTING INITIATIVES	AGENCY/ INSTITUTIONS REFERENCE	DESCRIPTION	CRITERIA FOR ASSESSMENT	GREEN PRACTICES INDICATOR	BENEFITS	REFERENCE (SCAN FOR LINK)
GREEN INVESTMENT TAX ALLOWANCE (GITA)	MIDA	Incentive or companies that undertake Green Technology projects involving capital investments.	Renewable Energy RE Energy Efficiency (EE); Green Building; Green Data Centre; Integrated Waste Management		Tax allowance	
GREEN INCOME TAX EXEMPTIONS (GITE)	MIDA	Incentive for companies that carry out services which support the implementation and operation of Green Technology projects.	Renewable Energy (RE); Energy Efficiency (EE); Green Building; Green Data Centre; Green Certification and Verification; Green Township; Electrical Vehicle		Tax exemptions	
MyHIJAU MARK	MGTC	A government initiative to promote the sourcing and purchasing of green products and services in Malaysia.	Existing Green Label Certification, or Performance Standard Compliance report from an independent certification body that meets the minimum standards recognised by MGTC		Eligibility for Government Green Procurement (GGP), Green Private Purchasing (GPP), and may be eligible for GITA or GITE	
ECO-LABELLING SCHEME	SIRIM	This labelling gives eco-friendly products a competitive advantage over similar products.	Compliance with product standards or specifications and the relevant eco-labelling criteria, as well as relevant provisions in the Environmental Quality Act		Boost acceptance of products in international “green markets” that favour green products with a price premium	

EXISTING INITIATIVES	AGENCY/ INSTITUTIONS REFERENCE	DESCRIPTION	CRITERIA FOR ASSESSMENT	GREEN PRACTICES INDICATOR	BENEFITS	REFERENCE (SCAN FOR LINK)
ANUGERAH INDUSTRI HIJAU	Dept. of Environment (DOE)	An initiative by the DOE to provide special recognition and encouragement to SMEs for the efforts of implementing green industry practices.	Green activities and initiatives on water usage, electricity, fuel, raw materials, packaging materials, waste production, product lost, raw materials lost and wastewater production		Improved reputation and branding	
NATIONAL ENERGY AWARDS	MGTC	A platform to provide recognition and rewards to Malaysia's industry leaders in the growing green technology related products, services and energy services sectors for adopting and implementing sustainable energy practices.	Energy Efficiency (EE), Renewable Energy (RE)		International recognition and eligible to represent Malaysia at the annual ASEAN Energy Awards, Southeast Asia's highest energy awards	
PRIME MINISTER'S HIBISCUS AWARDS	ENSEARCH, FMM & MICCI with recognition from KASA	Provide an opportunity for public recognition of businesses and industry's environmental commitment, management, and performance	Leadership; Priority and commitment; Managing environmental issue; Training and communication; Legal and other compliance; Environmental emergencies; Employee participation; Supply chain; Environmental social programme; Environmental accounting; Eco-design; Carbon footprint		National recognition with a Plague and Certificate of Participation, and eligibility to include award's logo for promotional activities	
NATIONAL GREEN TECHNOLOGY POLICY (NGTP)	KASA *previously developed under KeTTHA	This policy recognises green technology as a driver to accelerate the national economy and promote sustainable development	Energy sector; Building sector; Water and waste management sector; Transportation sector		Reduction in the rate of GHG emission	

EXISTING INITIATIVES	AGENCY/ INSTITUTIONS REFERENCE	DESCRIPTION	CRITERIA FOR ASSESSMENT	GREEN PRACTICES INDICATOR	BENEFITS	REFERENCE (SCAN FOR LINK)
LOW CARBON CITIES FRAMEWORK (LCCF)	KASA	Provide framework to achieve sustainable development that will help in reducing carbon emissions by measuring the impact of development decisions in terms of carbon emissions and abatement.	Urban Environment; Urban Transport; Urban Infrastructure; Building		Reduction performance will be awarded an environmental performance rating	
FEED-IN TARIFF (FIT)	SEDA	Mechanism under the Renewable Energy Policy to catalyse generation of Renewable Energy (RE) up to 30 MW in size.	Biogas; Biomass; Small Hydropower; Solar Photovoltaic		Reduce CO_2 emissions and secure domestic energy supply, and guarantee investment security for renewable energy investors	
GREEN ELECTRICITY TARIFF (GET)	KeTSA	Encourage the use and purchase on green electricity from large scale solar and hydroelectric plants along with supporting the nation aspiration in reducing the net-zero GHG emission by 2050.	Residential customer (100kWh per block); Non-residential customer (1000kWh per block)		Subscribers able to receive Malaysia Energy Certificate (mREC) based on international REC standards and exempted from ICPT charge	
MALAYSIA ELECTRICITY SUPPLY INDUSTRY TRUST ACCOUNT (MESITA)	KeTSA	Funding for programmes or projects that support the development of national power industry including renewable energy R&D, human resource and energy efficiency.	Electricity supply		Funding for programmes and projects	
ENERGY MANAGEMENT GOLD STANDARD (EMGS)	MGTC	Certification system delivered under the ASEAN Energy Management Scheme (AEMAS) based on excellence in energy management.	Energy management		Recognised as a leader in energy management	

3.2 TOWARDS GREEN RECOGNITION

This guideline presents recommendations and proposed actions for the livestock sector to implement green practices in their daily operations. It is driven by the vision of establishing a Sustainable Livestock Certification that recognises and rewards sustainable practices within the industry.

To support the livestock industry in implementing green practices, a comprehensive Sustainable Livestock Certification Roadmap has been developed. This roadmap serves as a strategic guide, assisting livestock farmers and businesses in adopting and implementing sustainable practices within their operations. It provides a structured approach to ensure that the industry is equipped with the necessary knowledge and resources to effectively integrate green practices.

The long-term goal is to enable livestock players who have successfully implemented green and best practices to apply for the Sustainable Livestock Certification. This certification would serve as a formal recognition of their commitment to sustainability and environmental stewardship. As part of the proposed roadmap, livestock players meeting the eligibility criteria for the Sustainable Livestock Certification may also benefit from proposed financing incentives and support.

By establishing the Sustainable Livestock Certification and associated benefits, the industry is encouraged to prioritise and embrace sustainable practices. This initiative not only acknowledges the efforts of the livestock industry in adopting green practices but also serves as a catalyst for knowledge sharing and collaboration across the sector. Ultimately, the Sustainable Livestock Certification aims to drive widespread adoption of sustainable practices, promote environmental protection, and contribute to the overall sustainability goals of the livestock sector in Malaysia.

Examples of recommended green practices for the livestock sector include:

1. **ANIMAL WELFARE:** Implementing responsible animal husbandry practices that prioritise the well-being and humane treatment of livestock, including proper housing, nutrition, and healthcare.

2. **SUSTAINABLE FEED MANAGEMENT:** Using feed ingredients that are sourced sustainably, reducing reliance on unsustainable feed sources, and optimising feed conversion ratios to minimise environmental impact.

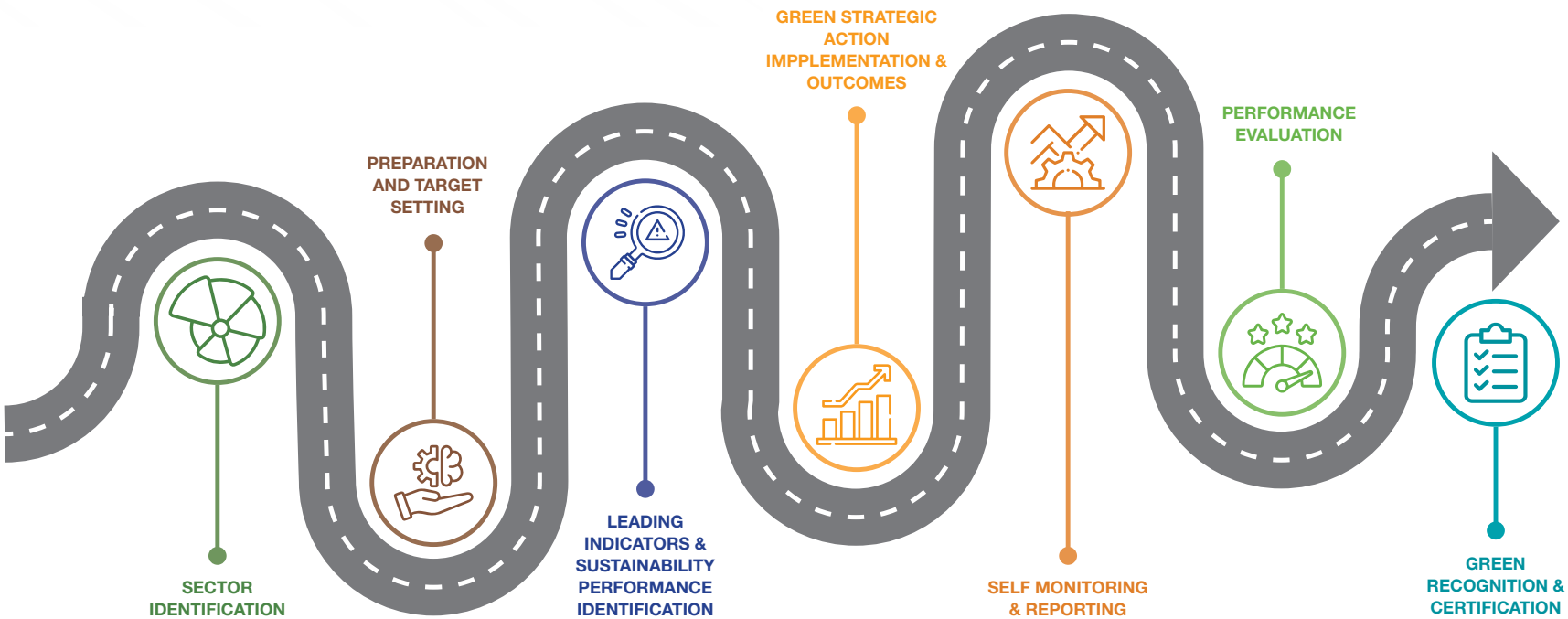
3. **WASTE MANAGEMENT:** Implementing efficient waste management systems, such as anaerobic digesters or composting, to minimise waste generation and promote nutrient recycling.

4. **GRAZING MANAGEMENT:** Employing rotational grazing systems, practicing managed intensive grazing, and implementing pasture management strategies to improve soil health, reduce erosion, and optimise forage utilisation.

5. **WATER EFFICIENCY:** Implementing water-saving measures, such as proper watering systems, leak detection, and water recycling, to minimise water usage and conserve water resources.

6. **COMMUNITY ENGAGEMENT:** Collaborating with local communities, supporting local livestock markets, and promoting fair trade practices to enhance social and economic well-being, foster local food systems, and strengthen connections between farmers and consumers.

By adopting these green practices, the livestock sector in Malaysia can enhance environmental sustainability, promote animal welfare, conserve natural resources, support rural communities, and contribute to the achievement of national and global sustainability goals.



3.3 WAY FORWARD

To remain competitive and contribute to environmental protection in the livestock sector, businesses must proactively adopt green practices and integrate ESG factors into their operations. This includes implementing sustainable livestock farming practices, disclosing ESG initiatives, transitioning to renewable energy sources for livestock activities, reducing carbon emissions, and exploring green financing and investment opportunities.

The integration of ESG disclosure in the livestock sector allows companies to communicate their environmental initiatives, such as implementing responsible animal husbandry practices, managing livestock waste efficiently, conserving water resources, and promoting animal welfare. Effective ESG disclosure enhances a company's reputation, attracts socially conscious investors, and ensures compliance with regulatory requirements.

By considering ESG factors alongside financial performance, the livestock sector can assess its environmental impact, social responsibility, and governance practices. This holistic approach ensures alignment with sustainable development goals, investor expectations, and industry requirements, strengthening the long-term sustainability and resilience of businesses.

Embracing ESG factors and integrating green practices in the livestock sector not only demonstrates environmental stewardship but also provides a competitive edge in the market. By adopting sustainable livestock farming practices, reducing environmental impact, and addressing ESG considerations, businesses can secure their long-term viability, attract investment, and contribute to a sustainable and resilient livestock industry.

By incorporating ESG disclosure, forest companies can communicate their environmental initiatives, such as implementing sustainable logging practices, implementing waste reduction measures, utilising renewable energy sources in operations, and undertaking efforts to mitigate climate change. Effective ESG disclosure enhances a company's reputation, attracts socially conscious investors, ensures regulatory compliance, and contributes to long-term value creation.

In evaluating the long-term sustainability and resilience of forest businesses, it is crucial to consider ESG factors alongside financial performance. This holistic approach enables companies to assess their environmental impact, social responsibility, and governance practices, ensuring alignment with sustainable development goals, investor expectations, and regulatory requirements.

Examples of green practices and ESG factors in the livestock sector include:

1. **SUSTAINABLE LIVESTOCK FARMING:** Implementing pasture-based systems, practicing rotational grazing, providing access to open spaces, and using natural feed sources to promote animal welfare, reduce environmental impact, and support regenerative agriculture.

2. **WASTE MANAGEMENT:** Implementing efficient waste management systems, such as anaerobic digesters or composting, to minimise waste generation, promote nutrient recycling, and reduce greenhouse gas emissions from livestock waste.

3. **WATER CONSERVATION:** Adopting water-saving techniques, such as efficient watering systems and proper water management, to minimise water usage and protect water resources.

4. **BIODIVERSITY PROTECTION:** Preserving natural habitats, creating wildlife-friendly areas, implementing agroforestry practices, and promoting biodiversity conservation within livestock farming operations.

5. **SOCIAL RESPONSIBILITY:** Ensuring fair labour practices, supporting the well-being of farmers and farmworkers, promoting gender equality and diversity, and engaging with local communities to foster sustainable livestock farming and enhance social resilience.

6. **RENEWABLE ENERGY ADOPTION:** Transitioning to renewable energy sources, such as solar panels or bioenergy systems, for powering livestock facilities, reducing reliance on fossil fuels, and lowering carbon emissions.

By adopting these green practices and integrating ESG factors, the livestock sector can enhance environmental sustainability, promote animal welfare, conserve natural resources, support rural communities, and contribute to the achievement of national and global sustainability goals.

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GENERATION OF BIOGAS FROM LIVESTOCK

CASE STUDIES

DESCRIPTION:

This study focuses on the implementation of biogas plants in animal farms in Malaysia as a waste management system. Biogas plants use animal manure to produce biogas, which can be used as a source of energy for cooking, incineration, and electricity generation. The effluent from the biogas digester is also used as organic fertiliser. The study evaluates the current status of biogas plants based on livestock waste in Malaysia until 2018.

RESULTS:

Fifteen biogas plants based on livestock waste were developed in Malaysia by 2018. These plants were primarily aimed at domestic use, with seven on cattle farms, four on pig farms, three on poultry farms, and one on a buffalo farm. However, only 40% of the biogas plants were still functional, while 60% were dormant or nonfunctional due to various factors such as poor maintenance, design errors, lack of technical knowledge, improper planning and monitoring, and insufficient livestock waste for continuous biogas production. The construction costs of the biogas plants ranged from MYR4,500 to MYR30 million.

CONCLUSION:

The adoption of biogas technology in Malaysia's livestock sector has remained low despite efforts to promote it. The government and relevant stakeholders need to take concerted efforts to encourage farmers to implement biogas systems as a waste management solution. Further studies are being conducted to assess the feasibility and viability of biogas plants for livestock waste treatment. Government support, including incentives and subsidies for farmers, can play a crucial role in promoting the adoption of biogas technology and reducing environmental pollution while increasing farm profits.

APPENDIX

GLOSSARY

ASSESSOR

An individual or a group of people being assigned to conduct a green practices assessment to measure level green practices performance of an organisation.

CIRCULAR ECONOMY

A circular economy is an economic system in which resources are used, reused, and recycled in a closed loop, rather than being extracted, used, and then discarded as waste. It is based on the principles of reducing, reusing and recycling, and it is designed to minimise waste and pollution while conserving natural resources.

