KEMENTERIAN SUMBER ASLI, ALAM SEKITAR
DAN PERUBAHAN IKLIM

GREEN PRACTICES GUIDELINE FOR CONSTRUCTION SECTOR

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GREEN PRACTICES GUIDELINE FOR

CONSTRUCTION SECTOR

Malaysian Green Technology and Climate Change Corporation

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TERMINOLOGIES

Green Construction Practices	Environmentally responsible and resource-efficient structures and methods are used throughout the life cycle of development, encompassing buildings from siting to design, construction, operation, maintenance, renovation, and deconstruction.
Green Building Codes	Go beyond baseline code requirements, serve as a testing ground for future standards, and give jurisdictions another tool for managing building and development in a less disruptive, more appropriate manner.
Green Guidelines	Practical suggestions/ideas are offered to aid in the greening of company functions.
Construction Industry	Industry-related to construction works, including design, manufacturing, technology, material and workmanship and services for purposes of construction.
Civil Engineering	Managing, designing, constructing, and maintaining the built and natural environments, while operating within the carrying capacity of local ecosystems and the planet, employing technologies and practices that give services to society.
Green Building	A building that, by its design, construction, or operation, reduces or eliminates negative impacts on the climate and natural environment while also having the potential to create positive ones.
Green Technology	Set of technologies that assist mankind in extracting food, feed, fibre, fuel, and fertilizer from the environment using renewable and non-renewable energies while maintaining ecosystem resilience, supporting the environment in maintaining nutrient cycles, pollination, carbon sequestration, climate regulation, waste decomposition and detoxification, purification.
Green Economy / Growth	One in which public and private investments reduce carbon emissions and pollution, improve energy and resource efficiency, and avoid the loss of biodiversity and ecosystem services, resulting in increased revenue and employment.

ABBREVIATION

ACEM	Association of Consulting Engineers Malaysia
AGC	Attorney General Chambers of Malaysia
BAS	Building Automation System
CIDB	Construction Industry Development Board
CITP	Certified Information Technology Professional
CIPAA	Construction Industry Payment & Adjudication Act 2012
COP26	26th United Nations Climate Change Conference
DASN	Dasar Alam Sekitar Negara
DOSH	Department of Occupational, Safety & Health
DOE	Department of Environment
DID	Department of Irrigation and Drainage
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPU	Economic Planning Unit
FGD	Focus Group Discussion
FM	Facilities Management
GBI	Green Building Index
Gg	Gigagrams
GTFS	Green Technology Financing Scheme
IEA	International Energy Agency
IAQ	Indoor Air Quality
JKR	Jabatan Kerja Raya
JPSPN	Jabatan Pengurusan Sisa Pepejal Negara
KASA	Kementerian Alam Sekitar dan Air
LEED	Leadership in Energy and Environmental Design
MGTC	Malaysia Green Technology and Climate Change Corporation
MOSTI	Ministry of Science, Technology and Innovation
NRECC	Ministry of Natural Resources, Environment and Climate Change
PAM	Pertubuhan Arkitek Malaysia
PV	Photovoltaic
SMEs	Small Medium Enterprises
SDG	Sustainable Development Goals
SOP	Standard Operating Procedure
SHASSIC	Safety and Health Assessment System in Construction
SCORE	Program Penilaian Keupayaan dan Kemampuan Kontraktor
TC9	Technical Committee 9
UNFCC	United Nations Framework Convention on Climate Change

CONTENT

FOREWORD

Welcome to the Green Practices Guideline; a significant milestone in the ongoing implementation of the MyHIJAU Programme since 2012 as part of the Green Industry efforts outlined in the Twelfth Malaysia Plan. This programme is under the Ministry of Natural Resources, Environment and Climate Change (NRECC) and coordinated by the Malaysian Green Technology and Climate Change Corporation (MGTC).

Eight Green Practices Guidelines were developed for the following sectors: Agriculture & Plantation, Construction, Manufacturing, Mining, Fisheries (Aquaculture), Livestock, Forest Operation, and Services. These guidelines serve as a comprehensive resource for the green industry, providing guidance on the adoption and implementation of sustainable practices at every stage of a company's production and consumption.

The development of these guidelines aligns with the National Green Technology Policy (NGTP) and the Sustainable Consumption & Production (SCP) direction, aiming to promote the use of green technology among local manufacturers, producers, and suppliers, particularly small and medium enterprises (SMEs). By incorporating green practices, we can foster a culture of sustainability and contribute to the government's vision of green development in Malaysia.

These guidelines not only emphasize the importance of integrating green practices in an organisation's business operations but also provide a roadmap for industry players in their pursuit of green technology adoption.

By adhering to these guidelines, businesses can tap into the potential of the green sector, explore green product and service offerings, and enhance their operations by incorporating sustainable practices.

In line with SDG 12.6, which advocates for the integration of sustainable practices and information sustainability into the reporting cycle, these guidelines outline the requirements that industries, companies, and organisations should follow. They are designed to be a valuable reference for all stakeholders, facilitating the government's objective of promoting and implementing green development initiatives.

As we embark on the Twelfth Malaysia Plan, with a strong focus on accelerating green growth, these guidelines emerge as a catalyst for practical and effective green practices across the industry. By prioritising environmental, social, and governance (ESG) elements in decision-making processes, companies can significantly reduce their negative impact on the environment while increasing productivity and long-term profitability.

Although Malaysia's contribution to greenhouse gas emissions stands at 0.7 percent, the government remains committed to reducing GHG emission intensity by 45 percent relative to GDP by 2030. This commitment aligns with our aspiration to become a low carbon nation. By embracing green practices and incorporating knowledge about the benefits and applications of green technology, the industry can play a pivotal role in achieving this goal.

We hope that these Green Practice Guidelines will serve as a foundation for industry-wide understanding and adoption of sustainable practices. By embracing the principles outlined within this guide, businesses can gain recognition as leaders in the green industry and contribute to a cleaner, greener, and more sustainable future for Malaysia.

Let us join hands in the pursuit of a thriving green industry and a better world for generations to come.

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 organizations 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.
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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 organizations in Malaysia.

Purpose

To provide guidance and recommendations for manufacturing industries in the implementation of green practices.

Approach

The Guideline emphasizes the optimization of natural resource consumption, energy usage, and water management, while concurrently reducing toxic emissions and waste generation.

Optimize

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

Circularity

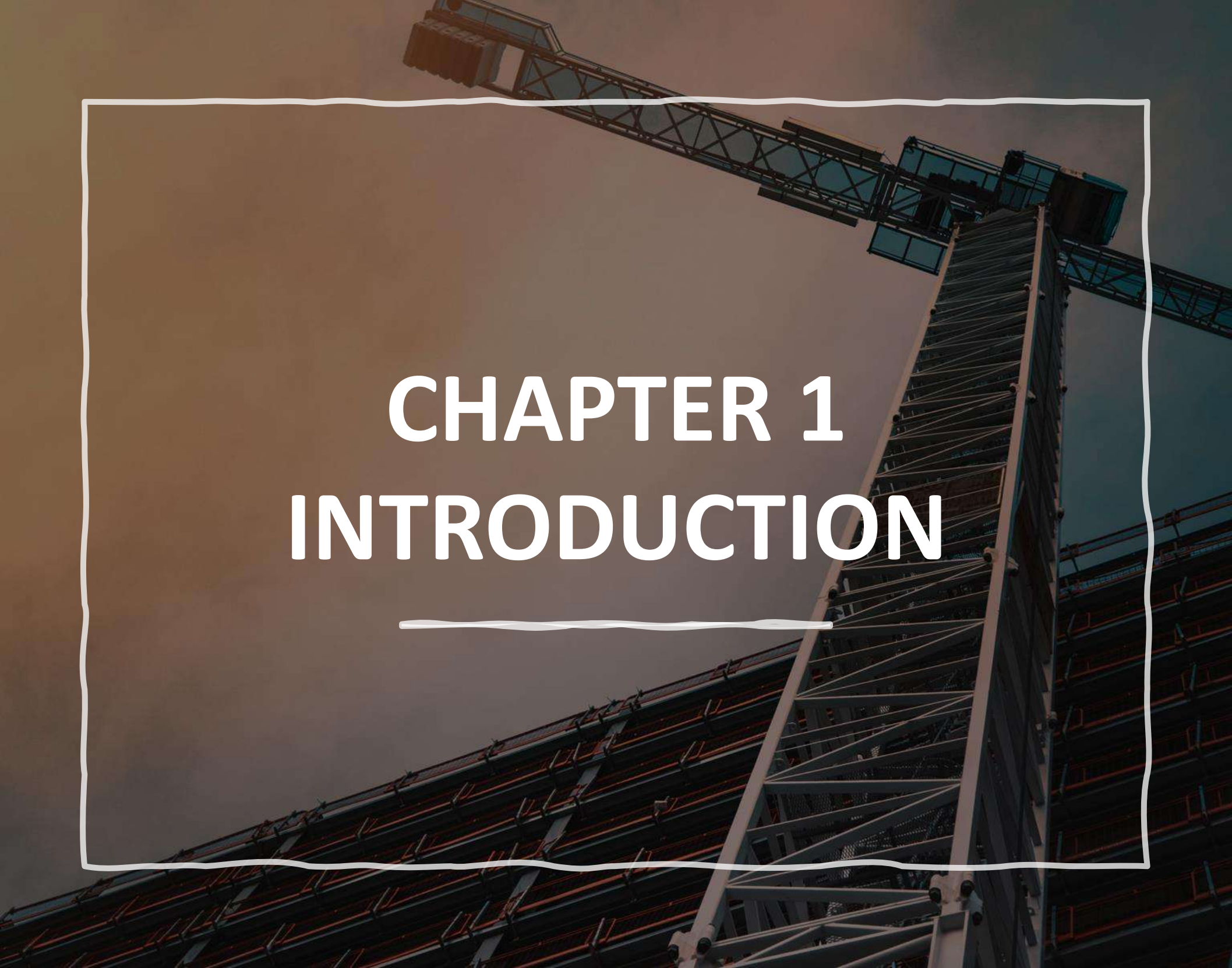
Encourage the adoption of circular economy principles by increasing the reuse, recycling, and reduction of materials, energy, and water.

Reduce

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

Implement

Promote the utilization of innovative green technologies to enhance processes and operations.



CHAPTER 1
INTRODUCTION

1.1 ABOUT THE SECTOR

According to data from the Department of Statistics Malaysia, Malaysia population reached **32.7 million** in 2021 (Department of Statistic Malaysia,2021).

Since independence, Malaysia has generally registered continuous economic growth and this development has brought numerous benefits including improved social

As the **population increases**, the demand for housing, infrastructure and utility increases. Economic development in Malaysia has contributed to environmental degradation and uncontrolled

Nonetheless, the **conventional method** of construction is not efficient enough to cope with the increasing demand for development.

ABOUT THE SECTOR

The construction sector in Malaysia plays a vital role in meeting the increasing demand for housing, infrastructure, and utilities driven by a growing population. However, traditional construction methods are often inefficient and contribute to environmental degradation and uncontrolled development. The need for sustainable practices in the construction sector is evident to mitigate the negative impacts of rapid urbanization and ensure long-term environmental and social well-being.

Data from the Department of Statistics Malaysia indicates that Malaysia's population reached 32.7 million in 2021, highlighting the pressing need for sustainable development (Department of Statistics Malaysia, 2021). While economic growth has brought numerous benefits, it has also contributed to environmental degradation. The construction sector, in particular, is recognized as one of the main sources of environmental pollution globally (World Green Building Council, 2019).

The construction industry accounts for a significant share of global energy-related carbon emissions and resource consumption. Buildings alone contribute to almost 40% of global energy-related carbon emissions and consume 50% of all extracted materials (UNFCCC COP26, 2021). Moreover, the sector's demand for natural resources accelerates climate change, and inefficient buildings have negative impacts on human health and well-being.

The construction sector in Malaysia plays a vital role in meeting the increasing demand for housing, infrastructure, and utilities driven by a growing population. However, traditional construction methods are often inefficient and contribute to environmental degradation and uncontrolled development. The need for sustainable practices in the construction sector is evident to mitigate the negative impacts of rapid urbanization and ensure long-term environmental and social well-being.

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The impact of climate change is particularly concerning for the construction sector. By 2050, over 800 million people in more than 570 cities will be vulnerable to sea-level rise and coastal flooding, while 1.6 billion urban dwellers will face regular exposure to extreme high temperatures (World Green Building Council, 2021). With the projected doubling of the world's building stock and nearly 70% of the global population residing in urban areas by 2060, it is imperative to address the environmental footprint of the construction sector (World Green Building Council, 2021).

Green technology offers a significant opportunity to mitigate the environmental impacts of the construction sector. By adopting green practices, such as energy-efficient technologies, sustainable waste management, water conservation, and reduced carbon emissions, the construction industry can play a pivotal role in achieving the goals outlined in Malaysia's Green Technology Master Plan (GMTP).

The integration of green practices in the construction sector aligns with the objectives of the GMTP, which aims to promote the adoption of sustainable and environmentally friendly technologies across various industries. Green technology can help the construction sector reduce its carbon footprint, minimize waste generation, conserve water resources, and enhance energy efficiency.

By embracing green practices, the construction sector in Malaysia can contribute to a more sustainable future, mitigating the environmental impacts associated with rapid urbanization. It can help create healthier and more resilient communities, improve resource efficiency, and foster economic growth through the development of green infrastructure and sustainable buildings.

The construction sector plays a crucial role in Malaysia's development but faces significant environmental challenges. By adopting green practices and leveraging green technology, the sector can reduce its ecological footprint, promote sustainable development, and contribute to achieving the goals outlined in the Green Technology Master Plan. This will ensure a more sustainable and resilient future for Malaysia's built environment.

1.2 SCOPE AND APPLICATION

The Green Practices Guidelines for the Construction Sector provide a comprehensive framework for implementing sustainable and environmentally friendly practices in construction projects in Malaysia. These guidelines are designed to be applicable to both new and existing projects, regardless of whether an Environmental Impact Assessment (EIA) is required. They offer valuable insights and recommendations for organizations seeking to incorporate green construction practices into their operations.

The scope of application for these guidelines is broad, encompassing various types of construction projects and applications. Whether it's residential, commercial, or infrastructure development, the guidelines serve as a reference to promote the adoption of sustainable practices throughout the construction industry in Malaysia.

By implementing green construction practices, projects can meet the demands of development while adopting a sustainable approach. It is essential for the industry to strike a balance between economic growth, social expansion, and environmental protection. The Green Construction Guidelines provide a roadmap for achieving this balance and guide construction practitioners in incorporating sustainable principles into their projects.

The Green Construction Guideline covers a wide range of areas, addressing the utilization of key indicators such as **Materials, Waste, Water, Energy, Innovation, and Management.** These indicators align with the objectives of the Green Technology Master Plan (GTMP) and provide a holistic approach to achieving sustainability goals in the construction sector.

For example, in the context of materials, the guidelines promote the use of sustainable and recycled materials, reducing the environmental impact associated with resource extraction and consumption. Waste management practices focus on minimizing waste generation, promoting recycling and responsible disposal techniques. Water conservation measures aim to reduce water consumption during construction activities and enhance water efficiency in buildings.

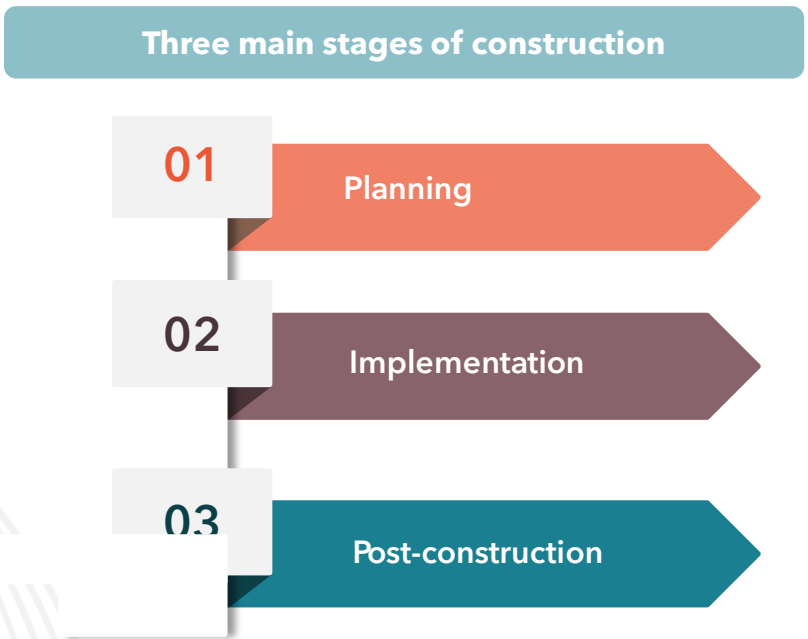
Energy efficiency is another crucial aspect addressed by the guidelines. By encouraging the adoption of energy-efficient technologies and practices, the guidelines contribute to reducing carbon emissions and overall energy consumption in the construction sector.

Innovation and management are also emphasized, urging construction practitioners to embrace innovative approaches and management systems that promote sustainable practices throughout the project lifecycle. This may include incorporating green building certifications, implementing environmental management systems, and fostering a culture of sustainability within organizations.

Throughout the three main stages of construction - planning, implementation, and post-construction - the Green Construction Practices Guideline provides specific procedures and recommendations to support the integration of sustainable practices. These guidelines not only help enhance environmental performance but also contribute to the economic and social well-being of communities.

By adopting the Green Practices Guidelines for the Construction Sector, stakeholders in Malaysia's construction industry can play a crucial role in advancing the goals outlined in the Green Technology Master Plan. These guidelines provide a roadmap for integrating sustainable practices into construction projects, facilitating the transition towards a more environmentally conscious and resilient built environment.