ENVIRONMENTAL, SOCIAL AND GOVERNANCE

Set of criteria that measures the ethical and sustainability impacts of an investment in a company or business.

GREEN PRACTICES GUIDELINE

A document that provides guide for the industry in implementing green practices within their operations.

GREEN PRACTICES

Environmentally friendly actions, which promote environment protection and sustainable development.

GREENHOUSE GAS

Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrochlorofluorocarbons (HCFCs), ozone (O_3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). See carbon dioxide, methane, nitrous oxide, hydrochlorofluorocarbon, ozone, hydrofluorocarbon, perfluorocarbon, sulfur hexafluoride.

INDICATOR

A metrics concerning energy, water, waste, material, innovation and management that measures level of green practices of an organisation.

INSTRUMENT

A tool comprises of data collection form, instrument factsheet and rubric that is used by assessor to evaluate level of green practices in an organisation.

RUBRIC

A set of sustainable criteria for assessing level of green practices in an organisation.

SUSTAINABLE DEVELOPMENT GOALS

A universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

ACRONYM

3R	Reduce, reuse, recycle
CO_2	Carbon dioxide
COP26	The 2021 United Nations Climate Change Conference
CQI	Continuous Quality Improvement
DSTIN	Dasar Teknologi dan Inovasi Negara
ESG	Environmental, Social and Governance
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GHG	Green House Gas
GP	Green Practice
GT	Green Technology
GTMP	Green Technology Master Plan
IPCC	The Intergovernmental Panel on Climate Change
LCA	Life Cycle Analysis
LCC	Life Cycle Costing
MGTC	Malaysian Green Technology and Climate Change
NDC	Nationally Determined Contribution
SDG	Sustainable Development Goals
SME	Small Medium Enterprise
SOP	Standard Operating Procedure
SPAN	Suruhanjaya Perkhidmatan Air Negara
TE	Technical Expert
UN	United Nation
UNFCC	The United Nations Framework Convention on Climate Change

DATA COLLECTION TEMPLATE

GENERAL INFORMATION		
AUDIT INFORMATION		
AUDIT	ITEMS	DESCRIPTION
1	Objective	:
2	Scope	:
3	Auditor's Name	:
INFORMATION OF PREMISE		
AUDIT	ITEMS	DESCRIPTION
1	Name of Premise	:
2	Address	:
3	Total No. of Employee	:
4	Operation Hours	:
5	Type of Sector	:
6	Year of Operation	:
7	History of DOE Enforcement Involvement	:

INDICATOR MATRIX

INDICATOR	SUB INDICATOR	WEIGHTAGE BY SUB-INDICATOR	WEIGHTAGE BY INDICATOR
MATERIALS	Sustainable materials	50	10
	Sustainable services	50	
WASTE	Wastewater	30	30
	Non-Hazardous	60	
	Hazardous waste	10	
WATER	Water Efficiency	50	20
	Water Exploration	50	
ENERGY	Emission Reduction	30	20
	Energy Efficiency	30	
	Energy Management System	10	
	Renewable Energy	30	
INNOVATION	Research and Development	50	10
	Knowledge transfer & Collaboration	50	
MANAGEMENT	Policy & Programme	30	10
	Green Procurement	40	
	Human Capital	30	
		TOTAL	100

EVALUATION INDICATOR MATRIX

INDICATOR	SUB INDICATOR	WEIGHTAGE BY SUB-INDICATOR	MARK BY SUBINDICATOR (A)	INPUT MARKS HERE	WEIGHTAGE BY INDICATOR (B)	MARK BY INDICATOR Σ(A)*(B)/100
MATERIALS	Sustainable materials	50	x / 4 * 50	x	10	
	Sustainable services	50	x / 4 * 50	x		
WASTE	Wastewater	30	x / 4 * 30		30	
	Non-Hazardous	60	x / 4 * 60	x		
	Hazardous waste	10	x / 4 * 10	x		
WATER	Water Efficiency	70	x / 4 * 50	x	20	
	Water Exploration	30	x / 4 * 50	x		
ENERGY	Emission Reduction	30	x / 4 * 30	x	20	
	Energy Efficiency	30	x / 4 * 30	x		
	Energy Management System	10	x / 4 * 10	x		
	Renewable Energy	30	x / 4 * 30	x		
INNOVATION	Research and Development	50	x / 4 * 50	x	10	
	Knowledge transfer & Collaboration	50	x / 4 * 50	x		
MANAGEMENT	Policy & Programme	30	x / 4 * 30	x	10	
	Green Procurement	40	x / 4 * 40	x		
	Human Capital	30	x / 4 * 30	x		
				TOTAL	100	
					1-Star	
				STAR RATING	2-Star	
				(Please tick based on the star rating assessment criteria)	3-Star	

STAR RATINGS (ASSESSMENT CRITERIA)

(60% - 70%)

Comply to all regulatory requirements

Demonstrate leadership in developing systematic environmental reporting practical

(71% - 80%)

Exhibit characteristics of being resource efficient

Demonstrating positive impacts from green practices

Incorporate and implement continuous quality improvement initiatives throughout business operations

(81% - 100%)

Demonstrate integration of governance framework related to sustainability and circular economy

Demonstrate capacity in contributing towards achieving national decarbonisation targets

Demonstrates leadership in developing, expanding and applying new tech related to green practices

MARKS	STAR RATING
0	No Star
60	1 Star
71	2 Star
81	3 Star
100.1	Invalid

DATA COLLECTION FORM

MATERIAL INDICATOR

INDICATOR: MATERIAL				
SUB-INDICATOR: SUSTAINABLE MATERIALS				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	Demonstration on purchase/utilisation of sustainable materials utilisation with specific direction/vision; with self-regulation on implementation (evidence of correlation on sustainability goals); and received recognition/certification from third party/ies/certificate body	*Company Sustainability Report:* A report published by a company or organisation about environmental, social, and governance (ESG) impacts containing specific policy statements or guidelines or instructions for green material application as well as the practice of self-regulation on the application (through monitoring) to show the correlation with the sustainability goal and to provide evidence of related certificate or proof recognition.	
	3	Demonstration on purchase/utilisation of sustainable materials utilisation with specific direction/vision; with self-regulation implementation (evidence of correlation on sustainability goals)	*Company Sustainability Report:* A report published by a company or organisation about environmental, social, and governance (ESG) impacts containing specific policy statements or guidelines or instructions for green material application as well as the practice of self-regulation on the application (through monitoring) to show the correlation with the sustainability goal.	
	2	Demonstration on purchase/utilisation of sustainable materials utilisation with specific direction/vision	*Company Sustainability Report:* A report published by a company or organisation about environmental, social, and governance (ESG) impacts containing specific policy statements or guidelines or instructions for green material application.	
	1	Demonstration on purchase/utilisation of sustainable materials utilisation	*Company Sustainability Report:* A report published by a company or organisation about environmental, social and governance (ESG) impacts.	
	0	None	No initiative at all	

INDICATOR: MATERIAL				
SUB-INDICATOR: SUSTAINABLE SERVICES				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	Demonstration on purchase/utilisation of sustainable services utilisation with specific direction/vision; with self-regulation on implementation (evidence of correlation on sustainability goals); and received recognition/certification from third party/ies/certificate body	*Company Sustainability Report:* A report published by a company or organisation about environmental, social, and governance (ESG) impacts containing specific policy statements or guidelines or instructions for green services application as well as the practice of self-regulation on the application (through monitoring) to show the correlation with the sustainability goal and to provide evidence of related certificate or proof recognition.	
	3	Demonstration on purchase/utilisation of sustainable services utilisation with specific direction/vision; with self-regulation implementation (evidence of correlation on sustainability goals)	*Company Sustainability Report:* A report published by a company or organisation about environmental, social, and governance (ESG) impacts containing specific policy statements or guidelines or instructions for green services application as well as the practice of self-regulation on the application (through monitoring) to show the correlation with the sustainability goal.	
	2	Demonstration on purchase/utilisation of sustainable services utilisation with specific direction/vision	*Company Sustainability Report:* A report published by a company or organisation about environmental, social, and governance (ESG) impacts containing specific policy statements or guidelines or instructions for green services application.	
	1	Demonstration on purchase/utilisation of sustainable services utilisation	*Company Sustainability Report:* A report published by a company or organisation about environmental, social and governance (ESG) impacts.	
	0	None	No initiative at all	

WASTE INDICATOR

INDICATOR: WASTE				
SUB-INDICATOR: NON-HAZARDOUS				
A. TREATED EFFLUENT				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	Wastewater recovery initiative/technology available (e.g., IETS, biogas capture facility and etc.); implemented; WITH monitoring in place; ≥33% treated effluent recycle; WITH continuous quality improvement (CQI); WITH certification/recognition/validation	*Validation/certification/recognition:* Refers to documents issued by third party that confirms performance and achievement in meeting certain standard or criteria.	
	3	Wastewater recovery initiative/technology available (e.g., IETS, biogas capture facility and etc.); implemented; WITH monitoring in place; WITH achievement of Treated effluent recycle ≥33%	*Monitoring records:* Refers to documents/records used as evidence and primary data for the purpose of calculating the intended goals and targets. Examples of records that can be referred to are record of wastes generated, recycled, reused, repurposed, disposed. Example of continuous quality improvement (CQI) evidence including positive outcome to cost saving; OR profit generation; OR reduce environment impact.	
	2	Wastewater recovery initiative/technology available (e.g., IETS, biogas capture facility and etc.); WITH monitoring in place	*Relevant contract agreements:* Documents referred to as evidence for indicating mutual obligations between the parties. Examples are agreement made by the organisation with the intention to manage hazardous waste in a sustainable manner.	
	1	Wastewater recovery initiative/technology available (e.g., IETS, biogas capture facility and etc.)	*Purchasing records and documents:* Documents that serve as evidence of the organisation acquiring services or/and products/ system.	
	0	NO initiative of wastewater recovery	*Installation records:* Documents that serve as evidence for installation of technologies in the organisation.	

INDICATOR: WASTE				
SUB-INDICATOR: HARDOUS WASTE				
B. SLUDGE RECOVERY				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	Sludge recovery initiative/technology available WITH monitoring in place; WITH continuous quality improvement (CQI); WITH achievement of 100% sludge recovery; WITH certification/recognition/ validation	*Validation/certification/recognition:* Refers to documents issued by third party that confirms performance and achievement in meeting certain standard or criteria.	
	3	Sludge recovery initiative/technology available; implemented; WITH monitoring in place; WITHOUT continuous quality improvement (CQI); WITH achievement of 100% sludge recovery	*Monitoring records:* Refers to documents/records used as evidence and primary data for the purpose of calculating the intended goals and targets. Examples of records that can be referred to are record of wastes generated, recycled, reused, repurposed, disposed. Example of continuous quality improvement (CQI) evidence including positive outcome to cost saving; OR profit generation; OR reduce environment impact.	
	2	Sludge recovery initiative/technology available, but NOT implemented	*Relevant contract agreements:* Documents referred to as evidence for indicating mutual obligations between the parties. Examples are agreement made by the organisation with the intention to manage hazardous waste in a sustainable manner.	
	1	NO initiative of sludge recovery	*Purchasing records and documents:* Documents that serve as evidence of the organisation acquiring services or/and products/ system.	
	0	NO initiative of waste diversion to disposal	*Installation/maintenance records:* Documents that serve as evidence for installation and maintenance of technologies in the organisation.	

WASTE INDICATOR

INDICATOR: WASTE				
SUB-INDICATOR: NON-HAZARDOUS				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	Initiative/technology available (e.g., biogas capture facility and etc.); implemented; WITH monitoring in place; ≥40% recycle rate; and WITH validation/ certification/recognition/	*Validation/certification/recognition:* Refers to documents issued by third party that confirms performance and achievement in meeting certain standard or criteria.	
	3	Initiative/technology available (e.g., biogas capture facility and etc.); implemented; WITH monitoring in place; WITH ≥40% recycle rate	*Monitoring records:* Refers to documents/records used as evidence and primary data for the purpose of calculating the intended goals and targets. Examples of records that can be referred to are record of wastes generated, recycled, reused, repurposed, disposed. Example of CQI evidence including positive outcome to cost saving; OR profit generation; OR reduce environment impact.	
	2	Initiative/technology available (e.g., biogas capture facility and etc.); implemented; WITH monitoring in place	*Relevant contract agreements:* Documents referred to as evidence for indicating mutual obligations between the parties. Examples are agreement made by the organisation with the intention to manage hazardous waste in a sustainable manner.	
	1	Initiative/technology available (e.g., biogas capture facility and etc.)	*Purchasing records and documents:* Documents that serve as evidence of the organisation acquiring services or/and products/ system.	
	0	NO initiative of waste diversion to disposal	*Installation records:* Documents that serve as evidence for installation of technologies in the organisation.	

INDICATOR: WASTE				
SUB-INDICATOR: HAZARDOUS WASTE				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	Initiative/technology available; implemented; WITH monitoring in place; ≥50% recycle rate; and WITH validation/ certification/recognition/	*Validation/certification/recognition:* Refers to documents issued by third party that confirms performance and achievement in meeting certain standard or criteria.	
	3	Initiative/technology available; implemented; WITH monitoring in place; WITH ≥50% recycle rate	*Monitoring records:* Refers to documents/records used as evidence and primary data for the purpose of calculating the intended goals and targets. Examples of records that can be referred to are record of wastes generated, recycled, reused, repurposed, disposed. Example of continuous quality improvement (CQI) evidence including positive outcome to cost saving; OR profit generation; OR reduce environment impact.	
	2	Initiative/technology; implemented; WITH monitoring in place	*Relevant contract agreements:* Documents referred to as evidence for indicating mutual obligations between the parties. Examples are agreement made by the organisation with the intention to manage hazardous waste in a sustainable manner.	
	1	Initiative/technology available	*Purchasing records and documents:* Documents that serve as evidence of the organisation acquiring services or/and products/ system.	
	0	NO initiative of waste diversion to disposal	*Installation/maintenance records:* Documents that serve as evidence for installation and maintenance of technologies in the organisation. Other initiatives including minimising the feed to avoid over generation of hazardous waste.	

WATER CONSERVATION INDICATOR

INDICATOR: WATER				
SUB-INDICATOR: WATER EXPLORATION				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	30% of Alternative Water used	Metered water usage reading (i.e,. m^3), utility bills (i.e., m^3), or any other documents recording the water consumption for the organisation	
	3	20% of Alternative Water used	Metered alternative water consumption readings (i.e,. m^3), utility bills (i.e., m^3), or any other documents recording the alternative water consumption for the organisation. In the event that consumption data for alternative water is not available, alternative water production readings can be used	
	2	10% of Alternative Water used		
	1	5% of Alternative Water used		
	0	No Renewable Energy used		

INDICATOR: WATER				
SUB-INDICATOR: WATER EFFICIENCY				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	30% of energy savings	Metered water usage reading (i.e,. m^3), utility bills (i.e., m^3), or any other documents recording the water consumption for the organisation	
	3	20% of energy savings		
	2	10% of energy savings		
	1	5% of energy savings		
	0	No energy savings		

ENERGY INDICATOR

INDICATOR: ENERGY				
SUB-INDICATOR: EMISSION REDUCTION				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	45% emission reduction achieved	GHG Inventory reports prepared in accordance to nationally or internationally recognised standards.	
	3	35% emissio,n reduction achieved		
	2	25% emission reduction achieved		
	1	15% emission reduction achieved		
	0	No emission reduction achieved		

INDICATOR: ENERGY				
SUB-INDICATOR: ENERGY EFFICIENCY				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	8% of energy savings	*Energy consumption:* Meter energy usage readings (i.e., kWh, kJ, MMBTU), utility bills (i.e., kWh, kJ, MMBTU), or any other documents recording the energy consumption for the organisation	
	3	6% of energy savings	*Fuel consumption:* Bills of quantities for fuels (i.e., litres, of fuel, kg of fuel, cu.ft of gases), or any other documents recording the fuel consumption for the organisation	
	2	4% of energy savings	*Certification of analysis (COA):* COA for fuels shall be referred to determine calorific values of fuels used (if applicable).	
	1	2% of energy savings		
	0	No energy savings		

INDICATOR: ENERGY				
SUB-INDICATOR: ENERGY MANAGEMENT SYSTEM				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	External certification received for energy management system	*Organisation energy policies:* Organisation policies or guidelines specific to energy or main policy documents which specifically address energy efficiency plan and target.	
	3	Energy saving measure implemented; WITH systematic reporting and monitoring system; WITH energy pol icies in place	*Organisation mission and vision statements:* Organisation mission and vision statements specific to energy or main policy documents which specifically address energy efficiency.	
	2	Energy saving measure implemented; WITH systematic reporting and monitoring system; WITH energy policies in place	*Energy management activity:* Records and documentation related to energy management activity that include the energy management committee and energy audit.	
	1	Energy saving measure implemented; WITHOUT systematic reporting and monitoring system; WITHOUT energy policies in place	*Data related to energy management activity:* Records and documentation of energy consumption, renewable energy, energy saving and performance within the organisation.	
	0	No energy savings	Reports, reviews by third parties, or certifications received by the organisation based on locally or internationally recognised standards.	