In conclusion, the Green Practices Guidelines for the Construction Sector serve as a valuable tool for promoting sustainability in Malaysia's construction industry. By encompassing key indicators and addressing the various stages of construction, these guidelines enable organizations to align their practices with the objectives of the Green Technology Master Plan. Through the implementation of green construction practices, the industry can achieve economic growth, social development, and environmental protection, ultimately contributing to a sustainable and resilient future for Malaysia.



1.3 MOTIVATION TO SUSTAINABILITY

Sustainability is of utmost importance in today's global business landscape, particularly in the construction sector. As a pivotal industry in economic development, construction companies must embrace sustainable practices to protect the environment and unlock a range of benefits that contribute to long-term success and competitiveness.

Environmental Responsibility

Construction companies have a responsibility to be environmentally conscious. Adopting sustainable practices allows them to minimize their ecological footprint, reduce pollution, and conserve natural resources. Demonstrating environmental responsibility showcases a commitment to safeguarding ecosystems and supports global efforts to combat climate change.

Cost Savings and Efficiency

Sustainability practices often result in long-term cost savings. Energy-efficient construction processes and equipment, waste reduction, and water conservation can lower operational expenses, enhancing financial resilience. Embracing sustainable supply chain practices improves resource efficiency, reducing material and transportation costs.

Market Demand and Reputation

Consumers increasingly prioritize environmentally friendly construction projects. Embracing sustainability in the construction sector allows companies to tap into the growing market demand for eco-conscious and socially responsible products. A strong commitment to sustainability enhances reputation, builds trust with stakeholders, and fosters brand loyalty.

Regulatory Compliance and Market Access

Sustainability practices align with and exceed environmental regulations. Proactively complying with regulations and anticipating future requirements helps companies avoid fines and legal issues. Adhering to sustainability standards opens access to international markets with stringent environmental requirements, expanding reach and export opportunities.

Innovation and Competitiveness

Sustainability drives innovation, prompting exploration of new technologies and processes in the construction sector. Companies investing in green technologies and sustainable construction methods gain a competitive edge. Sustainable practices foster creativity and problem-solving, enabling companies to stay ahead in a rapidly evolving global economy.

Employee Engagement and Productivity

Commitment to sustainability boosts employee morale and engagement. Working for environmentally responsible organizations is a source of pride for employees. Companies prioritizing sustainability attract and retain top talent, leading to increased productivity and job satisfaction.

Resilience to Climate Risks

Incorporating sustainability practices builds resilience to climate-related risks in the construction sector. Strategies to mitigate and adapt to climate change impacts, such as extreme weather events or supply chain disruptions, ensure business continuity and protect assets.

By embracing sustainable practices in the construction sector, companies not only contribute to a more environmentally conscious industry but also reap the benefits of cost savings, market demand, regulatory compliance, innovation, employee engagement, and resilience to climate risks. These efforts position construction companies as leaders in sustainability, driving positive change and shaping a more sustainable future for the industry.

1.3.1 CLIMATE CHANGE

Climate change poses a significant challenge in the 21st century, and it is crucial to recognize that economic development should not come at the expense of the environment. The construction sector plays a substantial role in addressing this challenge by controlling greenhouse gas (GHG) emissions and mitigating the impacts of climate change for the well-being of present and future generations.

In Malaysia, the construction industry ranks as one of the significant sources of GHG emissions, contributing to the country's overall emissions. As part of Malaysia's commitment to climate action and green technology, the nation aims to become a low-carbon economy by 2050. This includes a target to reduce GHG emissions (against Gross Domestic Product: GDP) by 45% by 2030 compared to the 2005 level.

This national aspiration creates opportunities for businesses in the construction sector to contribute to climate change mitigation. Some specific examples include:

Green Building Practices: Construction companies can adopt sustainable building practices that prioritize energy efficiency, utilize renewable energy sources, and reduce overall carbon emissions. This includes incorporating green design principles, using eco-friendly materials, and implementing energy-efficient technologies and systems.

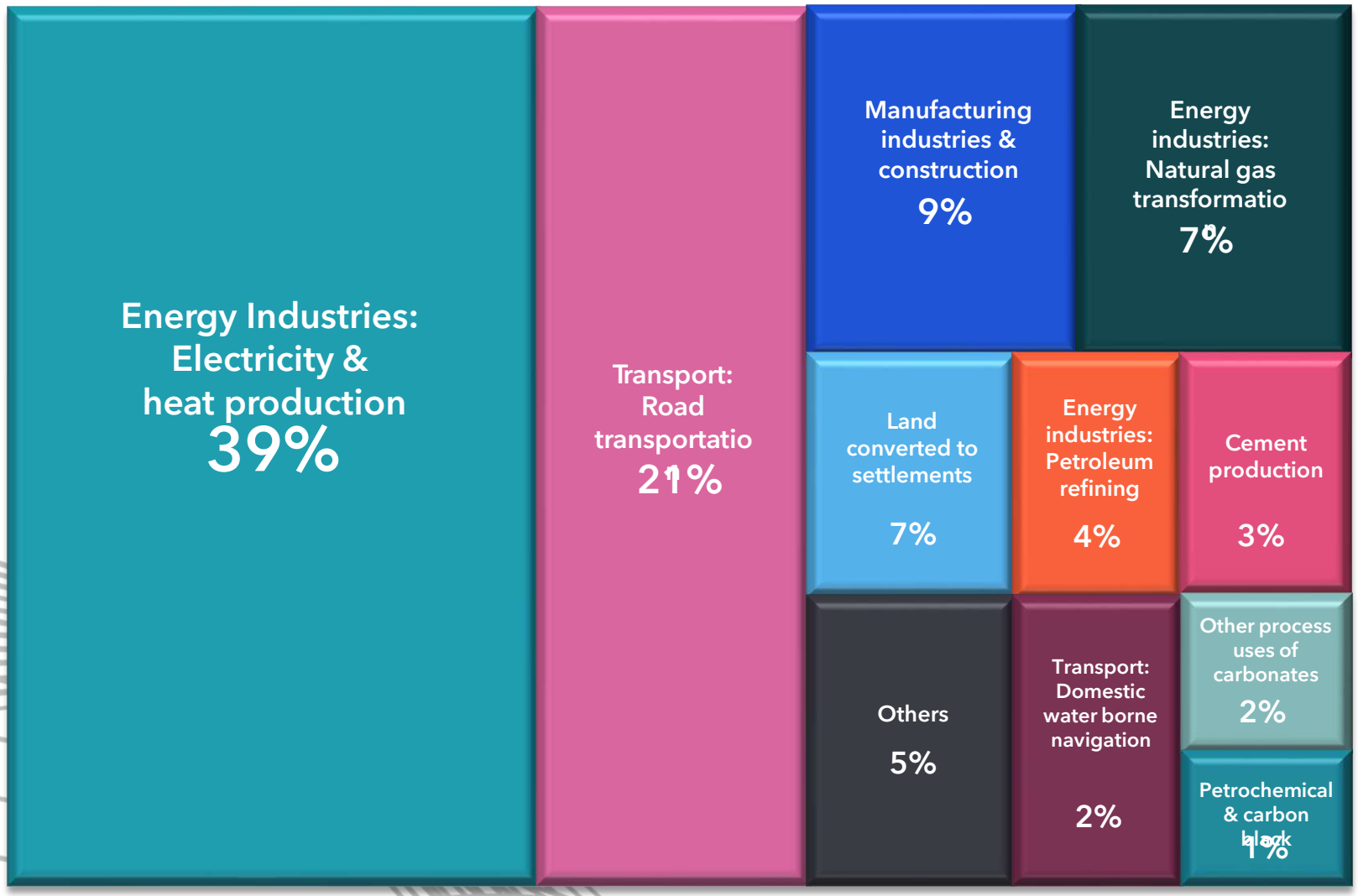
Carbon Footprint Reduction: Companies can implement measures to minimize their carbon footprint throughout the construction process. This includes optimizing transportation and logistics, reducing waste generation, promoting recycling and reuse of materials, and implementing efficient construction site management practices.

Sustainable Infrastructure Development: Embracing sustainable infrastructure development involves integrating climate resilience, resource efficiency, and environmental considerations into construction projects. This includes designing infrastructure that can withstand climate change impacts, such as extreme weather events, and incorporating green spaces and biodiversity conservation.

Collaboration and Partnerships: Engaging in collaborations and partnerships with stakeholders across the construction value chain can drive sustainability initiatives. This may involve working with architects, engineers, suppliers, and clients to collectively identify and implement sustainable practices, exchange knowledge, and share best practices.

Regulatory Compliance and Certification: Adhering to relevant environmental regulations and seeking certifications such as Green Building Index (GBI) or Leadership in Energy and Environmental Design (LEED) can demonstrate a commitment to sustainability. Compliance with these standards not only helps reduce environmental impact but also enhances the reputation and market competitiveness of construction companies.

By embracing sustainable practices in the construction sector, companies can contribute to Malaysia's climate goals, reduce their environmental impact, and position themselves as leaders in the industry. These efforts align with global sustainability objectives, enhance reputation, attract environmentally conscious investors, and ensure long-term viability in an environmentally conscious world.


Energy Industries: Electricity & heat production
39%
Transport: Road transportatio
21%
Manufacturing industries & construction
9%
Energy industries: Natural gas transformatio
7%
Land converted to settlements
7%
Energy industries: Petroleum refining
4%
Cement production
3%
Others
5%
Transport: Domestic water borne navigation
2%
Other process uses of carbonates
2%
Petrochemical & carbon black
1%

RENEWABLE ENERGY

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 Co2eq

Hydropower

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

Emission avoidance
6,535.99 Gg Co2eq

NATIONAL ENERGY EFFICIENCY ACTION PLAN (NEEAP)

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

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

Emission avoidance
458.02 Gg Co2eq

ENERGY EFFICIENT VEHICLES (EEVs)

Malaysia aims to become a regional hub for energy efficient vehicles (EEVs) through strategic investments & 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 2024

Emission avoidance
90.65 Gg Co2eq

GREEN BUILDING RATING SCHEME

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

Existing Standards:

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

Green certification:

- Green Building Index (GBI)
- GreenRE

Emission avoidance
143.47 Gg Co2eq

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 Co2eq

NATURAL GAS VEHICLES

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

Benefits of programs:
- Lower retail prices
- Incentives
- Road tax reduction
- Import duty & sale tax exemption

Emission avoidance
114.77 Gg Co2eq

BIODIESEL

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

Related policy & Acts:
- The National Biofuel Policy
- Malaysian Biofuel
- Industry Act

Emission avoidance
1,127.34 Gg Co2eq

OIL & GAS OPERATIONS

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

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

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

WATER PAPER RECYCLING

Target of 40% waste redirection from waste disposal sites:
- 22% through recycling
- 18% through waste treatment

Impact:
Increasing 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 Co2eq

BIOGAS RECOVERY FROM PALM OIL MILL EFFLUENT (POME)

Biogas plays a crucial role in driving Malaysia that is moving towards adopting renewable energy & 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 facilities10

Related Projects:
Entry Point Project – Developing Biogas Facilities at Palm Oil Mills
Related Programs
Economic Transformation Programme 2012

Emission avoidance
2,377.84 Gg Co2eq

AGRICULTURE

Malaysian Organics Scheme (SOM) or Malaysia Organic (MyOrganic is a certification that recognizes farms that practices good agricultural practices & organics farming based on Malaysian Standard MS1529:2015

Impacts:
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 it the Permanent Reserved Forest (PRF) is capped at 8m3/ha for the period of tenth & eleventh Malaysian Plan.

Related Certification:
Malaysian Criteria & Indicators for Forest Management Certification 2001

Emission avoidance:
20,307.50 Gg Co2eq

CONSERVATION OF BIODIVERSITY & ECOSYSTEM SERVICES

Relevant initiatives:
Malaysia's Protected Area (PA) Network

Target:
Increase the PA to at least 20% by 2025

Impact:
PA increased from 2.757 to 3.171 million ha between 2014 & 2016

FOREST ENRICHMENT PROGRAMMES

Aim:
Improve degraded forests sequestration capacity
Enhance connectivity between forests through two distinct initiatives

Examples:
Central Forest Spine (CFS) Programme in Peninsular Malaysia
Heart of Borneo (HoB) Programme in Sabah & Sarawak

1.3.2 CIRCULAR ECONOMY

The construction sector has a significant role to play in embracing the principles of the circular economy. By adopting a circular economy approach, construction companies can contribute to resource efficiency, cost-effectiveness, waste reduction, climate change mitigation, and sustainable economic growth. Here are key aspects and initiatives relevant to the construction sector in Malaysia:

Policy and Regulatory Framework:
Recognizing the importance of transitioning towards a circular economy, the Malaysian government has implemented policies and regulations to support this shift in the construction sector. The policies focus on transforming the linear economy model into a sustainable circular economy model, mitigating environmental harm caused by construction activities.

Waste Management and Recycling:
Efficient waste management and recycling systems are critical for achieving a circular economy in the construction sector. Malaysia has made progress in waste management through initiatives such as waste separation at source and proper disposal practices. Construction companies can adopt waste reduction strategies, promote recycling of construction materials, and explore innovative methods for managing construction waste.

Product Design and Extended Producer Responsibility (EPR):
Promoting sustainable product design and implementing extended producer responsibility schemes are essential in the construction sector's transition to a circular economy. Guidelines integrating eco-design principles into construction product development are being established to minimize the environmental footprint throughout the lifecycle of buildings and infrastructure projects. Exploring EPR policies for construction materials and products ensures that producers take responsibility for their products' entire lifecycle, including recycling and end-of-life management.

Consumption and Production:
Promoting sustainable consumption and production patterns is crucial in advancing the circular economy in the construction sector. Construction companies can adopt resource-efficient construction practices, utilize eco-friendly materials, and promote the use of durable and recyclable building components. Additionally, initiatives can focus on educating consumers and professionals about the environmental impact of construction choices and encouraging the adoption of sustainable construction practices.

Innovation and Technology:
Innovation and the adoption of advanced technologies are key drivers for the circular economy transition in the construction sector. Malaysia encourages research and development in areas such as sustainable construction materials, energy-efficient technologies, and waste-to-energy conversion. Government support and funding, facilitated through agencies like the Malaysian Green Technology and Climate Change Centre (MGTC), promote the adoption of innovative solutions that contribute to a circular economy in construction.

Collaboration and Stakeholder Engagement:
The successful implementation of a circular economy in the construction sector requires collaboration among various stakeholders. Construction companies can engage with government agencies, industry associations, academia, and civil society to foster partnerships and share knowledge, best practices, and resources. Platforms such as conferences and industry forums provide opportunities for collaboration and stakeholder engagement, enabling the construction sector to collectively drive the circular economy agenda forward.

By embracing circular economy principles, the construction sector in Malaysia can optimize resource use, minimize waste generation, and promote sustainable practices throughout the lifecycle of buildings and infrastructure projects. This shift will lead to long-term environmental and economic benefits, contributing to Malaysia's goals for a more sustainable and resilient future.

1.3.3 IMPACT OF ESG TOWARDS THE INDUSTRY

ESG (Environmental, Social, and Governance) considerations are of utmost importance in the construction sector in Malaysia. By integrating ESG factors into their operations, construction companies can ensure long-term sustainability and success. The following initiatives and measures specifically apply to the construction sector:

Empowering Small and Medium Enterprises (SMEs):

The Ministry of Finance has outlined strategies to support SMEs in adopting ESG practices. These include implementing principles for good governance for construction-related entities and introducing specific financing measures such as low-carbon transition facilities and grants for NGOs and social enterprises. These initiatives aim to empower SMEs in the construction sector to prioritize ESG considerations.

Sustainable Development Goals Trust Fund:

The establishment of the Malaysia Sustainable Development Goals Trust Fund (MySDG Fund) provides support for ESG efforts in the construction sector. This fund enables financing and investments aligned with the Sustainable Development Goals (SDGs), promoting sustainable practices and social impact in construction projects.

Mitigating Environmental Impacts:

The construction industry faces challenges related to pollution, resource efficiency, and greenhouse gas emissions. Adhering to ESG principles is crucial for long-term survival and aligning with the expectations of trading partners, capital markets, and financial institutions. Construction companies can focus on adopting energy-efficient practices, implementing effective waste management systems, reducing greenhouse gas emissions, and utilizing eco-friendly materials.

Climate Finance Opportunities:

In line with the goals of the Paris Agreement and the UNFCCC, developed countries have pledged financial support for climate efforts in developing nations. Construction companies in Malaysia can explore climate finance opportunities to fund their mitigation and adaptation actions. Aligning these actions with existing ESG frameworks allows construction companies to leverage funding sources and enhance their sustainability practices.

Investor Focus on ESG:

Globally, investors are increasingly emphasizing ESG frameworks when making investment decisions. For the construction sector, this means that energy efficiency, waste management, greenhouse gas emissions, water consumption, and the use of biodegradable materials are key areas of concern. By addressing these factors, construction companies can attract investment, mitigate operational risks, and maintain stable share prices.

Adopting Green Technologies:

To address environmental protection, climate change, and sustainable development, construction companies should consider integrating green technologies into their operations and management practices. This includes adopting energy-efficient construction methods, utilizing sustainable materials, and implementing innovative approaches to minimize environmental impacts.

By embracing ESG principles, the construction sector in Malaysia can enhance its environmental performance, social responsibility, and governance practices. This not only ensures long-term viability but also positions construction companies to thrive in an increasingly sustainable-focused global landscape.

1.3.4 SUSTAINABLE DEVELOPMENT GOALS

The United Nations Sustainable Development Goals (SDGs) provide a comprehensive framework for sustainable development and offer specific targets and indicators to measure progress. In the construction sector in Malaysia, embracing the SDGs is crucial for addressing global challenges and achieving sustainable development. The industry can actively contribute to several SDGs by implementing sustainable practices and adopting green technologies. Here are specific examples:

Construction companies can incorporate water-efficient technologies in building designs, such as low-flow plumbing fixtures and rainwater harvesting systems. Additionally, they can implement sustainable stormwater management practices to reduce water pollution and promote water conservation.