INDICATOR: ENERGY				
SUB-INDICATOR: RENEWABLE ENERGY				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	40% of Renewable Energy used	*Energy consumption:* Meter energy usage readings (i.e., kWh, kJ, MMBTU), utility bills (i.e., kWh, kJ, MMBTU), or any other documents recording the energy consumption for the organisation.	
	3	30% of Renewable Energy used	*Renewable energy consumption:* Meter renewable energy production readings (i.e., kWh, kJ, MMBTU), utility bills (i.e., kWh, kJ, MMBTU), or any other documents recording the renewable energy consumption for the organisation.	
	2	20% of Renewable Energy used	*Fuel consumption:* Bills of quantities for fuels (i.e., litres of fuel, kg of fuel, cu.ft of gases), or any other documents recording the fuel consumption for the organisation.	
	1	10% of Renewable Energy used	*Certificates of analysis (COA):* COA for fuels shall be referred to determine calorific values of fuels used (if applicable).	
	0	No Renewable Energy used		

INNOVATION INDICATOR

INDICATOR: INNOVATION				
SUB-INDICATOR: RESEARCH AND DEVELOPMENT (R&D)				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	**Visible Return on Value** based on R&D process/initiative/output managed by innovation unit/department/personnel, **resulting in commercialisation/ intellectual property filling/registration and award**	***Proof of in-house R&D Process:***	
	3	Established in house R&D process to Green Practice/Sustainable initiative **with proven investment** managed by innovation unit/department/personnel	*Organisational Structure:* Refers to systems which outlines how innovation activities are formalised through functions within an R&D unit within the boundaries of the organisations under evaluation, OR	
	2	Established inhouse R&D process to Green Practice/Sustainable initiative **managed by innovation unit/department/personnel**	*Appointment letter or Minute Meeting indicating specific person-in-charge of an R&D project related to Green Practice, OR*	
	1	Established inhouse R&D process relating to Green Practice/Sustainable initiative	*Project Charter:* A document that describes an innovation project in its entirety. Overview, an outline of scope, an approximate schedule, a budget estimate, anticipated risks, and key stakeholders.	
	0	No Renewable energy used	***Proof of R&D Investment***	
			Grant Proposal: A document proposing a research project requesting for sponsorship of that research, OR	
			Grant Award Document: A written agreement between the organisation and a grantee as the official notification of grant approval with evidence for contractual grant reporting, OR	
			Investment records: Financial documents/records used as evidence for internal and external investment of technology or system which enables innovation process/research/practice/ development in the organisation	

INDICATOR: INNOVATION				
SUB-INDICATOR: RESEARCH AND DEVELOPMENT (R&D)				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
			Proof of R&D Outcome	
			Intellectual Property (IP): Provisional IP application document/E-Filling document/published detailed on invention on intellectual protection within copyright, trademark, patents, geographical indications, plant varieties, industrial designs and semiconductor integrated circuit layout designs, OR	
			Recognition/Award/Certification: Refers to the state or quality innovation product/process/service that are recognised or acknowledged by certified bodies, OR	
			Proof of Return on Value *Economic Value:* Project completion report or Financial accounting report outlining investment, revenue and net profit based on commercialisation/marketing attribution success of innovative green products/services, OR	
			Proof of Return on Value *Social Value:* Project completion report with evidence of applied/ implemented/reviewed innovation practices which leads to pre-set goals that are measurable improvements on existing practices of identified community.	
			Proof of Return on Value *Project completion report with evidence of improvement on productivity/practice/System and resource and material-efficiency leading to improved air and water quality/fewer waste/more renewable energy sources and other sustainable conditions.*	

INDICATOR: INNOVATION				
SUB-INDICATOR: KNOWLEDGE TRANSFER AND COLLABORATION				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	Strategic partnership/Collaborative project **with signed MOU+MOA and visible Return on Value**	*Contract agreements:* Documents indicating mutual obligations between two or more parties such as LOI/NDA/MOU/MOA.	
	3	Strategic partnership/Collaborative projects **with signed MOU+MOA**	***Proof of R&D Outcome***	
	2	Strategic partnership/Collaborative projects **with signed MOU**	*Intellectual Property (IP):* Documents related to intellectual protection such as copyrights, trademarks, trade secret, industrial design, utility innovation or patent, OR	
	1	Strategic partnership/Collaborative projects **with NDA/LOI**	*Proof of Return on Value* *Economic Value:* Project complet ion re port or Financial accounting report outlining investment, revenue and net profit based on commercialisation/marketing attribution success of innovative green products/services, OR	
	0	None	*Proof of Return on Value* *Socia/Value:* Project completion report with evidence of a pplied/ *implemented/reviewed innovation practices which leads to preset goals that are measurable improvements on existing practices of identified cornmunity.*	
			Proof of Return on Value *Project completion report with evidence of improvement on productivity/practice/System and resource and materialefficiency leading to improved air and water quality/fewer waste/more renewable energy sources and other sustainable conditions*	

MANAGEMENT INDICATOR

INDICATOR: MANAGEMENT				
SUB-INDICATOR: POLICY AND PROGRAMME				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	A present of policy related to sustainability, participate in any sustainability programme, produce a report related to the sustainability programme, and receive recognition at National and International level.	*Policy or standards:* Refers to a written policy and/or international/ national standards used/implemented within the boundaries of the organisation.	
	3	A present of policy related to sustainability, participate in any sustainability programme, produce a report related to the sustainability programme and receive recognition or certification.	*Monitoring records:* Refe rs to documents/records used as evidence and primary data for the purpose of achieving the intended goals.	
	2	A present of policy related to sustainability, participate in any sustainability programme, and produce a report related to the sustainability programme.	*Contract agreements:* Documents referred to as evidence for indicating mutual obligations between the parties.	
	1	A present of policy related to sustainability and participate in any sustainability programme.		
	0	None		

INDICATOR: MANAGEMENT				
SUB-INDICATOR: GREEN PROCUREMENT				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	A present of policy and practice of green procurement, record of purchases as evidence including eco-label certified services or/and products/system.	*Policy or standards:* Refers to a written policy and/or international/national standards used/implemented within the boundaries/organisations.	
	3	A present of policy and practice of green procurement and record of purchases as evidence.	*Monitoring records:* Refers to documents/records used as evidence and primary data for the purpose to achieve the intended goals.	
	2	A present of policy and practice of green procurement.	*Contract agreements:* Documents referred to as evidence for indicating mutual obligations between the parties.	
	1	A present of green procurement policy.	*Purchasing records and documents:* Documents that are serve as evidence of the organisation acquiring services or/and products/system.	
	0	None		

INDICATOR: MANAGEMENT				
SUB-INDICATOR: HUMAN CAPITAL				
SCORE PLEASE TICK (/)	POINT	SCORE CRITERIA	DATA SOURCES/EVIDENCE	ATTACHMENT REFERENCE
	4	A present of human capital policy development to establish lifelong learning culture.	*Policy or standards:* Refers to a written policy and/or international/ national standards used/implemented within the boundaries/ organisations.	
	3	Key performance indicator documented related to human capital development.	*Monitoring records:* Refers to documents/records used as evidence and primary data for the purpose to achieve the intended goals.	
	2	Mission and vision of the organisation related to human capital development.	*Contract agreements:* Documents referred to as evidence for indicating mutual obligations between the parties.	
	1	Minutes of meetings related to human capital development.	*Purchasing records and documents:* Documents that are serve as evidence of the organisation acquiring services or/and products/ system.	
	0	None		

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: MATERIAL

SUB-INDICATOR: SUSTAINABLE MATERIALS

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: Encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

Sustainable Development Goal 12: Ensure sustainable consumption and production patterns

a) Goal 12.4: Responsible management of chemical and waste

b) Goal 12.6: Encourage companies especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (target at Sustainable reporting in companies).

1.2. INDICATOR

Material

1.3. SUB-INDICATOR

Sustainable Materials

1.4. LAST UPDATE

3 January 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Services
- Fisheries (Aquaculture)
- Manufacturing
- Livestock
- Mining
- Forest operation
- Construction
- Agriculture & Plantation

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Organisation: The entity undergoing the evaluation.

Baseline year: A reference point in time against which measure of consumption and/or in the future are measured.

Sustainable material: Sustainable materials are materials that are produced and used in a way that minimises environmental impact and reduces the depletion of natural resources. These materials are often produced using renewable resources, are nontoxic, and are biodegradable or recyclable, for example, clay, rock, sand, bamboo, or materials with eco-label.

Circular economy: A circular economy is an economic system in which resources are used, reused, and recycled in a closed loop, rather than being extracted, used, and then discarded as waste. It is based on the principles of reducing, reusing and recycling, and it is designed to minimise waste and pollution while conserving natural resources.

Life Cycle Assessment: Life Cycle Assessment (LCA) is a methodology used to evaluate the environmental impact of a product or service over its entire life cycle. This includes the extraction of raw materials, production, transportation, use, and disposal or recycling of the product.

ESG: ESG stands for Environmental, Social and Governance. It is a set of criteria used to evaluate the sustainability and societal impact of an investment in an organisation.

Certification: Certification is the provision by an independent body or an authorised agency of written assurance that the product, service, or system in question meets specific requirements.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

2.2. CONCEPT

Not applicable.

2.3. UNIT OF MEASURE

Not applicable.

3. METHODOLOGY

3.1. DATA SOURCES

Company sustainability report: A report published by a company or organisation about environmental, social and governance (ESG) impacts.

Organisation sustainability policies: Organisation policies or guidelines specific to sustainability addressed in the company sustainability report.

Sustainability monitoring activity: Self-regulation implementation to show correlation with sustainability goals.

Certification or recognition of sustainable material: Certifications attained by the organisation (including from third parties) related to sustainable material.

3.2. DATA COLLECTION METHOD

Reference and citation to sections, parts, and/or entire documents as evidence. Documents cited shall specifically address the following aspects:

1. Evidence of company sustainability report
2. Evidence of policy for the application of green material
3. Evidence of self-regulation implementation relating to sustainability goals
4. Evidence of certification or recognition from other parties including third parties

3.3. ASSUMPTIONS AND UNCERTAINTIES

Not applicable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

There are no limitations to this indicator.

4.2. VALIDATION

1. GRI Standards
2. SASB Standards

4.3. QUALITY MANAGEMENT

ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework

ISO/CD 59004 Circular Economy – Terminology, Principles and Guidance for Implementation

5. REFERENCES

1. National Energy Efficiency Action Plan 2016-2025
2. Malaysia Renewable Energy Roadmap (MyRER)
3. Malaysia National Energy Policy (NEP) 2022-2040
4. he Sustainable Development Goals (SDGs)

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: MATERIAL

SUB-INDICATOR: SUSTAINABLE SERVICES

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: Encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

Sustainable Development Goal 12: *Ensure sustainable consumption and production patterns*

a) Goal 12.1: Implement the 10-year sustainable consumption and production framework

b) Goal 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (target at Sustainable reporting in companies).

c) Goal 12.8: Promote universal understanding of sustainable lifestyles

1.2. INDICATOR

Material

1.3. SUB-INDICATOR

Sustainable Services

1.4. LAST UPDATE

18 January 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Services
- Fisheries (Aquaculture)
- Manufacturing
- Livestock
- Mining
- Forest operation
- Construction
- Agriculture & Plantation

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Organisation: The entity undergoing the evaluation.

Baseline year: A reference point in time against which measure of consumption and/or in the future are measured.

Sustainable material: Sustainable service is a service that fulfils customer needs and can be perpetuated for a long period of time without negatively influencing the natural and social environments. For example, certification or recognition like ISO 14000 or MyHijau, strategy/planning, technical support, testing, and verification.

Sustainable framework: A written document describing a framework for action to enhance international cooperation and accelerate the shift towards sustainable consumption and production (SCP) patterns in both developed and developing countries.

Life Cycle Assessment: Refers to increasing the sustainable management of resources and achieving resource efficiency along both production and consumption phases of the lifecycle, including resource extraction, the production of intermediate inputs, distribution, marketing, use, waste disposal and re-use of products and services.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

2.2. CONCEPT

Not applicable.

2.3. UNIT OF MEASURE

Not applicable.

3. METHODOLOGY

3.1. DATA SOURCES

Company sustainability report: A report published by a company or organisation about environmental, social and governance (ESG) impacts.

Organisation sustainability policies: Organisation policies or guidelines specific to sustainability addressed in the company sustainability report.

Sustainability monitoring activity: Self-regulation implementation to show correlation with sustainability goals.

Certification or recognition of sustainable material: Certifications attained by the organisation (including from third parties) related to sustainable services.

3.2. DATA COLLECTION METHOD

Reference and citation to sections, parts, and/or entire documents as evidence. Documents cited shall specifically address the following aspects:

5. Evidence of company sustainability report
6. Evidence of policy for the application of green services.
7. Evidence of self-regulation implementation relating to sustainability goals
8. Evidence of certification or recognition from other parties including third parties

3.3. ASSUMPTIONS AND UNCERTAINTIES

Not applicable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

There are no limitations to this indicator.

4.2. VALIDATION

1. GRI Standards
2. SASB Standards
3. House Rule

4.3. QUALITY MANAGEMENT

ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework

ISO/CD 59004 Circular Economy – Terminology, Principles and Guidance for Implementation

5. REFERENCES

1. National Energy Efficiency Action Plan 2016-2025
2. Malaysia Renewable Energy Roadmap (MyRER)
3. Malaysia National Energy Policy (NEP) 2022-2040
4. The Sustainable Development Goals (SDGs)

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: WASTE

SUB-INDICATOR: WASTEWATER

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: 100% sludge to be recycled by 2030.

Goal 2: 33% of treated effluent to be recycled by 2030.

These goals are aligned with the GTMP 2017-2030 emphasising on the wastewater treatment recycling targets. It has been outlined that by 2030, 100% of sludge shall be recycled and 33% of treated effluent shall be recycled. These goals also map to SDG #12 - Sustainable consumption and production, specifically addressing target #12.3 - Substantially reduce waste generation through prevention, reduction, recycling, and reuse by 2030.

1.2. INDICATOR

Waste

1.3. SUB-INDICATOR

Wastewater

1.4. LAST UPDATE

9 May 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Fisheries (Aquaculture)
- Manufacturing
- Livestock
- Mining

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Boundary: A defined border that accounts and limits the key business activities and processes which forms a basis of the study or analysis within the reporting period.

Functional Unit: A specific/selected amount of feed or product or service defined as a basis of calculation, such as mass (weight), volume, and units.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

Wastewater: Effluent generated after the use of any water related resources in a variety of applications or processes.

Sludge recovery: It is the process of extracting useful components from sludge. Dewatering, thickening, and digesting are just a few of the processes that can be used to recover the sludge and make them ready for repurposed process.

2.2. CONCEPTS

Not applicable.

2.3. UNIT OF MEASURE

1. Percentage (%) of recycling of water from the wastewater processing unit within the organisation.
2. Percentage (%) of sludge recovery from the wastewater processing unit within the organisation.

3. METHODOLOGY

3.1. DATA SOURCES

Validation/certification/recognition: Refers to documents issued by third parties that confirms performance and achievement in meeting certain standards or criteria.

Monitoring records: Refers to documents/records used as evidence and primary data for the purpose of calculating the intended goals and targets. Examples of records that can be referred to are record of wastes generated, recycled, reused, repurposed, disposed.

Relevant contract agreements: Documents referred to as evidence for indicating mutual obligations between the parties. Examples are agreement made by the organisation with the intention to manage hazardous waste in a sustainable manner.

Purchasing records and documents: Documents that serve as evidence of the organisation acquiring services or/and products/ system.

Installation records: Documents that serve as evidence for installation of technologies in the organisation.

Maintenance records: Documents that serve as evidence of maintenance activity of the wastewater processing unit.

3.2. DATA COLLECTION METHOD

Observations: Observations are made during the site visit to understand the actual case scenario of the green initiative implementation within the boundaries of the organisation.

Interviews: Interviews with respondent carried out to acquire insight of the processes/activities involved within the boundaries of the organisation.

Questionnaires/surveys: A set of questions designed for respondent to acquire insight of the processes/activities involved within the boundaries of the organisation.

Documents reviews: Documents reviewed during the site visit to support the observation.

Evidence:

1. Initiative proposal: Business or project planning with budget allocation.
2. Evidence of initiatives-

   Purchasing record, or installation record; presence of initiative/unit/facility/equipment/system being validated.
3. Monitoring record – look for current record and check for frequency monitoring.
4. Data availability at selected baseline year:
   a. Data on:
      i. Amount of discharge from the stream leaving the treatment unit to water bodies;
      ii. Amount of discharge from the stream leaving the treatment facility that is utilised elsewhere in the organisation;
      iii. Amount of wastewater generated from the process unit.

   At least any two data listed above must be available to allow calculation on treated recycled effluent.

b. Data on amount of sludge leaving the treatment unit and amount of sludge sent for disposal.

5. Evidence of recycling by third parties e.g., receipt/invoice/ financial report etc.
6. Validation of recycling by third parties e.g., contract/validation report/audit report.
7. Evidence of continuous quality improvement (CQI) exercise such as minute of meeting/CQI report. Example of CQI is performance of the selected contractor.
8. Evidence of recognition by third party such as validation or certification or award.

3.3. COMPUTATION

a) Percentage (%) of hazardous waste recycled $= \left[\frac{\text{Amount of recycled water}}{\text{Amount of hazardous waste generated}} \right] \times 100$

Where:

Amount of recycle of water = Amount of discharge from the stream leaving the treatment facility that is utilised elsewhere in the organisation within the baseline year.

Total amount of wastewater generated = Amount of wastewater discharge from the stream leaving the process unit within the baseline year.

Note: In the case of stream meter is not available the secondary data in the form of size (volume) of the following storage may be used: pond, tank, dam etc.

b) Percentage (%) of sludge recovery $= \left[\frac{(A-B)}{(A)} \right] \times 100$

Where:

A = Amount of sludge produced from the wastewater treatment facility and leaving the wastewater treatment unit.

B = Amount of sludge produced from the wastewater treatment facility and sent for disposal.

3.4. ASSUMPTIONS AND UNCERTAINTIES

Instrument applicability is limited to the activities within the defined boundary.

Secondary data will be used in the event of primary data is unavailable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

Not applicable.

4.2. VALIDATION

Not applicable.

4.3. QUALITY MANAGEMENT

National Water Quality Standard.

5. REFERENCES

1. Green Technology Master Plan (GTMP) 2017 – 2030.
2. Sustainable Development Goals (SDG) 2030.

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: WASTE

SUB-INDICATOR: NON-HAZARDOUS

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

1. Goal 1: 40% recycling rate of solid waste from total non-hazardous waste generated by 2025.
2. Goal 2: 100% avoidance of waste to landfills by 2025.
3. Goal 3: 180 unit of biogas capture facility by 2030.

These goals are aligned with the world convention COP 26 by the UNFCC emphasising on the solid wastes recycling target, landfill avoidance, and reduction of carbon intensity (against GDP) in 2030 compared to 2005 level. It has been outlined that by 2030, 40% of the solid wastes generated shall be recycled, 100% avoidance of waste to the landfill, and there shall be 180 unit of biogas capture facility. These goals also map to SDG #12 - Sustainable consumption and production, specifically addressing target #12.3 - Substantially reduce waste generation through prevention, reduction, recycling, and reuse by 2030.

1.2. INDICATOR

Waste

1.3. SUB-INDICATOR

Non-hazardous waste

1.4. LAST UPDATE

11 April 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Services
- Fisheries (Aquaculture)
- Manufacturing
- Livestock
- Mining
- Forest operation
- Construction
- Agriculture & Plantation

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Biogas Capture Facility: A facility that capture biogas released as a result of waste degradation.

Boundary: A defined border that accounts and limits the key business activities and processes which forms a basis of the study or analysis within the reporting period.

Functional Unit: A specific/selected amount of feed or product or service defined as a basis of calculation, such as mass (weight), volume, and units.

Non-Hazardous Wastes: Any form of materials that are discarded from a process/activity, and in this document, specifically refers to solid form of waste materials.

Non-hazardous waste loss: Any leakage/spills along the waste stream before or after treatment process.

Recycling: Process in converting waste materials into new materials or objects.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

2.2. CONCEPT

Not applicable.

2.3. UNIT OF MEASURE

1. Percentage (%) of recycling of non-hazardous waste within the organisation.
2. Number of biogas capture facility

3. METHODOLOGY

3.1 DATA SOURCES

Validation/certification/recognition: Refers to documents issued by third party that confirms performance and achievement in meeting certain standard or criteria.

Monitoring records: Refers to documents/records used as evidence and primary data for the purpose of calculating the intended goals and targets. Examples of records that can be referred to are record of wastes generated, recycled, reused, repurposed, disposed. Example of CQI evidence including positive outcome to cost saving; OR profit generation; OR reduce environmental impact.

Relevant contract agreements: Documents referred to as evidence for indicating mutual obligations between the parties. Examples are agreement made by the organisation with the intention to manage hazardous waste in a sustainable manner.

Purchasing records and documents: Documents that serve as evidence of the organisation acquiring services or/and products/system.

Installation/maintenance records: Documents that serve as evidence for installation and maintenance of technologies in the organisation.

3.2 DATA COLLECTION METHOD

Observations: Observations are made during the site visit to understand the actual case scenario of the green initiative implementation within the boundaries of the organisation.

Interviews: Interviews with respondent carried out to acquire insight of the processes/activities involved within the boundaries of the organisation.

Questionnaires/surveys: A set of questions designed for respondent to acquire insight of the processes/activities involved within the boundaries of the organisation.

Documents reviews: Documents reviewed during the site visit to support the observation.

Evidence:

9. Initiative proposal: Business or project planning with budget allocation.
10. Evidence of initiatives-

    Dedicated space/storage of non-hazardous waste; purchasing record, or installation record; transportation record (e.g., no trips/schedule to transport the waste to dedicated disposal/recycling premise) presence of initiative/unit /facility/equipment/system being validated.
11. Policy in place, documented (e.g., minutes of meeting/policy document/annual budget approval) and disseminated.
12. Monitoring record– look for current record and check for frequency monitoring.

13. Data availability at selected baseline year on the amount of non-hazardous waste recycled, amount of non-hazardous waste disposed, and amount of non-hazardous waste generated. At least any two data listed must be available to allow calculation on non-hazardous waste recycle.
14. Evidence of recycling by third parties e.g., receipt/invoice/ financial report etc.
15. Validation of recycling by third parties e.g., contract/validation report/audit report.
16. Evidence of continuous quality improvement (CQI) exercise such as minute of meeting/CQI report. Example of CQI is performance of the selected contractor.
17. Evidence of recognition by third party such as validation or certification or award.

3.3 COMPUTATION

Selecting a baseline year;

Percentage (%) of recycling non-hazardous waste = [Amount of recycling non-hazardous waste / Total amount of non-hazardous waste generated] × 100;

where:

Amount of recycling non-hazardous waste = Amount of non-hazardous waste generated – Amount of non-hazardous waste disposed.

Total amount of non-hazardous waste generated is the summation of all wastes generated from the process/activity within the boundary.

3.4 ASSUMPTIONS AND UNCERTAINTIES

Non-hazardous waste loss during the activities within the defined boundary is assumed to be negligible.

Secondary data will be used in the event of primary data is unavailable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1 COMMENT AND LIMITATION

There are no limitations to this indicator.

4.2 VALIDATION

Not applicable.

4.3 QUALITY MANAGEMENT

ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework

5. REFERENCES

1. Green Technology Master Plan (GTMP) 2017 – 2030.
2. Sustainable Development Goals (SDG) 2030.

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: WASTE

SUB-INDICATOR: HAZARDOUS WASTE

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: 50% recycling rate of hazardous waste from the total hazardous waste generated by 2030

Goal 2: 40% recycling rate of solid waste from total waste generated by 2025

Goal 3: 100% avoidance of waste to landfill/zero waste to landfill by 2025

These goals are aligned with the GTMP 2017-2030 prepared by the Ministry of Energy, Green Technology and Water Malaysia emphasising on the hazardous waste recycling targets. It has been outlined that by 2030, 50% of the hazardous wastes generated from the industrial/sectoral activities shall be recycled. On top of that, the selected goals also addressed the target set by the world convention COP 26 by the UNFCC emphasising on achieving 40% recycling rate and 100% avoidance/zero waste directed to the landfill by 2025. These goals are also mapped to SDG #12 - Sustainable consumption and production, specifically addressing target #12.3 - Substantially reduce waste generation through prevention, reduction, recycling, and reuse by 2030.

1.2. INDICATOR

Waste

1.3. SUB-INDICATOR

Hazardous waste

1.4. LAST UPDATE

8 May 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Services
- Manufacturing
- Livestock
- Mining
- Forest operation
- Construction
- Agriculture & Plantation

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Boundary: A defined border that accounts and limits the key business activities and processes which forms a basis of the study or analysis within the reporting period.

Functional Unit: A specific/selected amount of feed or product or service defined as a basis of calculation, such as mass (weight), volume, and units.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

Recycling: Process in converting waste materials into new materials or objects.

Scheduled Waste: Scheduled waste is any waste that has hazardous characteristics that have the potential to negatively impact the public and the environment. A total of 77 types of scheduled waste are listed under the First Schedule, Environmental Quality (Scheduled Waste) Regulations 2005, and the management of such waste shall be in accordance with the provisions under the above Regulations.

Waste loss: Any leakage/spills along the waste stream before or after treatment process.

2.2. CONCEPTS

Not applicable.

2.3. UNIT OF MEASURE

Percentage (%) of recycling of hazardous waste within the organisation.

3. METHODOLOGY

3.1. DATA SOURCES

Validation/certification/recognition: Refers to documents issued by third party that confirms performance and achievement in meeting certain standard or criteria.

Monitoring records: Refers to documents/records used as evidence and primary data for the purpose of calculating the intended goals and targets. Examples of records that can be referred to are record of wastes generated, recycled, reused, repurposed, disposed. Example of continuous quality improvement (CQI) evidence including positive outcome to cost saving; OR profit generation; OR reduce environmental impact.

Relevant contract agreements: Documents referred to as evidence for indicating mutual obligations between the parties. Examples are agreement made by the organisation with the intention to manage hazardous waste in a sustainable manner.

Purchasing records and documents: Documents that serve as evidence of the organisation acquiring services or/and products/system.

Installation/maintenance records: Documents that serve as evidence for installation and maintenance of technologies in the organisation. Other initiatives including minimising the feed to avoid over generation of hazardous waste.

3.2. DATA COLLECTION METHOD

Observations: Observations are made during the site visit to understand the actual case scenario of the green initiative implementation within the boundaries of the organisation.

Interviews: Interviews with respondent carried out to acquire insight of the processes/activities involved within the boundaries of the organisation.

Questionnaires/surveys: A set of questions designed for respondent to acquire insight of the processes/activities involved within the boundaries of the organisation.

Documents reviews: Documents reviewed during the site visit to support the observation.

Evidence:

1. Initiative proposal: Business or project planning with budget allocation.
2. Evidence of initiatives-
    - Dedicated space/storage of schedule waste; valid licence from regulatory body (special management) permit; purchasing record, or installation record; maintenance record; transportation record (e.g., no trips/schedule to transport the waste to dedicated disposal/recycling premise) presence of initiative/unit /facility/equipment/system being validated.
    - Policy in place, documented (e.g., minutes of meeting/policy document/annual budget approval) and disseminated.

- Monitoring record– look for current record and check for frequency of monitoring.
- Data availability at selected baseline year on the amount of schedule waste recycle, amount of schedule waste disposed, and amount of schedule waste generated. At least any two data listed must be available to allow calculation on schedule waste recycle.

3. Evidence of recycling by third parties e.g., receipt/invoice/ financial report etc.
4. Validation of recycling by third parties e.g., contract/validation report/audit report.
5. Evidence of continuous quality improvement (CQI) exercise such as minute of meeting/CQI report. Example of CQI is performance of the selected contractor.
6. Evidence of recognition by third party such as validation or certification or award.

3.3 COMPUTATION

$$\text{Percentage (\%) of waste recycled} = \frac{\text{Amount of hazardous waste recycled}}{\text{Amount of hazardous waste generated}} \times 100$$

where;

Amount of hazardous waste recycled = Amount of hazardous waste generated – Amount of hazardous waste disposed.

Total amount of hazardous waste generated is the summation of all hazardous waste generated from the process/activity within the boundary.

3.4 ASSUMPTIONS AND UNCERTAINTIES

- Instrument applicability is limited to the activities within the defined boundary.
- Secondary data will be used in the event of primary data is unavailable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1 COMMENT AND LIMITATION

There are no limitations to this indicator.

4.2 VALIDATION

Not applicable.

4.3 QUALITY MANAGEMENT

ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework

ISO/CD 59004 Circular Economy – Terminology, Principles and Guidance for Implementation

5. REFERENCES

1. Green Technology Master Plan (GTMP) 2017 – 2030.
2. Sustainable Development Goals (SDG) 2030.
3. “Malaysia - High-Level Segment Statement COP 26.” Unfccc.int, 11 Nov. 2021, https://unfccc.int/documents/310827

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: WATER

SUB-INDICATOR: WATER EXPLORATION

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: To reduce dependency on potable water by exploring the consumption of other water resources such as rainwater and recycled water.

The goal of this instrument is mapped to the following global goals and National targets:

Sustainable Development Goal 12: Ensure sustainable consumption and production patterns.

> Goal 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (target at Sustainable reporting in companies).

1.2. INDICATOR

Water

1.3. SUB-INDICATOR

Water Exploration

1.4. LAST UPDATE

16 March 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture
- Aquaculture
- Construction
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Organisation: The entity undergoing the evaluation.

Water: Refers to water that meets quality standards for various processes and applications within the industry.

Potable water: Refers to clean and safe drinking water that meets quality standards for various processes and applications within the industry – for the purpose of this Guideline, this also refers to water supplied as city water.

Water conservation: Refers to the practice of reducing water usage, improving efficiency, and implementing sustainable strategies to minimise the overall water footprint within processes.

Water efficiency: Refers to the optimisation and reduction of water usage throughout industrial processes to minimise waste and improve resource conservation.

Water saving: A water consumption reduction measured against a baseline year.

Water consumption: An energy usage by the organisation and its sub-entities for its operations and activities.

Alternative water: Refers to water from alternative sources such as rainwater or reclamation processes.

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

2.2. UNIT OF MEASUREMENT

Percentage (%) of alternative water used with reference to the total water used within the organisation

3. METHODOLOGY

3.1. DATA SOURCE

Water consumption: Metered water usage readings (i.e., m^3), utility bills (i.e., m^3), or any other documents recording the water consumption for the organisation.

Alternative water consumption: Meter alternative water consumption readings (i.e., m^3), utility bills (i.e., m^3), or any other documents recording the alternative water consumption for the organisation. In the event that consumption data for alternative water is not available, alternative water production readings can be used.