SDG 6: Clean Water and Sanitation:

The construction sector can support this goal by providing safe working conditions, fair wages, and training opportunities for workers. Embracing ethical labor practices and promoting inclusive employment practices, such as hiring locally and diversifying the workforce, can enhance job quality and contribute to economic growth.

SDG 8: Decent Work and Economic Growth:

Construction plays a vital role in shaping sustainable cities and communities. Implementing eco-friendly construction practices, promoting green building certifications, and integrating principles of urban planning can contribute to creating livable, resilient, and inclusive cities.

SDG 11: Sustainable Cities and Communities:

SDG 7: Affordable and Clean Energy:

Construction companies can promote the use of renewable energy sources in their projects, such as incorporating solar panels or implementing energy-efficient designs to reduce reliance on fossil fuels and contribute to clean energy generation.

SDG 9: Industry, Innovation, and Infrastructure:

By adopting innovative technologies and sustainable construction practices, the industry can promote responsible resource extraction, minimize environmental impacts, and contribute to the development of sustainable infrastructure that meets the needs of communities.

SDG 12: Responsible Consumption and Production:

The construction industry can promote responsible consumption by incorporating principles of circular economy in their operations. This involves using recycled or locally sourced materials, adopting modular construction methods for easy disassembly and reusability, and implementing construction waste management practices to minimize waste generation.

The construction sector can mitigate its carbon footprint by implementing strategies to reduce greenhouse gas emissions throughout the construction lifecycle. This includes incorporating energy-efficient designs, using sustainable materials, and adopting construction methods that minimize environmental impacts.

SDG 13: Climate Action:

Responsible construction practices and sustainable land use in the construction sector can help protect biodiversity, conserve ecosystems, and promote land restoration. This involves employing environmentally friendly techniques, adhering to reclamation and rehabilitation plans, and preserving natural habitats.

SDG 15: Life on Land:

SDG 14: Life Below Water:

Construction near coastal areas can prioritize environmental protection by implementing erosion control measures, avoiding harmful construction practices that can harm marine ecosystems, and adhering to regulations to protect sensitive marine habitats.

SDG 16: Peace, Justice, and Strong Institutions:

The construction sector can contribute to this goal by adhering to ethical business practices, ensuring transparency in procurement processes, and supporting initiatives that promote good governance, anti-corruption measures, and access to justice within the industry.

SDG 17: Partnerships for the Goals:

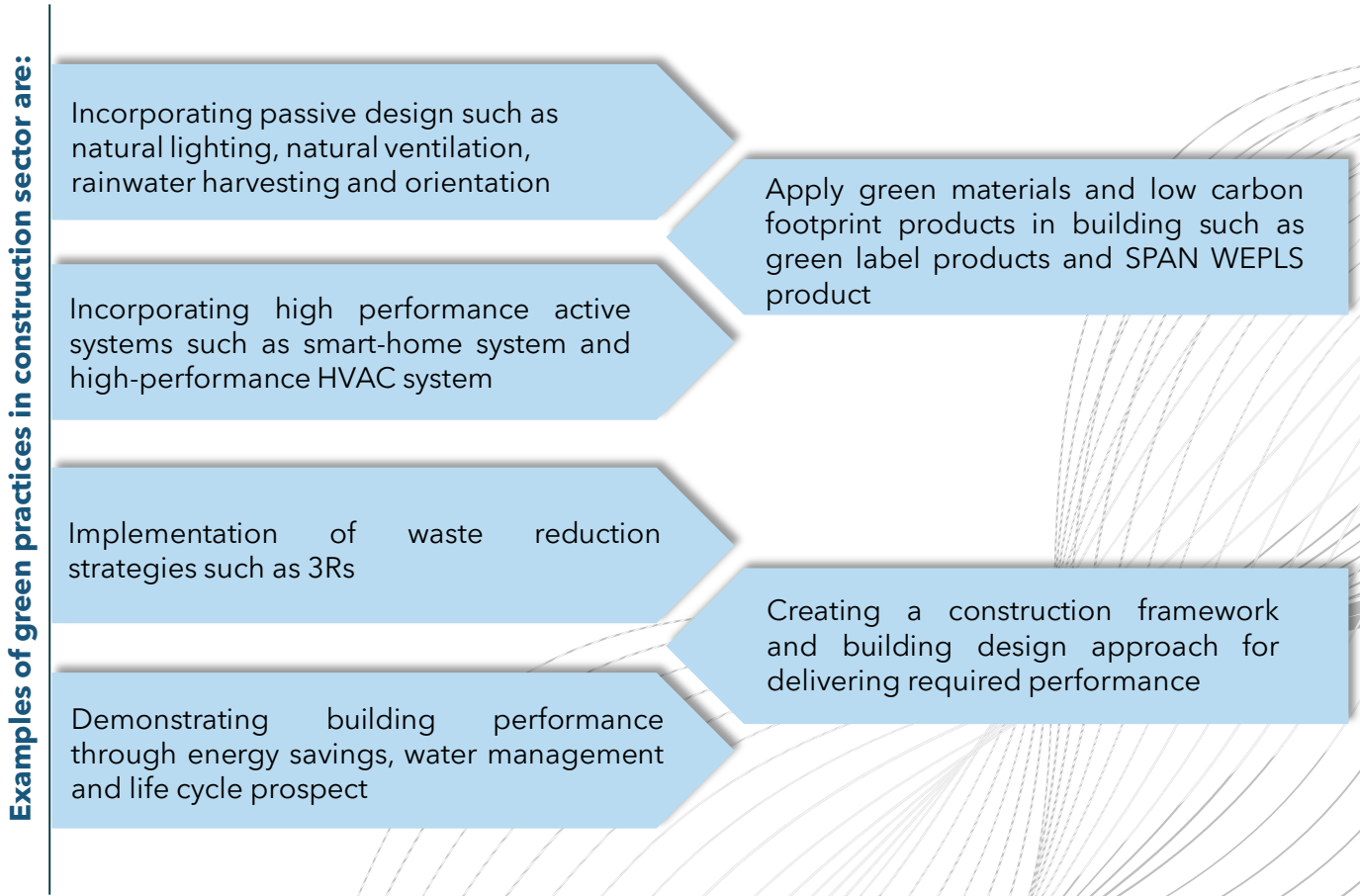
Collaboration between construction companies, government bodies, and civil society is vital for achieving sustainable development. By engaging in partnerships and initiatives, the industry can drive collective efforts to address social and environmental challenges, promote sustainable practices, and advance the SDGs.

By aligning their operations with the SDGs, the construction sector in Malaysia can contribute to the country's progress towards sustainable development, ensuring a prosperous future for all while addressing social and environmental challenges.

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).



1.4.2 GREEN PRACTICES IN THE CONSTRUCTION SECTOR

In the context of the construction sector in Malaysia, the adoption of green practices plays a vital role in promoting sustainability and aligning with global environmental goals. The construction industry has a significant impact on the environment, and by embracing green practices, it can mitigate environmental degradation and contribute to a more sustainable future.

One example of a green practice in the construction sector is the implementation of cleaner production methods. This involves utilizing technologies and processes that minimize the use of raw materials, energy, and water while reducing waste and emissions. Construction companies can adopt energy-efficient equipment, optimize construction techniques to minimize resource consumption, and implement stringent pollution control measures. For instance, incorporating energy-efficient lighting systems, utilizing sustainable building materials, and implementing effective waste management practices can significantly reduce the environmental footprint of construction projects.

Lean manufacturing principles can also be applied in the construction sector to optimize resource utilization and reduce waste throughout the value chain. Construction companies can focus on efficient inventory management, improved transportation logistics, and eliminate non-value-added activities. By implementing lean practices, unnecessary resource consumption can be minimized, leading to cost savings and reduced environmental impact.

The concept of a circular economy is also relevant to the construction sector. Embracing the principles of a circular economy involves minimizing resource extraction and waste generation by promoting reuse, recycling, and responsible disposal. Construction companies can adopt practices such as recycling construction waste materials, repurposing demolished structures, and implementing closed-loop production systems. By diverting waste from landfills and finding alternative uses for materials, the construction industry can contribute to a more sustainable and circular economy.

Ensuring a sustainable supply chain is another critical aspect of green practices in the construction sector. By working closely with suppliers, construction companies can promote responsible sourcing practices, reduce environmental impacts, and uphold social and ethical standards. This includes initiatives such as responsible sourcing of building materials, promoting fair trade practices, and implementing assessment and auditing processes to ensure sustainability throughout the supply chain.

By integrating these green practices into the construction sector, Malaysia can enhance resource efficiency, reduce environmental impacts, and contribute to the achievement of sustainable development goals. The adoption of green practices also positions the construction industry for long-term growth, improved competitiveness, and access to global markets that increasingly demand environmentally responsible products.

Moreover, aligning with government policies, guidelines, and regulations related to climate action, decarbonization, and green technology showcases the construction sector's commitment to environmental stewardship and compliance with sustainable development objectives. By actively embracing green practices and aligning with national initiatives like the Green Technology Master Plan (GTMP), the construction industry can contribute significantly to the country's sustainability agenda.