3.2. DATA COLLECTION METHOD

Water consumption:

- Meter usage reading showing a consumption of water over a period of time. Typically, meter reading is provided with a monthly time span. The total water consumed shall be computed by taking the total meter readings for individual months over the period of the reporting year. In the event that more than one water source is available, the sum of the meter readings shall be considered.
- Bills of quantities of water purchased shall be used to represent consumption of water over a period of time. The total water consumed shall be computed by taking the total quantities for the period of the reporting year. In the event that more than one water source is consumed, the sum of the quantities of water consumed shall be considered.
- Other forms of evidence acceptable include, purchase invoices, bill of lading, and other similar documents.
- Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for water purchased with the assumption that the water purchased is consumed within the reporting period.

Alternative water consumption:

- Meter usage reading showing a consumption of alternative water over a period of time. Typically, meter reading is provided with a monthly time span. The total alternative water consumed shall be computed by taking the total meter readings for individual months over the period of the reporting year. In the event that more than one alternative water source is available, the sum of the meter readings shall be considered.
- Bills of quantities of alternative water purchased shall be used to represent consumption of alternative water over a period of time. The total alternative water consumed shall be computed by taking the total quantities for the period of the reporting year. In the event that more than one alternative water source is consumed, the sum of the quantities of alternative water consumed shall be considered.
- Other forms of evidence acceptable include, purchase invoices, bill of lading, and other similar documents.
- Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for alternative water purchased with the assumption that the water purchased is consumed within the reporting period.

Observations: Observations are made during the site visit to understand the actual case scenario of the green initiative implementation within the boundaries of the organisation.

Interviews: Interviews with respondent carried out to acquire insight of the processes/activities involved within the boundaries of the organisation.

Questionnaires/surveys: A set of questions designed for respondent to acquire insight of the processes/activities involved within the boundaries of the organisation.

Documents reviews: Documents reviewed during the site visit to support the observation.

3.3. COMPUTATION

The renewable energy percentage and renewable fuel percentage for the reporting period can be calculated using the following equations:

$$\text{Percentage (\%) of alternative consumption} = \frac{[\text{Alternative water consumption (i.e., m}^3)]}{[\text{Total water consumption (i.e., m}^3)]} \times 100\%$$

3.4. ASSUMPTIONS AND UNCERTAINTIES

Any and all averaging approach to consumption data shall be noted and wherever practicably possible the uncertainties shall be quantified.

Total water consumed for the reporting period shall be calculated based on the actual consumption of water for each month within the reporting period. In the event of data unavailability, average consumptions can be provided. Averaging approaches and assumptions made should be described in sufficient detail.

Total water consumed for the year of reporting shall be calculated based on the actual consumption of fuel for each month within the reporting period. Each source of water should be calculated separately.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

Not applicable.

4.2. VALIDATION

Measurement and Verification (M&V) report to verify savings endorsed by certified M & V professional.

4.3. QUALITY MANAGEMENT

Not applicable.

5. REFERENCES

1. SO 46001:2019 Water efficiency management systems.
2. Green Technology Master Plan Malaysia 2017–2030.
3. The Sustainable Development Goals (SDGs).

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: WATER

SUB-INDICATOR: WATER EFFICIENCY

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: To increase water efficiency and improve water saving in operations.

The goal of this instrument is mapped to the following global goals and National targets:

Sustainable Development Goal 12: Ensure sustainable consumption and production *patterns*

> *Goal 12.6:* Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (target at Sustainable reporting in companies).

1.2. INDICATOR

Water

1.3. SUB-INDICATOR

Water Efficiency

1.4. LAST UPDATE

16 March 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Organisation: The entity undergoing the evaluation.

Water: Refers to water that meets quality standards for various processes and applications within the industry.

Water conservation: Refers to the practice of reducing water usage, improving efficiency, and implementing sustainable strategies to minimise the overall water footprint within processes.

Water efficiency: Refers to the optimisation and reduction of water usage throughout industrial processes to minimise waste and improve resource conservation.

Water saving: A water consumption reduction measured against a baseline year.

Water consumption: An energy usage by the organisation and its sub-entities for its operations and activities.

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

2.2. UNIT OF MEASUREMENT

Percentage (%) of water consumption reduction measured against the baseline year.

3. METHODOLOGY

3.1. DATA SOURCE

Water consumption: Metered water usage readings (i.e., m^3), utility bills (i.e., m^3), or any other documents recording the water consumption for the organisation.

3.2. DATA COLLECTION METHOD

Water consumption:

- Meter usage reading showing a consumption of water over a period of time. Typically, meter reading is provided with a monthly time span. The total water consumed shall be computed by taking the total meter readings for individual months over the period of the reporting year. In the event that more than one water source is available, the sum of the meter readings shall be considered.
- Bills of quantities of water purchased shall be used to represent consumption of water over a period of time. The total water consumed shall be computed by taking the total quantities for the period of the reporting year. In the event that more than one water source is consumed, the sum of the quantities of water consumed shall be considered.
- Other forms of evidence acceptable include, purchase invoices, bill of lading, and other similar documents.
- Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for water purchased with the assumption that the water purchased is consumed within the reporting period.

Observations: Observations are made during the site visit to understand the actual case scenario of the green initiative implementation within the boundaries of the organisation.

Interviews: Interviews with respondent carried out to acquire insight of the processes/activities involved within the boundaries of the organisation.

Questionnaires/surveys: A set of questions designed for respondent to acquire insight of the processes/activities involved within the boundaries of the organisation.

Documents reviews: Documents reviewed during the site visit to support the observation.

3.3. COMPUTATION

The water saving for the reporting period can be calculated using the following equations:

Percentage (%) of energy saving =

$$\frac{\text{Total water consumed for the year of reporting } (m^3) - \text{Total water consumed for the baseline year } (m^3)}{\text{Total water consumed for the baseline year } (m^3)}$$

Remark: Negative (%) indicates there is savings, positive (%) indicates there is no savings

3.4. ASSUMPTIONS AND UNCERTAINTIES

Any and all averaging approach to consumption data shall be noted and wherever practicably possible the uncertainties shall be quantified.

Total water consumed for the reporting period shall be calculated based on the actual consumption of water for each month within the reporting period. In the event of data unavailability, average consumptions can be provided. Averaging approaches and assumptions made should be described in sufficient detail.

Total water consumed for the year of reporting shall be calculated based on the actual consumption of fuel for each month within the reporting period. Each source of water should be calculated separately.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

Not applicable.

4.2. VALIDATION

Measurement and Verification (M&V) report to verify savings endorsed by certified M & V professional.

4.3. QUALITY MANAGEMENT

Not applicable.

5. REFERENCES

1. ISO 46001:2019 Water efficiency management systems.
2. Green Technology Master Plan Malaysia 2017–2030.
3. The Sustainable Development Goals (SDGs).

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: ENERGY

SUB-INDICATOR: EMISSION REDUCTION

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: Nationally Determined Contribution (NDC) of 45% carbon intensity reduction in 2030 compared to 2005 level.

The goal of this instrument is mapped to the following global goals and National targets:

Sustainable Development Goal 12: Ensure sustainable consumption and production patterns

Goal 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (target at Sustainable reporting in companies).

National Commitment at COP – Nationally Determined Contribution (NDC) of 45% carbon intensity reduction in 2030 compared to 2005 level.

1.2. INDICATOR

Energy

1.3. SUB-INDICATOR

Emission Reduction

1.4. LAST UPDATE

3 January 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Organisation: The entity undergoing the evaluation.

Energy: Energy resources, which refer to substances like fuels, petroleum products, heating and cooling, and electricity in general, because a significant portion of the energy contained in these resources can easily be extracted to serve a useful purpose.

Energy consumption: Energy usage by the organisation and its sub-entities for its operations and activities.

Energy savings: Energy consumption reduction measured against a baseline year.

Emission: Emission herein refers to greenhouse gas (GHG). GHG is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. GHG emissions herein refers to all the GHGs and are collectively reported in carbon dioxide equivalent (CO_2e).

Baseline year: A reference point in time against which measure of consumption and/or in the future are measured.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

GHG inventory: A list of emission sources and the associated emissions quantified using standardised methods.

Scope 1: Direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organisation (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles).

Scope 2: Indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.

Scope 3: Indirect GHG emissions associated with activities from assets not owned or controlled by the reporting organisation.

2.2 UNIT OF MEASURE

Percentage (%) reduction in emissions by an organisation within its operations in percentage with reference to a selected baseline year.

3. METHODOLOGY

3.1 DATA SOURCES

GHG Inventory reports prepared in accordance to nationally or internationally recognised standards.

3.2 DATA COLLECTION METHOD

GHG Inventory:

1. The emissions for the reporting period shall be the total GHG emissions generated by the organisation for the reporting period in CO_2e.
2. The total GHG emissions generated shall consider the total of Scope 1 and Scope 2 emissions generated by the organisation for the reporting period.
3. If present, the Scope 3 emission shall be considered for computing the total emissions.
4. Reports generated by the "Sistem Pengurusan dan Pemantauan Industri Hijau" provided by Department of Environment Malaysia can serve as evidence to represent the total GHG emissions for the organisation for the reporting period.
5. Reports and certification by national or international standards such as the ISO 14064 can serve as evidence to represent the total GHG emissions for the organisation for the reporting period.

Observations: Observations are made during the site visit to understand the actual case scenario of the green initiative implementation within the boundaries of the organisation.

Interviews: Interviews with respondent carried out to acquire insight of the processes/activities involved within the boundaries of the organisation.

Questionnaires/surveys: A set of questions designed for respondent to acquire insight of the processes/activities involved within the boundaries of the organisation.

Documents reviews: Documents reviewed during the site visit to support the observation.

3.3 COMPUTATION

The emission reduction can be calculated using the following equation:

$$\text{Emission reduction} = \frac{\left[\begin{array}{c}\text{Total emissions for the reporting period (kg } C0_2e\text{)} \\ - \\ \text{Total emissions for the baseline year(kg } C0_2e\text{)}\end{array}\right]}{\text{Total emissions for the baseline year (kg } C0_2e\text{)}}$$

3.4 ASSUMPTIONS AND UNCERTAINTIES

The uncertainties reported within the organisation's GHG inventory shall be noted.

Any and all averaging approach to GHG data shall be noted and wherever practicably possible the uncertainties shall be quantified.

GHG emissions shall account for Scope 1 and Scope 2 emissions for the organisation.

Scope 3 emissions may be included in the calculation. If Scope 3 emissions are included, values of Scope 3 emissions shall be considered throughout all the expressions.

Any omissions shall be clearly noted with justifications.

Calculation methods to comply with GHG Protocol Standards or IPCC standards or ISO 14064 standards or any other internationally recognise standards.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1 COMMENT AND LIMITATION

There are no limitations to this indicator.

4.2 VALIDATION

The review or validation of information and GHG inventory by the organisation shall be noted.

4.3 QUALITY MANAGEMENT

Any certification obtained with regard to the organisation's carbon emissions and management shall be noted.

5. REFERENCES

1. National Energy Efficiency Action Plan 2016–2025.
2. Malaysia Renewable Energy Roadmap (MyRER).
3. Dasar Tenaga Negara (DTN) 2022–2040.
4. The Sustainable Development Goals (SDGs).

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: ENERGY

SUB-INDICATOR: ENERGY EFFICIENCY

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: Energy saving meeting the National energy savings target of 8% by 2025.

The goal of this instrument is mapped to the following global goals and National targets:

Sustainable Development Goal 12: Ensure sustainable consumption and production patterns

Goal 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (target at Sustainable reporting in companies).

National Energy Efficiency Action Plan 2016–2025:

1. 52,233 GWh of energy savings (8.0%)

2. 37,702 kt CO_2 equivalent reduction

1.2. INDICATOR

Energy

1.3. SUB-INDICATOR

Energy Efficiency

1.4. LAST UPDATE

3 January 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Fisheries (Aquaculture)
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Organisation: The entity undergoing the evaluation..

Energy: Energy resources, which refer to substances like fuels, petroleum products, heating and cooling, and electricity in general, because a significant portion of the energy contained in these resources can easily be extracted to serve a useful purpose.

Energy consumption: An energy usage by the organisation and its sub-entities for its operations and activities.

Energy savings: An energy consumption reduction measured against a baseline year.

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

Certified M & V Professional: A certified professional that qualifies to conduct measurement and verification activities according to guidelines or standards for reporting energy savings.

2.2. CONCEPT

Not applicable.

2.3. UNIT OF MEASURE

Percentage (%) of electricity and fuel consumption reduction measured against the baseline year.

3. METHODOLOGY

3.1. DATA SOURCES

Energy consumption: Meter energy usage readings (i.e., kWh, kJ, MMBTU), utility bills (i.e., kWh, kJ, MMBTU), or any other documents recording the energy consumption for the organisation.

Fuel consumption: Bills of quantities for fuels (i.e., litres of fuel, kg of fuel, cu. ft of gases), or any other documents recording the fuel consumption for the organisation.

Certificates of analysis (COA): COA for fuels shall be referred to determine calorific values of fuels used (if applicable).

3.2. DATA COLLECTION METHOD

Energy consumption:

1. Meter usage reading showing a consumption of energy over a period of time. Typically, meter reading is provided with a monthly time span. The total energy consumed shall be computed by taking the total meter readings for individual months over the period of the reporting year. In the event that more than one energy source is available, the sum of the meter readings shall be considered.
2. If there are more than one type of energy being consumed, a common energy unit shall be utilised. (e.g., MWh, MJ)
3. Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for energy purchased with the assumption that the energy purchased is consumed within the reporting period.

Fuel consumption:

1. Bills of quantities of fuel for fuels purchased shall be used to represent consumption of fuel over a period of time. The total fuel consumed shall be computed by taking the total quantities for the period of the reporting year. In the event that more than one fuel source is consumed, the sum of the quantities of fuel consumed shall be considered.
2. Other forms of evidence acceptable include, purchase invoices, bill of lading, and other similar documents.
3. If there are more than one type of fuel being consumed, a common energy unit shall be utilised. (e.g., MWh, MJ)
4. The energy unit of fuels shall be computed by multiplying the calorific value (e.g., J/kg, kJ/l) of the fuel with the quantity (e.g., kg, l). Refer to the Appendix for the list of common calorific value that can be used as reference. In the event of fuels not listed in the Appendix, the assessor shall request from the organisation for such information accompanied by respective reference document (e.g., certificates of analysis for fuel calorific value, literature reference).
5. Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for fuel purchased with the assumption that the energy purchased is consumed within the reporting period.

Observations: Observations are made during the site visit to understand the actual case scenario of the green initiative implementation within the boundaries of the organisation.

Interviews: Interviews with respondent carried out to acquire insight of the processes/activities involved within the boundaries of the organisation.

Questionnaires/surveys: A set of questions designed for respondent to acquire insight of the processes/activities involved within the boundaries of the organisation.

Documents reviews: Documents reviewed during the site visit to support the observation.

3.3. COMPUTATION

The energy and fuel saving for the reporting period can be calculated using the following equations:

$$\text{Percentage (\%) of energy saving} = \frac{\text{Total energy consumed for the year of reporting (units for energy)} - \text{Total energy consumed for the baseline year (unit for energy)}}{\text{Total energy consumed for the baseline year (unit for energy)}} \times 100\% \quad (1)$$

$$\text{Percentage (\%) of fuel saving} = \frac{\text{Total energy consumed for the year of reporting (unit for fuel)} - \text{Total energy consumed for the baseline year (unit for fuel)}}{\text{Total energy consumed for the baseline year (unit for fuel)}} \times 100\% \quad (2)$$

NB: Negative (%) indicates there is savings, positive (%) indicates there is no savings

3.4. ASSUMPTIONS AND UNCERTAINTIES

Wherever fuel characteristic information is used for calculations, it shall be noted that the averaging of such characteristics (i.e., calorific value) contributes to uncertainties.

Any and all averaging approach to consumption data shall be noted and wherever practicably possible the uncertainties shall be quantified.

Total energy consumed for the reporting period shall be calculated based on the actual consumption of energy for each month within the reporting period. In the event of data unavailability, average consumptions can be provided. Averaging approaches and assumptions made should be described in sufficient detail.

Total fuel consumed for the year of reporting shall be calculated based on the actual consumption of fuel for each month within the reporting period. Each type of fuel should be calculated separately.

Suggested unit for fuel as follows:

- Liquid fuel (i.e., petrol, diesel, oil, etc.): litres of fuel
- Solid fuel (i.e., coal, woodchip, etc): kg of fuel
- Gaseous fuel (i.e., natural gas, LPG, etc.): MMBTU or cu. ft. of gases

If the organisation is reporting both energy and fuels, the energy units should be standardised in MWh or MJ and reported in combination.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

There are no limitations to this indicator.

4.2. VALIDATION

Measurement and Verification (M&V) report to verify savings endorsed by certified M & V professional.

4.3. QUALITY MANAGEMENT

Not applicable.

5. REFERENCES AND DOCUMENTATION

1. National Energy Policy (2022–2040).
2. National Energy Efficiency Action Plan 2016–2025.
3. The Sustainable Development Goals (SDGs).

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: ENERGY

SUB-INDICATOR: ENERGY MANAGEMENT SYSTEM

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: Energy saving meeting the National energy savings target of 8% by 2025.

The goal of the Energy: Energy Efficiency instrument is mapped to the following global goals and National targets:

Sustainable Development Goal 12: Ensure sustainable consumption and production patterns

Goal 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (target at Sustainable reporting in companies).

National Energy Efficiency Action Plan 2016-2025

1. Target of 52,233 GWh of energy savings (8.0%)

2. Target of 37,702 kt CO2 equivalent reduction

Malaysia Renewable Energy Roadmap (MyRER)

National aspiration of 31% renewable energy (RE) capacity by 2025 and 40% by 2035

Dasar Tenaga Negara (DTN) 2022-2040

National target set for RE at 18,431MW in 2040.

1.2. INDICATOR

Energy

1.3. SUB-INDICATOR

Energy Management Systems.

1.4. LAST UPDATE

3 January 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Organisation: The entity undergoing the evaluation.

Energy: Energy resources, which refer to substances like fuels, petroleum products, heating and cooling, and electricity in general, because a significant portion of the energy contained in these resources can easily be extracted to serve a useful purpose.

Renewable energy: Energy resources that is collected from renewable resources that are naturally replenished on a human timescale. It includes sources such as sunlight, wind, the movement of water, and geothermal heat.

Energy consumption: An energy usage by the organisation all it any sub-entities for its operations and activities.

Energy Management System: A set of policies and procedures integrated and put into practice to track, analyse, and plan for energy usage in an organisation.

Energy savings: An energy consumption reduction measured against a baseline year.

Baseline year: A reference point in time against which measure of consumption and/or in the future are measured.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

2.2. CONCEPT

Not applicable.

2.3. UNIT OF MEASURE

Not applicable.

3. METHODOLOGY

3.1. DATA SOURCES

Organisation energy policies: Organisation policies or guidelines specific to energy or main policy documents which specifically address energy efficiency plan and target.

Organisation mission and vision statements: Organisation mission and vision statements specific to energy or main policy documents which specifically address energy efficiency.

Energy management activity: Records and documentation related to energy management activity that include the energy management committee and energy audit.

Data related to energy management activity: Records and documentation of energy consumption, renewable energy, energy saving and performance within the organisation.

Reports, reviews by third parties, or certifications received by the organisation based on locally or internationally recognised standards.

Company policies, mission, and vision statements for continuous improvement.

3.2. DATA COLLECTION METHOD

Organisation energy policies:

1. Organisation policies or guidelines specific to energy or main policy documents which specifically address energy efficiency plan and target.
2. Statements within the policy describing energy management systems can be used as evidence. Statements describing targets for energy reduction, energy efficiency efforts, and any statements describing efforts or targets in achieving energy efficiency, increasing renewable energy mix, increasing renewable fuel mix shall also be considered.

Organisation mission and vision statements:

1. Organisation mission or vision statements specific to energy or organisation aspiration documents which specifically address energy efficiency plan and target.
2. Statements within the mission or vision statements describing energy management systems can be used as evidence. Statements within mission or vision statements describing targets for energy reduction, energy efficiency efforts, and any statements describing efforts or targets in achieving energy efficiency, increasing renewable energy mix, increasing renewable fuel mix shall also be considered.
3. Organisation mission and vision statements specific to energy or main policy documents which specifically address energy efficiency.

Energy management activity:

1. Documents, records, logbooks, minutes of meetings, and any written documentation related to energy management activity. This may also include documents describing activities by the energy management committee and energy audit.
2. Any form of documentation, including media such as videos and pictures related to energy management activity may also be considered as evidence.

Data related to energy management activity:

1. Records and documentation of energy consumption, renewable energy, energy saving and performance within the organisation.
2. Documents, records, logbooks, minutes of meetings, and any written documentation of data related to energy management activity. This may also include documents recording data activities by the energy management committee and energy audit.

Organisation mission and vision statements: Organisation mission and vision statements specific to energy or main policy documents which specifically address energy efficiency.

Energy management activity: Records and documentation related to energy management activity that include the energy management committee and energy audit.

Data related to energy management activity: Records and documentation of energy consumption, renewable energy, energy saving and performance within the organisation.

Reports, reviews by third parties, or certifications received by the organisation based on locally or internationally recognised standards.

Company policies, mission, and vision statements for continuous improvement.

Reference and citation to sections, parts, and/or entire documents as evidence. Documents cited shall specifically address the following aspects:

1. Evidence of a policy for more efficient use of energy.
2. Evidence of fixed targets and objectives to meet the policy.
3. Evidence of the usage data to better understand and make decisions about energy use.
4. Evidence of the performance of the policy.
5. Evidence of a continuous improvement in energy management.

3.3. ASSUMPTIONS AND UNCERTAINTIES

Not applicable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

There are no limitations to this indicator.

4.2. VALIDATION

1. ISO 50001:2018 Energy Management System.
2. AEMAS Energy Management Gold Standard.

4.3. QUALITY MANAGEMENT

Not applicable.

5. REFERENCES

1. National Energy Efficiency Action Plan 2016–2025
2. Malaysia Renewable Energy Roadmap (MyRER).
3. Dasar Tenaga Negara (DTN) 2022–2040.
4. The Sustainable Development Goals (SDGs).

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: ENERGY

SUB-INDICATOR: RENEWABLE ENERGY

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: National target of 31% RE (renewable energy) capacity mix in 2025, and 40% by 2035.

The goal of this instrument is mapped to the following global goals and National targets:

Sustainable Development Goal 12: Ensure sustainable consumption and production patterns.

Goal 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (target at Sustainable reporting in companies).

National Energy Efficiency Action Plan 2016 – 2025:

1. 52,233 GWh of energy savings (8.0%)

2. 37,702 ktCO2 equivalent reduction

Malaysia Renewable Energy Roadmap (MyRER)

National aspiration of 31% renewable energy (RE) capacity by 2025 and 40% by 2035.

Dasar Tenaga Negara (DTN) 2022 – 2040

National target set for RE at 18,431MW in 2040.

1.2. INDICATOR

Energy

1.3. SUB-INDICATOR

Renewable Energy

1.4. LAST UPDATE

13 May 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Organisation: The entity undergoing the evaluation.

Energy: Energy resources, which refer to substances like fuels, petroleum products, heating and cooling, and electricity in general, because a significant portion of the energy contained in these resources can easily be extracted to serve a useful purpose.

Renewable energy: Energy resources that is collected from renewable resources that are naturally replenished on a human timescale. It includes sources such as sunlight, wind, the movement of water, and geothermal heat.

Renewable fuel: Fuel resources that is produced from renewable resources. Examples include biofuels and Hydrogen fuel. This is in contrast to non-renewable fuels such as natural gas, LPG, petroleum, coal, and other fossil fuels and nuclear energy.

Energy consumption: An energy usage by the organisation and all its sub-entities for its operations and activities.

Energy savings: An energy consumption reduction measured against a baseline year.

Reporting period: The time span for which the instrument assesses the organisation. Unless required otherwise time span should be one year.

2.2. UNIT OF MEASURE

Percentage (%) of renewable energy used with reference to the total energy used within the organisation.

Percentage (%) of renewable fuel used with reference to the total fuel used within the organisation.

3. METHODOLOGY

3.1. DATA SOURCES

Energy consumption: Meter energy usage readings (i.e., kWh, kJ, MMBTU), electricity bills (i.e., kWh, kJ, MMBTU), or any other documents recording the energy consumption for the organisation.

Renewable energy consumption: Meter renewable energy production readings (i.e., kWh, kJ), utility bills (i.e., kWh, kJ, MMBTU), or any other documents recording the renewable energy consumption for the organisation.

Fuel consumption: Bills of quantities for fuels (i.e., litres of fuel, kg of fuel, cu.ft of gases), or any other documents recording the fuel consumption for the organisation.

Certificates of analysis (COA): COA for fuels shall be referred to determine calorific values of fuels used (if applicable).

3.2. DATA COLLECTION METHOD

Energy consumption:

1. Meter usage reading showing a consumption of energy over a period of time. Typically, meter reading is provided with a monthly time span. The total energy consumed shall be computed by taking the total meter readings for individual months over the period of the reporting year. In the event that more than one energy source is available, the sum of the meter readings shall be considered.
2. If there are more than one type of energy being consumed, a common energy unit shall be utilised. (e.g., MWh, MJ)
3. Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for energy purchased with the assumption that the energy purchased is consumed within the reporting period.

Renewable Energy consumption:

1. Meter usage reading showing a generation of renewable energy over a period of time. Typically, meter reading is provided with a monthly time span. The total renewable energy generated shall be computed by taking the total meter readings for individual months over the period of the reporting year. In the event that more than one energy source is available, the sum of the meter readings shall be considered.
2. If there are more than one type of renewable energy being generated, a common energy unit shall be utilised. (e.g., MWh, MJ)
3. Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for energy purchased with the assumption that the energy purchased is consumed within the reporting period.

Fuel consumption:

1. Bills of quantities of fuel for fuels purchased shall be used to represent consumption of fuel over a period of time. The total fuel consumed shall be computed by taking the total quantities for the period of the reporting year. In the event that more than one fuel source is consumed, the sum of the quantities of fuel consumed shall be considered.
2. Other forms of evidence acceptable include, purchase invoices, bill of lading, and other similar documents.
3. If there are more than one type of fuel being consumed, a common energy unit shall be utilised. (e.g., MWh, MJ)
4. The energy unit of fuels shall be computed by multiplying the calorific value (e.g., J/kg, kJ/l) of the fuel with the quantity (e.g., kg, l). Refer to the Appendix for the list of common calorific value that can be used as reference. In the event of fuels not listed in the Appendix, the assessor shall request from the organisation for such information accompanied by respective reference document (e.g., certificates of analysis for fuel calorific value, literature reference).
5. Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for fuel purchased with the assumption that the energy purchased is consumed within the reporting period.

Fuel consumption coming from renewable sources:

1. Bills of quantities of fuel for fuels coming from renewable purchased shall be used to represent consumption of renewable fuel over a period of time. The total renewable fuel consumed shall be computed by taking the total quantities for the period of the reporting year. In the event that more than one renewable fuel source is consumed, the sum of the quantities of fuel consumed shall be considered.
2. Other forms of evidence acceptable include, purchase invoices, bill of lading, and other similar documents. Documents and records of renewable fuels consumed (e.g., biomass, biogas) can also serve as evidence.
3. If there are more than one type of renewable fuel being consumed, a common energy unit shall be utilised. (e.g., MWh, MJ)
4. The energy unit of renewable fuels shall be computed by multiplying the calorific value (e.g., J/kg, kJ/l) of the fuel with the quantity (e.g., kg, l). Refer to the Appendix for the list of common calorific value that be used as reference. In the event of fuels not listed in the Appendix, the assessor shall request from the organisation for such information accompanied by respective reference document (e.g., certificates of analysis for fuel calorific value, literature reference).
5. Other documents that can be used as evidence are purchase invoices received by utility providers or suppliers for fuel purchased with the assumption that the energy purchased is consumed within the reporting period.

Observations: Observations are made during the site visit to understand the actual case scenario of the green initiative implementation within the boundaries of the organisation.

Interviews: Interviews with respondent carried out to acquire insight of the processes/activities involved within the boundaries of the organisation.

Questionnaires/surveys: A set of questions designed for respondent to acquire insight of the processes/activities involved within the boundaries of the organisation.

Documents reviews: Documents reviewed during the site visit to support the observation.

3.3. COMPUTATION

The renewable energy percentage and renewable fuel percentage for the reporting period can be calculated using the following equations:

Percentage (%) of renewable energy consumption =

$$\frac{\left[\begin{array}{c}\text{Energy consumption coming from} \\ \text{RE sources (i. e. , kWh, kJ, MMBTU)}\end{array}\right]}{\left[\begin{array}{c}\text{Total energy consumption} \\ \text{(i. e. , kWh, kJ, MMBTU)}\end{array}\right]} \times 100\%$$

Percentage (%) of renewable fuel consumption =

$$\frac{\left[\begin{array}{c}\text{Fuel consumption coming from} \\ \text{renewable sources (unit for fuel)}\end{array}\right]}{\left[\begin{array}{c}\text{Total fuel consumption} \\ \text{(unit for fuel)}\end{array}\right]} \times 100\%$$

3.4. ASSUMPTIONS AND UNCERTAINTIES

Wherever fuel characteristic information is used for calculations, it shall be noted that the averaging of such characteristics (i.e., calorific value) contributes to uncertainties.

Any and all averaging approach to consumption data shall be noted and wherever practicably possible the uncertainties shall be quantified.

Total energy consumed for the reporting period shall be calculated based on the actual consumption of energy for each month within the reporting period. In the event of data unavailability, average consumptions can be provided. Averaging approaches and assumptions made should be described in sufficient detail.

Total fuel consumed for the year of reporting shall be calculated based on the actual consumption of fuel for each month within the reporting period. Each type of fuel should be calculated separately.

Suggested unit for fuel as follows:

Liquid fuel (i.e., petrol, diesel, oil, etc.) - litres of fuel

Solid fuel (i.e., coal, woodchip, etc) - kg of fuel

Gaseous fuel (i.e., natural gas, LPG, etc.) – MMBTU or cu.ft of gases

If the organisation is reporting both renewable electricity and renewable fuels, the energy units should be standardised in MWh or MJ and reported in combination.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

There are no limitations to this indicator.

4.2. VALIDATION

Renewable Energy Certificate (REC) issued by Tenaga Nasional Berhad (TNB) or GSPARX Sdn. Bhd. to validate total amount of renewable energy subscribed.

4.3. QUALITY MANAGEMENT

Not applicable.

5. REFERENCES

1. National Energy Efficiency Action Plan 2016 – 2025
2. Malaysia Renewable Energy Roadmap (MyRER)
3. Dasar Tenaga Negara (DTN) 2022 – 2040
4. The Sustainable Development Goals (SDGs)

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: INNOVATION

SUB-INDICATOR: KNOWLEDGE TRANSFER AND COLLABORATION

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: Establishment of strategic partnership/collaboration/JV/ knowledge transfer programme for innovation in green practices and commercialisation initiatives.

Sustainable Development Goal 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.

Sustainable Development Goal 9: Build resilient infrastructure, promote sustainable industrialisation, and foster innovation.

Sustainable Development Goal 12: Ensure sustainable consumption and production patterns.

Green Technology Master Plan (GTMP) 2017 – 2030 Strategic Thrust

ST2: Market Enablers

8.3.6 Introducing Roll-Out Plans Comprising Human Capital Development and Public - Private Collaboration to Green the Cities

8.3.7 International Collaborations

ST3: Human Capital Development

8.4.2 Greater Collaboration with Tertiary Institutions for Upskilling of Graduates

Dasar Sains, Teknologi, Inovasi Negara (DSTIN) 2021 – 2030

ST1: Advancing Scientific and Social Research Development and Commercialisation

1. Increase Gross Expenditure on R&D (GERD) to at least 2.0% of GDP by 2020
2. Enhance the performance of public and private Research, Development & Commercialisation funding

1.2. INDICATOR

Innovation

1.3. SUB-INDICATOR

Knowledge transfer and collaboration

1.4. LAST UPDATE

13 May 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITION

Knowledge transfer: Method of sharing information, abilities, ideas, discoveries, and skills across different areas/community that encourages innovation and boost efficiency in the organisation system. The activity involves research, academic engagement for technology transfer or commercialisation through the relationship between collaborative partners, with outcomes of successful knowledge or technology transfer and commercialisation.