In conclusion, the integration of green practices in the construction sector in Malaysia is crucial for promoting sustainability, reducing environmental impacts, and aligning with global sustainability goals. By adopting cleaner production methods, implementing lean manufacturing principles, embracing the circular economy concept, and ensuring a sustainable supply chain, the construction industry can play a pivotal role in achieving a more sustainable and environmentally friendly built environment.

1.4.3 EXISTING NATIONAL POLICIES & GUIDELINES

The construction sector in Malaysia operates within a framework of national policies and guidelines that promote sustainable development and ensure environmental protection. These policies and guidelines provide a regulatory foundation for responsible construction practices. Here are some key policies and guidelines relevant to the sector:

National Policy on the Environment (Dasar Alam Sekitar Negara)

This policy aims to achieve continuous economic, social, and cultural progress while enhancing the quality of life for Malaysians through environmentally sound and sustainable development. It provides the overarching framework for environmental management and sets the direction for sustainable practices in the construction sector.

Environmental Quality Act 1974

This act is crucial for pollution prevention, abatement, and control, as well as the enhancement of environmental quality. It establishes regulations and standards for managing environmental impacts, including those related to construction activities, and ensures compliance with environmental requirements.

Construction Industry Development Board Act 1994 (Act 520)

This act establishes the Construction Industry Development Board (CIDB) and sets out the regulatory framework for the construction industry in Malaysia. CIDB's role includes promoting sustainable construction practices, developing standards and guidelines, and ensuring compliance with industry requirements.

Sustainable Construction Guidelines

Malaysia has developed specific guidelines for sustainable construction practices. These guidelines provide recommendations for incorporating sustainability principles into the design, construction, and operation of buildings. They cover aspects such as energy efficiency, water conservation, waste management, and materials selection.

Green Building Index (GBI)

The GBI is a recognized certification system in Malaysia that assesses the sustainability performance of buildings. It promotes the adoption of green building practices, including energy efficiency, water conservation, indoor environmental quality, and sustainable site planning. Construction companies can strive to achieve GBI certification for their projects, demonstrating their commitment to sustainable construction.

ISO Standards

ISO develops international standards applicable across industries, including the construction sector. Construction companies can adhere to ISO standards such as ISO 14001 for Environmental Management System, ISO 45001 for Occupational Health and Safety, and ISO 50001 for Energy Management System. These standards provide guidelines for environmental stewardship, occupational health and safety, and efficient energy management.

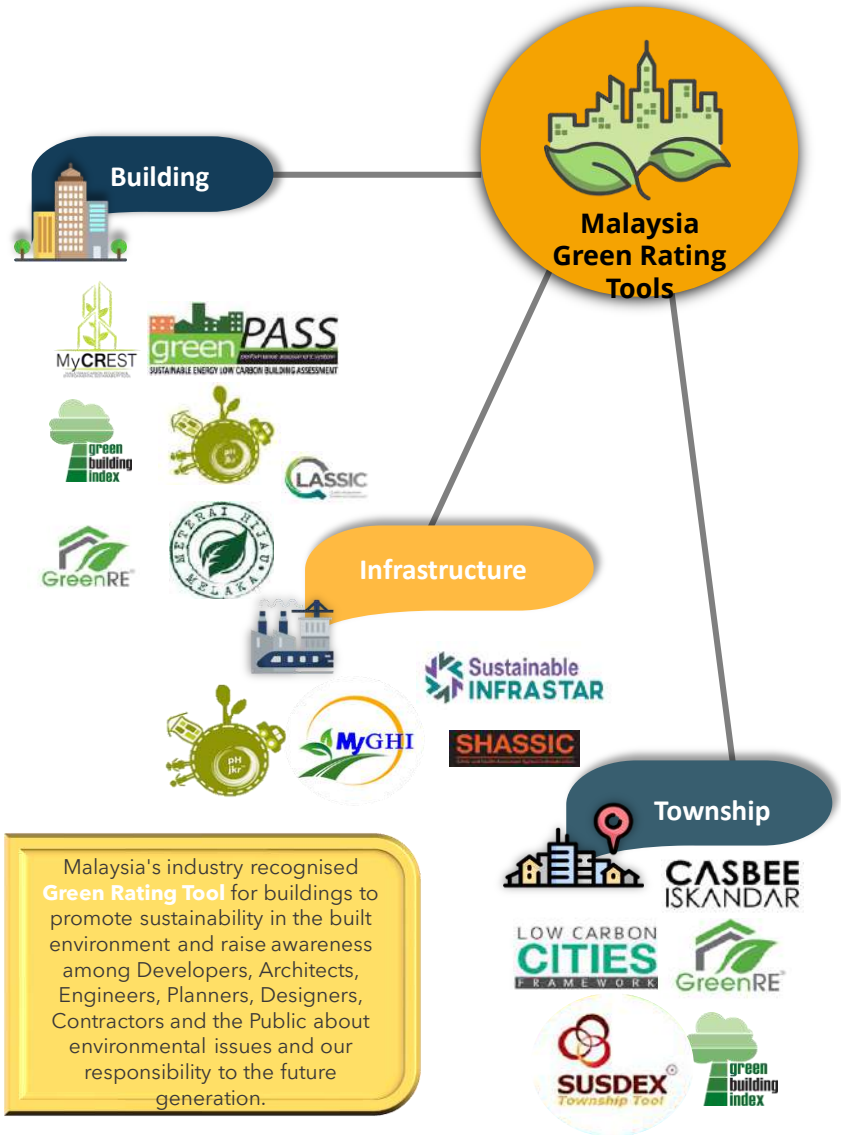
Malaysian Standard: MS1525:2019

This standard focuses on energy efficiency and the use of renewable energy in non-residential buildings. It provides a code of practice for reducing overall energy consumption and minimizing reliance on non-renewable energy sources. Construction companies can follow this standard to design and construct energy-efficient buildings.

These national policies, guidelines, and standards play a vital role in shaping the construction sector in Malaysia, ensuring responsible and sustainable practices, protecting the environment, and promoting the health and safety of workers and communities. Compliance with these policies and guidelines is crucial for the sector's long-term viability and alignment with global sustainability goals.

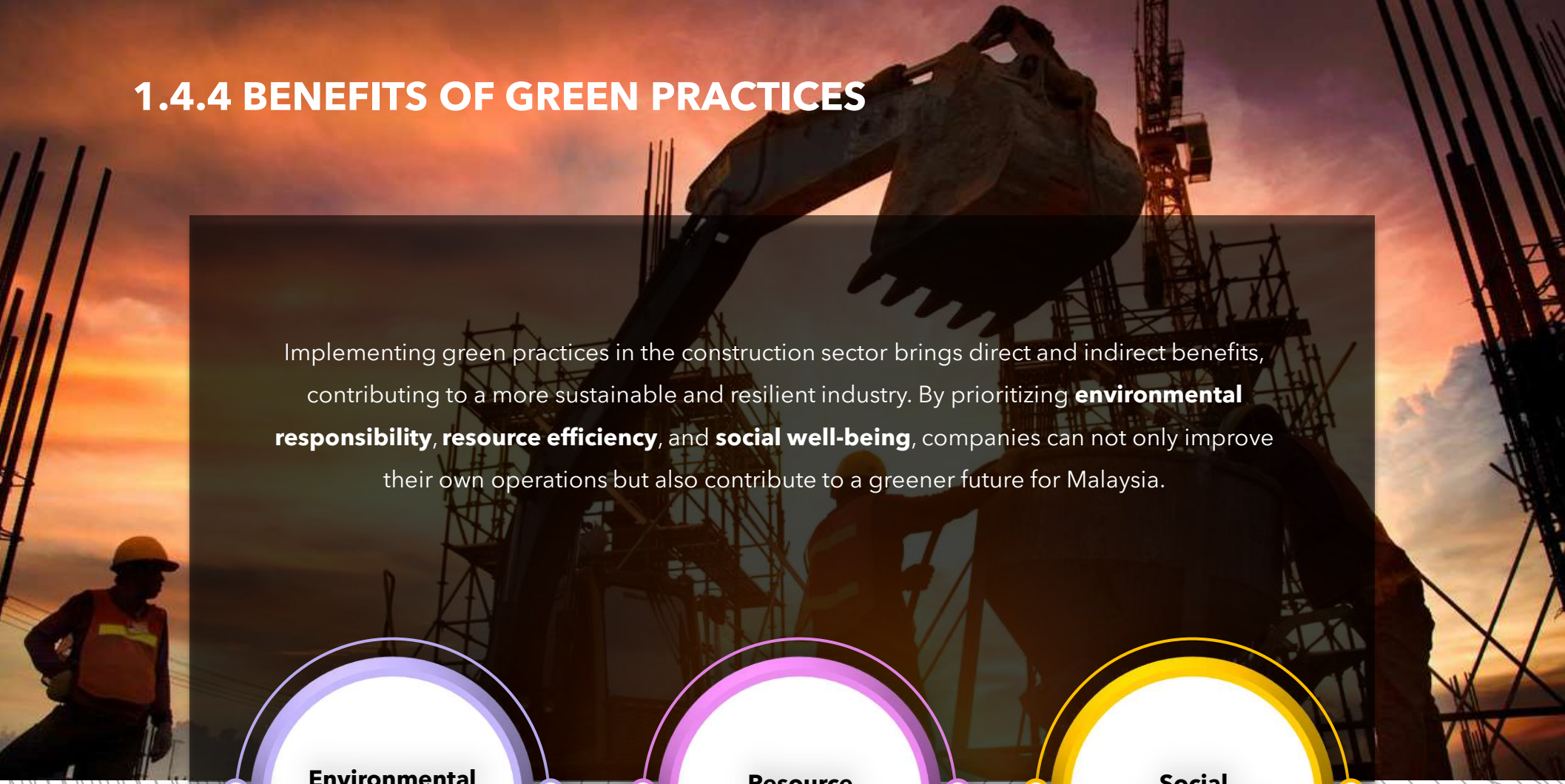
MALAYSIA

GREEN RATING TOOLS



Malaysia's industry recognised **Green Rating Tool** for buildings to promote sustainability in the built environment and raise awareness among Developers, Architects, Engineers, Planners, Designers, Contractors and the Public about environmental issues and our responsibility to the future generation.