Strategic collaboration: Strategic actions or programs in innovation practice to achieve specific goals and objectives of mutual benefit to the parties involved, creating values for intended audience/clients/consumers/stakeholders.

2.2. UNIT OF MEASURE

Not applicable

3 DATA SOURCE AND DATA COLLECTION METHOD

3.1 DATA SOURCES

Contract agreements: Documents indicating mutual obligations between two or more parties such as Letter of Intent (LOI)/Non-Disclosure Agreement (NDA)/Memorandum of Understanding (MOU)/Memorandum of Agreement (MOA).

Intellectual Property (IP): Documents related to intellectual protection such as copyrights, trademarks, trade secret, industrial design, utility innovation or patent.

Proof of Return on Value:

Economic Value: Financial accounting report indicating outlining investment, revenue and net profit based on commercialisation/ marketing attribution success of innovative green products/ services.

Social Value: Project completion report with evidence of applied/ implemented/reviewed innovation practices which leads to pre-set goals that are measurable improvements on existing practices of identified community.

Other related Value: Project report or document information improvement on productivity/practice/System and resource and material-efficiency leading to improved air and water quality/fewer waste/more renewable energy sources and other sustainable conditions.

3.2 DATA COLLECTION METHOD

Contract agreements

Evidence indicating a formal contract or agreement within collaborative parties:

1. Letter of Intent (LOI)/Non-Disclosure Agreement (NDA)/ Memorandum of Understanding (MOU)/Memorandum of Agreement (MOA).

Intellectual Property (IP)

1. Provisional IP application document or;
2. E-Filling document or;
3. Published detailed of invention or;
4. IP Award certificate/letter or;
5. IP filing number

Organisation may present proof of Economic ROI and/or Social Value ROI

Proof of Return on Investment (ROI) or Return on Value (ROV):

Proof of Economic ROI

1. Financial accounting report of commercialised product/ service solution resulting from innovation project. (e.g., commercial activities, transactions, order, invoice)

2. Proof of positive return on investment (ROI) is not necessary. However, organisation will only need to proof that commercialised product/service is going to or actively being promoted to market.

Proof of Social Value ROI

1. Project completion report (clearly shows measurable pre-set goals to improve existing practices related to community engagement outlining innovation product/service/process applied/implemented/system/management/productivity reviewed on identified community).
2. In the event of an ongoing project, proof of actual goals is not yet necessary. However, proof plan or ongoing engagement with community must be present through official project documents.

Proof of Other ROV

1. Project completion report with evidence of improvement on productivity/practice/System and resource and material-efficiency leading to improved air and water quality/fewer waste/more renewable energy sources and other sustainable conditions.

3.3 COMPUTATION

Not applicable

3.4 ASSUMPTIONS AND UNCERTAINTIES

Not applicable

4 OTHER METHODOLOGICAL CONSIDERATIONS

4.1 COMMENT AND LIMITATION

Not applicable

4.2 VALIDATION

Not applicable

4.3 QUALITY MANAGEMENT

1. Malaysian Standards (MS) - Standards Malaysia
2. Local or International Product Certification – SIRIM
3. Good Design Mark – Malaysia Design Council
4. MyHIJAU Mark - MGTC

5. REFERENCES

1. Green Practice Guideline for Services Sector (Final Report Draft 2022)
2. Green Technology Master Plan Malaysia/GTMP (2017 – 2030)
3. Dasar Sains, Teknologi dan Inovasi Negara/DSTIN (2021 – 2030)
4. Dasar Keusahawanan Negara/DKN (2030)
5. Sustainable Development Goals (SDG) 2030
6. Dasar Perubahan Iklim Negara

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: INNOVATION

SUB-INDICATOR: RESEARCH AND DEVELOPMENT (R&D)

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal 1: Establishment of Research & Development (R&D) process, output, and policy for organisation.

Goal 2: To increase investment or incentive received to support innovation in green practice to promote commercialisation, Intellectual Property and award/recognition within the organisation.

Sustainable Development Goal 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.

Sustainable Development Goal 9: Build resilient infrastructure, promote sustainable industrialisation, and foster innovation.

Sustainable Development Goal 12: Ensure sustainable consumption and production patterns.

Green Technology Master Plan (GTMP) 2017 – 2030 Strategic Thrust

ST4: Research & Development & Commercialisation (R&D&C)

8.5.1 A key steppingstone towards an innovative Green Technology (GT) hub

8.5.1.1 R&D&C Projects

8.5.2 Encouraging more localised and demand driven R&D&C

ST2: Market Enablers

8.3.2 Funding GT project development

8.3.3 Exploring Alternative GT Financing Ecosystem

8.3.4 GT Incentives

Dasar Sains, Teknologi, Inovasi Negara (DSTIN) 2021 – 2030

ST1: Advancing Scientific and Social Research Development and Commercialisation

1. Enhance commercialisation and increase uptake of home-grown R&D innovative products through clear guidelines and standards compliance
2. Increase Gross Expenditure on R&D (GERD) to at least 2.0% of GDP by 2020

1.2. INDICATOR

Innovation

1.3. SUB-INDICATOR

Research and Development (R&D)

1.4. LAST UPDATE

13 May 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1 DEFINITIONS

Research & Development (R&D): Activities that organisation undertakes to innovate and introduce new improvised products and services.

Commercialisation: The process of bringing new products and services to market.

Innovation: Innovation refers to activity that contribute to the creation of key products, services, or processes to reduce the harm, impact, and deterioration of the environment while optimising the use of natural resources.

Products: Product innovation involves creating new products or improved versions of existing products that increase their uses or impact in green solution/environment. It applies the concept of green to the entire process of product innovation by increasing resource utilisation, efficiently promoting green production design, and positively promoting corporate financial performance.

Services: Green service innovation includes elements such as green invention, environmental service portfolio, environmental service delivery, and environmental service design. Distinct from other service innovations, green service innovation focuses on environmental social responsibility and customer experience.

Intellectual Property: Form of property that includes any tangible/ intangible creations of human intellect, green practices, or green innovation initiatives. Namely patents, copyrights, industrial design, utility innovation, trademarks, and trade secrets.

Social innovations: New solutions (products/services/models/ markets/processes) that simultaneously meet a social need and lead to new or improved capabilities and relationships and better use of assets and resources.

2.2 UNIT OF MEASURE

Not applicable

3. DATA SOURCE AND DATA COLLECTION METHOD

3.1 DATA SOURCES

Innovation Management Procedure: Sets of policies, processes and procedures used by organisations to ensure fulfilment of tasks required to achieve operational objective for innovation (including financial success, safe operation, product quality, client relationships, legislative and regulatory conformance, and worker management).

Organisational Structure: Refers to systems which outlines how innovation activities are formalised through functions within an R&D unit and within the boundaries of the organisations under evaluation.

Product/Design/System/Solution Blueprint/Refers to related standard documents/record/proof of concept and pertaining innovation outcome.

Project Charter: A document that describes an innovation project in its entirety. (Overview, an outline of scope, an approximate schedule, a budget estimate, anticipated risks, and key stakeholders.

Grant Proposal: A document proposing a research project requesting for sponsorship of that research.

Grant Award Document: A written agreement between the organisation and a grantee as the official notification of grant approval with evidence for contractual grant reporting.

Investment Records: Financial documents/records used as evidence for internal and external investment of technology or system which enables innovation process/research/practice/ development in the organisation.

Intellectual Property (IP): Provisional IP application document/ E-Filling document/published detailed of invention on intellectual protection within copyright, trademark, patents, geographical indications, plant varieties, industrial designs and semiconductor integrated circuit layout designs.

Recognition/Award/Certification: Refers to the state or quality innovation product/process/service that are recognised or acknowledged by certified bodies.

Proof of Return on Value:

Economic Value: Financial accounting report indicating outlining investment, revenue and net profit based on commercialisation/ marketing attribution success of innovative green products/ services.

Social Value: Project completion report with evidence of applied/ implemented/reviewed innovation practices which leads to pre-set goals that are measurable improvements on existing practices of identified community.

Other related Value: Improvement on productivity/practice/ System and resource and material-efficiency leading to improved air and water quality/fewer waste/more renewable energy sources and other sustainable conditions.

3.2 DATA COLLECTION METHOD

The data to be collected should prove the existence of a Research and Development (R&D) unit/dept/personnel with proof of project document and R&D result that includes any one of the suggested types of evidence.

Proof of in-House R&D Process (any of the following):

Existence of R&D unit/dept/personnel/appointment

1. A unit or section or department that has a role on promoting innovation (e.g: R&D department, testing department, incubation unit) or;
2. Appointment letter or minute meeting indicating specific Person in Charge for a R&D project related to green practices.
3. Position or job title in charge in R&D, testing or innovation (e.g: Project manager, Research Supervisor,) or;
4. A project or an activity promoting innovation in management procedure within the reporting period. (e.g: new product development, Innovation Competition, Design improvement, product or service refinement) or;
5. In the event of unit or section specifically promoting innovation is not present, a specific team that work on innovation project can be considered as evidence of innovation management system in place.

Product/Design/System/Solution Blueprint

1. Evidence illustrates the outcome from R&D, Commercialisation, or Innovation (eg: Technical Drawing, System Drawing or chart, Layout, Product blueprint, Prototype, Model Making, Mock-ups, Proof of Concept Development).
2. A proof of service system (eg: System Flowchart, Apps, Software Development).

Project Charter: Project Plan and Proposal or Project Roadmap outlining the overview of project, scope, schedule, estimated budget.

Proof of Research & Development Investment (any of the following):

Grant Proposal:

1. Proof of submitted grant proposal outlining context, objectives, and methods leading to research and development project for innovation activities/product/services/process. or;
2. Grant proposal draft that will be submitted within the year of reporting period. (With proof of call for submission poster/ email/letter)

Grant Award Document:

1. Grant agreement for research and development project – active grant. (eg: Grant letter, Contract agreement, grant certificate, Proof of grant/financial) or;
2. Grant payment (eg: Proof of grant/financial record or transaction) or;
3. Grant Monitoring records (eg: Project progress report, financial statements)

Investment Records:

1. Financial documents/records used as evidence for internal and external investment of technology or system which enables innovation process/research/practice/development in the organisation.
2. A written agreement between the organisations as the official notification of grant/fund/sum value invested with evidence for contractual investment reporting.

Internal/external investment of innovation-enabling technology or system:

1. Agreement, subscription, assignment, or other document evidencing in physical form an investment appointing the organisation as custodian.
2. Purchase or installation record of system or technology.

Proof of Research & Development Outcome/Project Report (any of the following):

Proof of Return on Investment (ROI) or Return on Value (ROV):

Proof of Economic ROI

1. Financial accounting report of commercialised product/ service solution as a result of innovation project. (e.g commercial activities, transactions, order, invoice)
2. Proof of positive return on investment (ROI) is not necessary, organisation will only need to proof that commercialised product/service is going to or actively being promoted to market.

Proof of Social Value ROI

1. Project completion report (clearly shows measurable pre-set goals to improve existing practices related to community engagement outlining innovation product/service/process applied/implemented/system/management/productivity reviewed on identified community).
2. In the event of an ongoing project, proof of actual goals is not yet necessary. However, proof plan or ongoing engagement with community must be present through official project documents.

Proof of Other ROV: Project completion report with evidence of improvement on productivity/practice/System and resource and material-efficiency leading to improved air and water quality/fewer waste/more renewable energy sources and other sustainable conditions.

Intellectual Property (IP):

1. Provisional IP application document/E-Filling document/ published detailed of invention on intellectual protection within copyright, trademark, patents, geographical indications, plant varieties, industrial designs and semiconductor integrated circuit layout designs.
2. E-Filling document or;
3. Published detailed of invention or;
4. IP Award certificate/letter or;
5. IP filling number.

Recognition/Award/Certification:

1. Recognition of achievement, label, standards or special acknowledgment on Innovative solution, product or services. (eg: MyHIJAU mark, Eco-label mark, MS mark, or significant recognition promoting innovation).
2. Certificate for Research & Development outcome from local or international agencies, association, government bodies and authorities (eg: Product Certification from SIRIM, Standards Malaysia, MGTC, MRM or MyIPO).
3. Proof of award received from R&D&C&I initiative, projects, programs, or venture. (eg: Local or International recognised award/organiser/provider).

3.3 COMPUTATION

Not applicable

3.4 ASSUMPTIONS AND UNCERTAINTIES

Not applicable

4. OTHER METHODOLOGICAL CONSIDERATIONS

Not applicable

4.1 COMMENT AND LIMITATION

Not applicable

4.2 VALIDATION

Not applicable

4.3 QUALITY MANAGEMENT

- Malaysian Standards (MS) – Standards Malaysia
- Local or International Product Certification – SIRIM
- Good Design Mark – Malaysia Design Council
- MyHIJAU Mark – MGTC

5. REFERENCES

1. Green Practice Guideline for Services Sector (Final Report Draft 2022)
2. Green Technology Master Plan Malaysia/GTMP (2017 – 2030)
3. Dasar Sains, Teknologi dan Inovasi Negara/DSTIN (2021 – 2030)
4. Sustainable Development Goals (SDG) 2030
5. Dasar Keusahawanan Negara/DKN (2030)

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: MANAGEMENT

SUB-INDICATOR: GREEN PROCUREMENT

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal: Encourage companies to adopt sustainable practices and integrate sustainability information into their reporting cycle.

This goal is mapped to SDG #12 - Sustainable consumption and production, specifically addressing target #12.6 - Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (Sustainable target reporting in companies).

1.2. INDICATOR

Management

1.3. SUB-INDICATOR

Green Procurement

1.4. LAST UPDATE

13 May 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITIONS

Boundary: A defined border that accounts for and limits the key business activities and processes which form the basis of the study or analysis.

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Reporting period: The period for which the instrument assesses the organisation. Unless required, otherwise period should be one year.

Management: Management from an organisational perspective refers to planning, organising, and administering its resources and activities effectively to achieve specific objectives efficiently.

Green Procurement: The acquisition of environmentally friendly products and services, including setting environmental requirements in selecting suppliers, contractors, and contract agreements.

2.2. CONCEPTS

Not applicable.

2.3. UNIT OF MEASURE

Not applicable.

3. METHODOLOGY

3.1. DATA SOURCES

Policy or standards: Refers to a written policy and/or international/national standards used/implemented within the organisation's boundaries.

Monitoring records: Refers to documents/records used as evidence and primary data to achieve the intended goals.

Contract agreements: Documents are evidence for indicating mutual obligations between the parties.

Purchasing records and documents: Documents indicate the organisation acquiring services or/and products/systems.

3.2. DATA COLLECTION METHOD

Policy or standards:

1. A green procurement written document that states services or/and products/systems.
2. A description of company guidelines related to services or/and products/systems.
3. Strategic action plan document of a company on green procurement commitments.
4. Green procurement policy document related to the organisation's services or/and products/systems.

Monitoring Records:

1. A statement of green practices activities related to green procurement that are shared in minutes of meetings, mission & vision, website, social media, and others.
2. Recognition of certificate and award on green procurement activities in national and international organisations.

Contract agreements: A documented agreement on green procurement related to services or/and products/systems (LoI/MoU/MoA).

3.3. ASSUMPTION AND UNCERTAINTIES

Not applicable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

Not applicable.

4.2. VALIDATION

Any nationally and internationally recognised eco-label certification.

4.3. QUALITY MANAGEMENT

ISO 20400:2017 (Green Procurement)

5. REFERENCES AND DOCUMENTATION

1. Sustainable Development Goals (SDG) 2030.
2. ISO 20400:2017 Guideline

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: MANAGEMENT

SUB-INDICATOR: POLICY AND PROGRAMME

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal: Encourage small, medium, and large companies to adopt sustainable practices and reporting.

This goal is aligned with the Sustainable Development Goals (SDGs) created by the United Nations in its 2030 Agenda. Sustainable Development #12.6 focuses on small, medium, and large companies adopting sustainable practices by integrating sustainable information into their reporting cycle. This goal is crucial to ensure that the pattern of Consumption and Production should be sustainable as the key to sustaining the livelihoods of current and future generations.

1.2. INDICATOR

Management

1.3. SUB-INDICATOR

Policy and Programme

1.4. LAST UPDATE

13 May 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITIONS

Boundary: A defined border that accounts for and limits the key business activities and processes which form the basis of the study or analysis.

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Reporting period: The period for which the instrument assesses the organisation. Unless required, otherwise time span should be one year.

Management: Management from an organisational perspective refers to planning, organising, and administering resources and activities effectively to achieve specific objectives efficiently.

Policy: Documented statement to achieve specific goals by the organisations.

Programme: An activity that supports the achievement of the stated goal. The results of the project activities must have a direct, real, and measurable impact on achieving the intended purpose

2.2. CONCEPTS

Not applicable.

2.3. UNIT OF MEASURE

Not applicable.

3. METHODOLOGY

3.1. DATA SOURCES

Policy or standards: Refers to a written policy and/or international/ national standards used/implemented within the organisation's boundaries.

Monitoring records: Refers to documents/records used as evidence and primary data to achieve the intended goals.

Contract agreements: Documents are evidence for indicating mutual obligations between the parties.

3.2. DATA COLLECTION METHOD

Policy or standards:

1. Policy or standards comply with local, national, and international legislation and regulations (e.g., Environmental Quality Act 1974).
2. Policy or standards of green practice by the organisation (e.g., ISO standards).
3. Developed guidelines or standard operating procedures of any green practice by the organisation (e.g., MyHIJAU Guidelines).
4. A planned roadmap and implemented strategy of new green practices (e.g., National Green Growth Roadmap).

Monitoring Records:

1. Reports of participation in any sustainability programs on the website, social media, posters, and minutes of meetings.
2. Recognition of certificate and award received on sustainability programs at national and international levels.

Contract agreements:

1. A written agreement of green practices commitment among employees and top management (e.g., Vision and missions of organisation).
2. A written agreement of green practices commitment with industries (e.g., MOU/MOA/LOI/LOA/NDA).
3. A written agreement of green practices commitment for corporate social responsibility (CSR) (e.g., Community).

3.3. ASSUMPTION AND UNCERTAINTIES

Not applicable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

Not applicable.

4.2. VALIDATION

Not applicable.

4.3. QUALITY MANAGEMENT

ISO 9001:2015 (Quality Management Systems)
ISO 14001:2015 (Environmental Management System)
ISO 45001:2018 (OSHA)

5. REFERENCES

1. Sustainable Development Goals (SDG) 2030.
2. ISO 9001:2015 Guideline
3. ISO 14001:2015 Guideline
4. ISO 45001:2018 Guideline

INDICATOR INSTRUMENT FACTSHEET

INDICATOR: MANAGEMENT

SUB-INDICATOR: HUMAN CAPITAL

1. INDICATOR INFORMATION

1.1. GOALS AND TARGETS

Goal: Encourage companies to adopt sustainable practices and integrate sustainability information into their reporting cycle.

This goal is mapped to SDG #12 - Sustainable consumption and production, specifically addressing target #12.6 - Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle (Sustainable target reporting in companies).

1.2. INDICATOR

Management

1.3. SUB-INDICATOR

Human Capital

1.4. LAST UPDATE

3 May 2023

1.5. RELATED SECTORS

This indicator instrument applies to the following sectors:

- Agriculture & Plantation
- Aquaculture
- Construction
- Forest operation
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITIONS

Boundary: A defined border that accounts for and limits the key business activities and processes which form the basis of the study or analysis.

Baseline year: A reference point in time against which a measure of consumption and/or production in the present and/or future are measured.

Reporting period: The period for which the instrument assesses the organisation. Unless required, otherwise period should be one year.

Human Capital: A productive wealth embodied in labour, skills, and knowledge that can be developed, recruited, trained, and managed to achieve organisational goals.

2.2. UNIT OF MEASURE

Not applicable.

3. METHODOLOGY

3.1. DATA SOURCES

Policy or standards: Refers to a written policy and/or international/ national standards used/implemented within the boundaries/ organisations.

Monitoring records: Refers to documents/records used as evidence and primary data to achieve the intended goals.

Contract agreements: Documents are evidence for indicating mutual obligations between the parties.

Purchasing records and documents: Documents indicate the organisation acquiring services or/or products/systems.

3.2. DATA COLLECTION METHOD

Policy or standard:

1. Human capital development document that stated key performance indicators related to green practices.
2. A strategic action plan on human capital development that the organisation undertakes to meet its green practices.
3. Policy on human capital development related to green practices applied in the organisation.

Monitoring Records:

1. Minutes of meetings related to human capital development.
2. A statement of documented human capital development that the organisation shares on its website, social media, and other media of communications.
3. Recognition of organisational human capital development activities (e.g., certificate, award at national and international levels).

Contract agreements: A documented agreement indicating mutual obligations between the parties that is related to human capital development.

3.3 ASSUMPTIONS AND UNCERTAINTIES

Not applicable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1 COMMENT AND LIMITATION.

Not applicable.

4.2. VALIDATION

Not applicable.

4.3. QUALITY MANAGEMENT

ISO 30414:2018 (Human Resource Management)

5. REFERENCES AND DOCUMENTATION

1. Sustainable Development Goals (SDG) 2030.
2. ISO 30414:2018 Guide

QUESTIONNAIRE

1. Cost-benefit analysis: This involves comparing the costs of implementing the evaluation method with the potential benefits that it is expected to produce.

   (a) On a scale of 1-5, how expensive is it to implement this evaluation method?
   (1 = very inexpensive, 5 = very expensive)

   (b) On a scale of 1-5, how much of a benefit is this evaluation method expected to produce?
   (1 = no benefit, 5 = significant benefit)

   (c) On a scale of 1-5, how likely is it that the benefits of this evaluation method will outweigh the costs?
   (1 = not likely at all, 5 = extremely likely)

   (d) On a scale of 1-5, how confident are you that the costs of this evaluation method can be financed?
   (1 = not confident at all, 5 = extremely confident)

   (e) On a scale of 1-5, how well does this evaluation method compare to other evaluation methods in terms of cost-benefit ratio?
   (1 = much worse, 5 = much better)

   (f) On a scale of 1-5, how much of an impact does this evaluation method have in terms of unintended consequences?
   (1 = no impact, 5 = significant impact)

   (g) On a scale of 1-5, how much of an impact does this evaluation method have in terms of long-term costs or benefits?
   (1 = no impact, 5 = significant impact)

   (h) On a scale of 1-5, how much of an impact does this evaluation method have in terms of regulatory or legal considerations?
   (1 = no impact, 5 = significant impact)

2. Feasibility study: This is a comprehensive analysis of the potential risks, challenges and opportunities of the evaluation method, including the resources required and the potential impact on the stakeholders.

   (a) On a scale of 1-5, how easy is it to implement this evaluation method?
   (1 = very difficult, 5 = very easy)

   (b) On a scale of 1-5, how well does this evaluation method fit within the available resources and constraints?
   (1 = not well at all, 5 = extremely well)

   (c) On a scale of 1-5, how likely is it that this evaluation method will be successful given the available resources and constraints?
   (1 = not likely at all, 5 = extremely likely)

   (d) On a scale of 1-5, how much time is required to implement this evaluation method?
   (1 = very little time, 5 = a significant amount of time)

   (e) On a scale of 1-5, how well does this evaluation method perform during the pilot testing?
   (1 = not well at all, 5 = extremely well)

   (f) On a scale of 1-5, how well does this evaluation method perform in terms of logistics?
   (1 = not well at all, 5 = extremely well)

   (g) On a scale of 1-5, how well does this evaluation method perform in terms of data accessibility?
   (1 = not well at all, 5 = extremely well)

   (h) On a scale of 1-5, how well does this evaluation method perform in terms of expert review?
   (1 = not well at all, 5 = extremely well)

3. Time analysis: This involves analysing the amount of time required to implement the evaluation method, including the time required for data collection, analysis, and reporting.

   (a) On a scale of 1-5, how much time is required to set up this evaluation method?
   (1 = very little time, 5 = a significant amount of time)

   (b) On a scale of 1-5, how much time is required for data collection with this evaluation method?
   (1 = very little time, 5 = a significant amount of time)

   (c) On a scale of 1-5, how much time is required for data analysis with this evaluation method?
   (1 = very little time, 5 = a significant amount of time)

   (d) On a scale of 1-5, how much time is required for reporting with this evaluation method?
   (1 = very little time, 5 = a significant amount of time)

   (e) On a scale of 1-5, how often does the data need to be updated with this evaluation method?
   (1 = rarely, 5 = frequently)

   (f) On a scale of 1-5, how much of an impact does this evaluation method have on staff time?
   (1 = no impact, 5 = significant impact)

   (g) On a scale of 1-5, how much of an impact does this evaluation method have on the project timeline?
   (1 = no impact, 5 = significant impact)

   (h) 8. On a scale of 1-5, how well does this evaluation method fit within the overall project schedule?
   (1 = not well at all, 5 = extremely well)

   (i) On a scale of 1-5, how much flexibility is there to adjust the timing of data collection and analysis with this evaluation method?
   (1 = very little flexibility, 5 = a lot of flexibility)

   (j) On a scale of 1-5, how much time is required for training personnel to use this evaluation method?
   (1 = very little time, 5 = a significant amount of time)

4. Pilot testing: This involves testing a small-scale version of the evaluation method to identify any potential issues or challenges that need to be addressed before full implementation.

   (a) On a scale of 1-5, how well did this evaluation method perform during the pilot test?
   (1 = not well at all, 5 = extremely well)

   (b) On a scale of 1-5, how well did the evaluation method meet the needs of the test participants?
   (1 = not well at all, 5 = extremely well)

   (c) On a scale of 1-5, how well did the evaluation method achieve the desired outcomes?
   (1 = not well at all, 5 = extremely well)

   (d) On a scale of 1-5, how much feedback did test participants provide about the evaluation method?
   (1 = very little feedback, 5 = a lot of feedback)

   (e) On a scale of 1-5, how well did the evaluation method perform compared to other similar methods tested?
   (1 = not well at all, 5 = extremely well)

   (f) On a scale of 1-5, how feasible is it to implement this evaluation method on a larger scale?
   (1 = not feasible at all, 5 = extremely feasible)

   (g) On a scale of 1-5, how much of an impact did the evaluation method have on the pilot test participants?
   (1 = no impact, 5 = significant impact)

   (h) On a scale of 1-5, how well did the evaluation method perform in terms of data accuracy?
   (1 = not well at all, 5 = extremely well)

   (i) On a scale of 1-5, how well did the evaluation method perform in terms of data reliability?
   (1 = not well at all, 5 = extremely well)

   (j) On a scale of 1-5, how well did the evaluation method perform in terms of data validity?
   (1 = not well at all, 5 = extremely well)

5. Expert review: This involves consulting with experts in the field to gain their perspective on the feasibility of the evaluation method, including any potential challenges and opportunities.

   (a) On a scale of 1-5, how well does this evaluation method align with current industry standards and best practices?
   (1 = not well at all, 5 = extremely well)

   (b) On a scale of 1-5, how well does this evaluation method address the research question or problem it is intended to solve?
   (1 = not well at all, 5 = extremely well)

   (c) On a scale of 1-5, how well does this evaluation method utilise appropriate methods and techniques?
   (1 = not well at all, 5 = extremely well)

   (d) On a scale of 1-5, how well does this evaluation method account for potential sources of bias?
   (1 = not well at all, 5 = extremely well)

   (e) On a scale of 1-5, how well does this evaluation method account for potential confounding variables?
   (1 = not well at all, 5 = extremely well)

   (f) On a scale of 1-5, how well does this evaluation method account for potential ethical concerns?
   (1 = not well at all, 5 = extremely well)

   (g) On a scale of 1-5, how well does this evaluation method account for potential limitations?
   (1 = not well at all, 5 = extremely well)

   (h) On a scale of 1-5, how well does this evaluation method account for potential uncertainties?
   (1 = not well at all, 5 = extremely well)

   (i) On a scale of 1-5, how well does this evaluation method account for potential generalisability?
   (1 , not well at all, 5 = extremely well)

   (j) On a scale of 1-5, how well does this evaluation method perform in terms of data quality?
   (1 = not well at all, 5 = extremely well)

6. Stakeholder analysis: This involves identifying and assessing the perspectives and needs of the stakeholders affected by the evaluation method, to understand the feasibility of the method in relation to their needs and concerns.

   (a) On a scale of 1-5, how important are the stakeholders in the success of this evaluation method?
   (1 = not important at all, 5 = extremely important)

   (b) On a scale of 1-5, how satisfied are stakeholders with this evaluation method?
   (1 = not satisfied at all, 5 = extremely satisfied)

   (c) On a scale of 1-5, how well does this evaluation method meet the needs of the stakeholders?
   (1 = not well at all, 5 = extremely well)

   (d) On a scale of 1-5, how much input did stakeholders have in the development of this evaluation method?
   (1 = no input, 5 = significant input)

   (e) On a scale of 1-5, how well does this evaluation method align with the goals and objectives of the stakeholders?
   (1 = not well at all, 5 = extremely well)

   (f) On a scale of 1-5, how well does this evaluation method account for potential stakeholder conflicts?
   (1 = not well at all, 5 = extremely well)

   (g) On a scale of 1-5, how well does this evaluation method account for potential stakeholder resistance?
   (1 = not well at all, 5 = extremely well)

   (h) On a scale of 1-5, how well does this evaluation method account for potential stakeholder power imbalances?
   (1 = not well at all, 5 = extremely well)

   (i) On a scale of 1-5, how well does this evaluation method consider the perspectives of diverse stakeholders?
   (1 = not well at all, 5 = extremely well)

   (j) On a scale of 1-5, how well does this evaluation method involve stakeholders in the implementation and monitoring process?
   (1 = not well at all, 5 = extremely well)

7. Logistics: This involves assessing the logistical aspects of the evaluation method, including the availability of necessary equipment, personnel, and facilities required to implement the evaluation method.

   (a) On a scale of 1-5, how well does this evaluation method fit within the existing infrastructure and resources?
   (1 = not well at all, 5 = extremely well)

   (b) On a scale of 1-5, how much additional infrastructure and resources are required for this evaluation method?
   (1 = no additional resources, 5 = significant additional resources)

   (c) On a scale of 1-5, how well does this evaluation method account for potential logistical challenges?
   (1 = not well at all, 5 = extremely well)

   (d) On a scale of 1-5, how well does this evaluation method account for potential geographical challenges?
   (1 = not well at all, 5 = extremely well)

   (e) On a scale of 1-5, how well does this evaluation method account for potential seasonal challenges?
   (1 = not well at all, 5 = extremely well)

   (f) On a scale of 1-5, how well does this evaluation method account for potential security challenges?
   (1 = not well at all, 5 = extremely well)

   (g) On a scale of 1-5, how well does this evaluation method account for potential scalability?
   (1 = not well at all, 5 = extremely well)

   (h) On a scale of 1-5, how well does this evaluation method account for potential sustainability?
   (1 = not well at all, 5 = extremely well)

   (i) On a scale of 1-5, how well does this evaluation method account for potential adaptability?
   (1 = not well at all, 5 = extremely well)

   (j) On a scale of 1-5, how well does this evaluation method account for potential data privacy?
   (1 = not well at all, 5 = extremely well)

Link to Google form:

https://docs.google.com/forms/d/e/1FAIpQLSenOOok7nloLCSrkRLYF5CW0yX3_u5k_Jup7UM-1Vec9w5Zrw/viewform?usp=sf_link