1.4.4 BENEFITS OF GREEN PRACTICES



Implementing green practices in the construction sector brings direct and indirect benefits, contributing to a more sustainable and resilient industry. By prioritizing **environmental responsibility**, **resource efficiency**, and **social well-being**, companies can not only improve their own operations but also contribute to a greener future for Malaysia.

Environmental responsibility

Resource efficiency

Social well-being

Green practices in the construction sector in Malaysia offer numerous benefits that contribute to improved efficiency, reduced resource consumption, and enhanced sustainability.

BENEFITS of GREEN PRACTICES

Enhanced Human Resource Utilization:

Green practices in the construction industry promote better utilization of human resources. By investing in employee training and education on sustainable construction practices, companies can develop a skilled workforce capable of implementing eco-friendly building techniques, managing waste responsibly, and incorporating energy-saving measures. This not only improves productivity but also creates a more sustainable and socially responsible work environment.

Increased Efficiency and Resource Conservation:

Green practices result in improved efficiency, reducing the consumption of materials, energy, and water. Through optimized construction processes and technologies, the industry can minimize waste generation and achieve a lower carbon footprint. Examples include using prefabricated and modular construction techniques to reduce material waste, incorporating energy-efficient systems and equipment, and implementing water recycling systems on construction sites.

Support for Green Innovations:

Embracing green practices fosters an environment conducive to innovation in technology and processes. The construction sector can drive the development and adoption of sustainable construction materials, such as recycled and low-emission products. Additionally, implementing renewable energy solutions, such as solar panels and geothermal heating systems, in construction projects promotes the use of clean energy sources.

Adaptation to Global Initiatives:

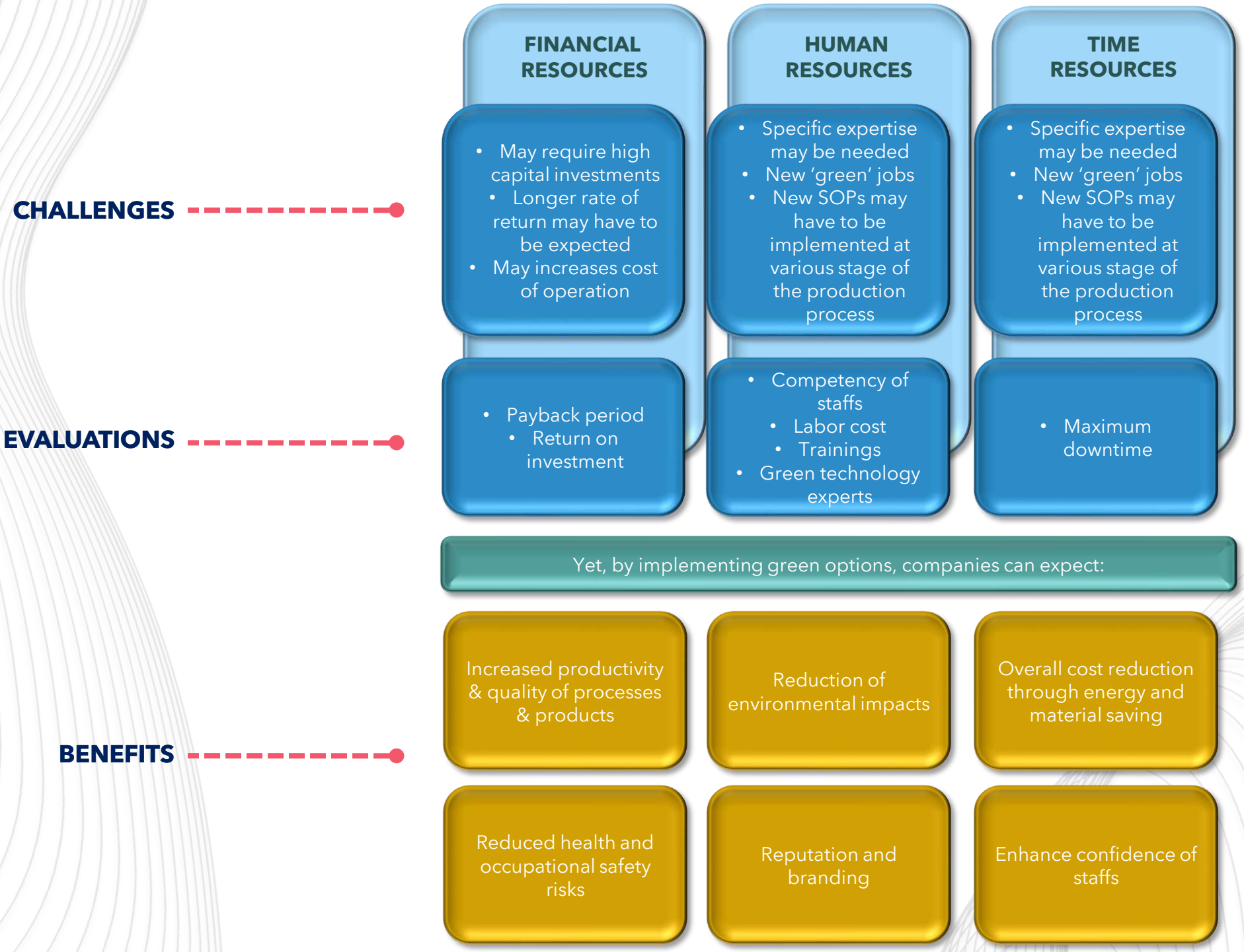
The construction industry is increasingly influenced by global initiatives promoting sustainable development and low-carbon economies. Green building certifications, such as Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Method (BREEAM), are gaining recognition worldwide. By adopting green practices, the construction sector in Malaysia can position itself as a leader in sustainable construction and adapt to evolving regulations and market demands.

Support for ESG Aspirations and Sustainability Reporting:

Green practices align with Environmental, Social, and Governance (ESG) aspirations and sustainability reporting. By integrating sustainability metrics into project planning and construction activities, companies can track and report on their environmental performance. This enhances transparency, facilitates compliance with ESG standards, and demonstrates a commitment to responsible construction practices.

Increased Productivity and Revenue:

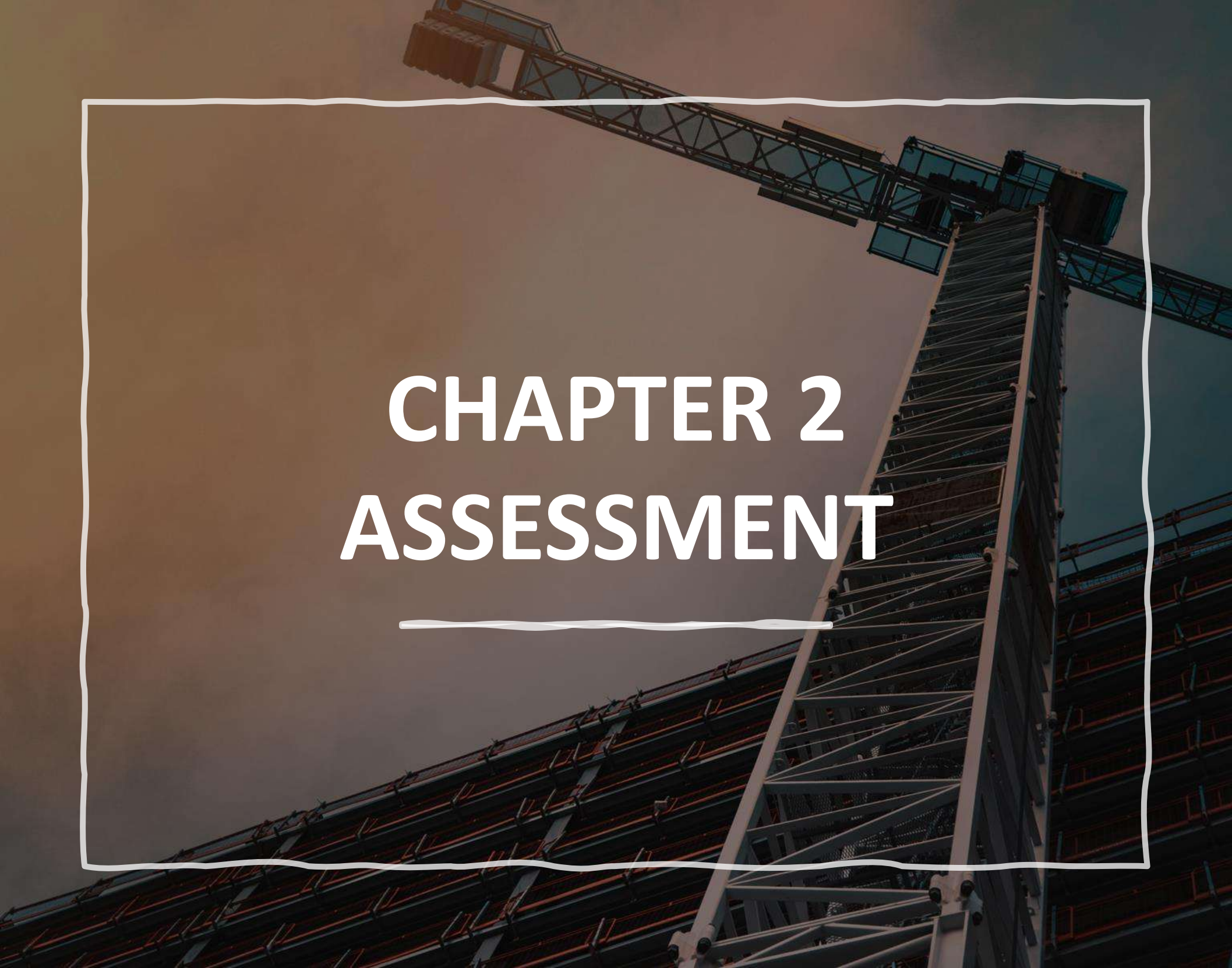
Adopting green practices often leads to increased productivity and revenue in the construction sector. By optimizing construction processes, reducing material waste, and incorporating sustainable design principles, companies can complete projects more efficiently. Moreover, the demand for green buildings and sustainable infrastructure is growing, creating new market opportunities and attracting environmentally conscious clients and investors.


FINANCIAL RESOURCES
HUMAN RESOURCES
TIME RESOURCES
CHALLENGES
• May require high capital investments
• Longer rate of return may have to be expected
• May increases cost of operation
• Specific expertise may be needed
• New 'green' jobs
• New SOPs may have to be implemented at various stage of the production process
• Specific expertise may be needed
• New 'green' jobs
• New SOPs may have to be implemented at various stage of the production process
EVALUATIONS
• Payback period
• Return on investment
• Competency of staffs
• Labor cost
• Trainings
• Green technology experts
• Maximum downtime
Yet, by implementing green options, companies can expect:
BENEFITS
Increased productivity & quality of processes & products
Reduction of environmental impacts
Overall cost reduction through energy and material 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 businesses, 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:

1-Star	• Comply to all regulatory requirements • Demonstrate leadership in developing systematic environmental reporting practical		**60% - 70%**
2-Star	• Exhibit characteristics of being resource efficient • Demonstrating positive impacts from green practices • Incorporate and implement continuous quality improvement initiatives throughout business operations		**71% - 80%**
3-Star	• Demonstrate integration of governance framework related to sustainability and circular economy • Demonstrate capacity in contributing towards achieving national decarbonization targets • Demonstrate leadership in developing, expanding and applying new tech related to green practices		**81% - 100%**



CHAPTER 2 ASSESSMENT

2.1 ABOUT THE ASSESSMENT OF GREEN PRACTICES

Green practices in the construction sector in Malaysia aim to foster innovation, minimize resource usage, eliminate or minimize toxic substances, reduce waste generation, and achieve net-zero greenhouse gas emissions throughout the entire construction process. By adopting sustainable practices, the construction industry can contribute to a greener and more sustainable future.

Here are some key goals and examples of green practices in the construction sector:

Resource Conservation

The construction sector aims to conserve valuable resources such as raw materials, water, and energy. This can be achieved through various practices, such as using recycled materials in construction projects, implementing energy-efficient designs and technologies, and adopting water-saving measures like rainwater harvesting systems.

Sustainable Materials

The use of sustainable construction materials is another important aspect of green practices. Construction companies can opt for eco-friendly materials like recycled steel, reclaimed wood, and low-emission concrete. Additionally, sustainable sourcing practices can be implemented to ensure the materials are obtained responsibly, considering factors such as their environmental impact and social implications.

Waste Reduction and Recycling

Green practices in construction emphasize waste reduction and recycling. Construction companies can implement strategies to minimize waste generation on construction sites, such as efficient material management, salvaging and reusing materials, and promoting the use of recycled content in construction products.

Energy Efficiency

The construction sector plays a significant role in energy consumption. By prioritizing energy-efficient designs and incorporating renewable energy sources, such as solar panels and geothermal systems, construction projects can reduce their carbon footprint and contribute to the transition to clean energy.

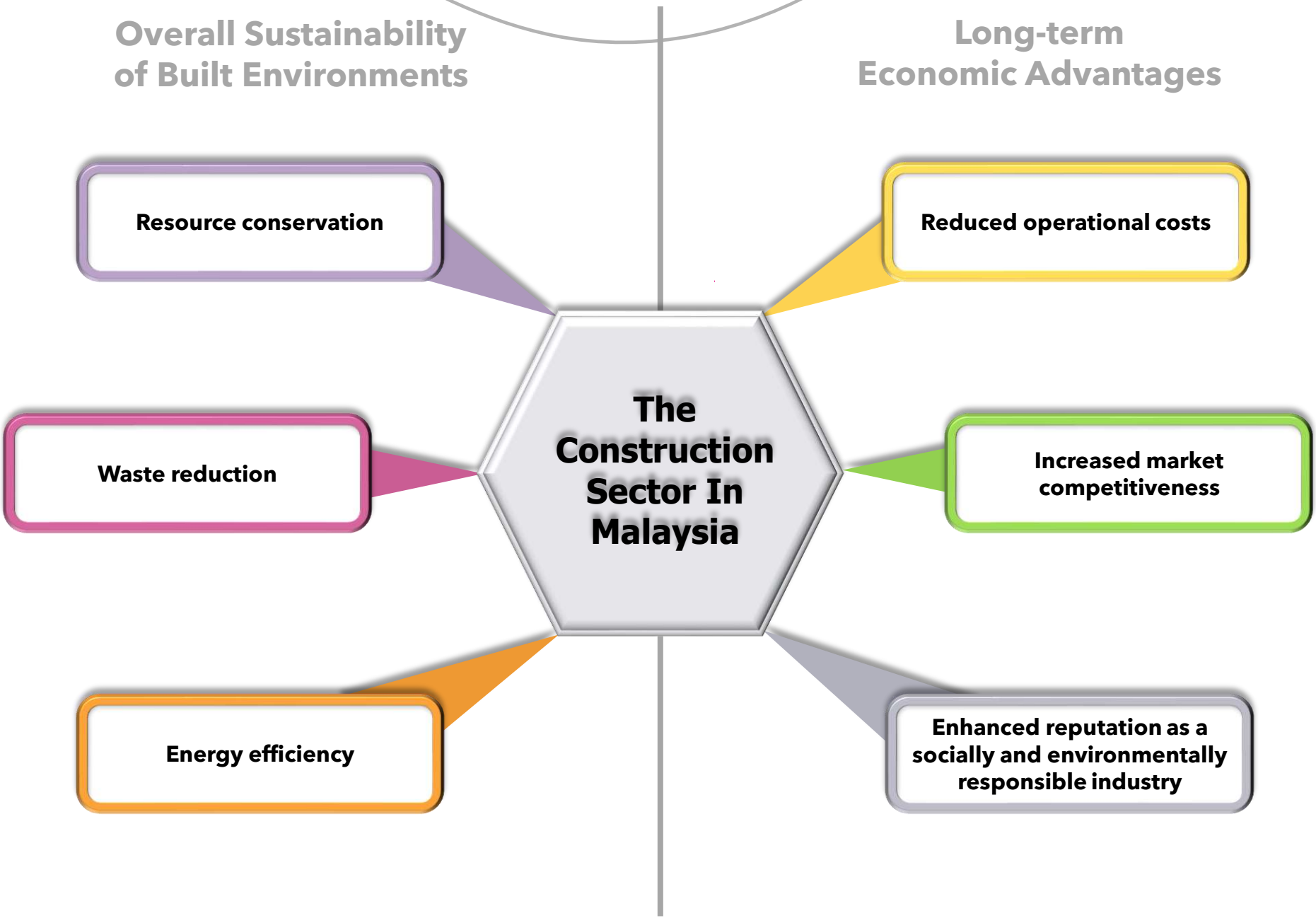
Collaborative Approach

Green practices in the construction sector require collaboration among stakeholders. This includes close coordination between architects, engineers, contractors, suppliers, and clients to ensure the integration of sustainable design principles, materials, and technologies throughout the construction process.

Green Building Certifications

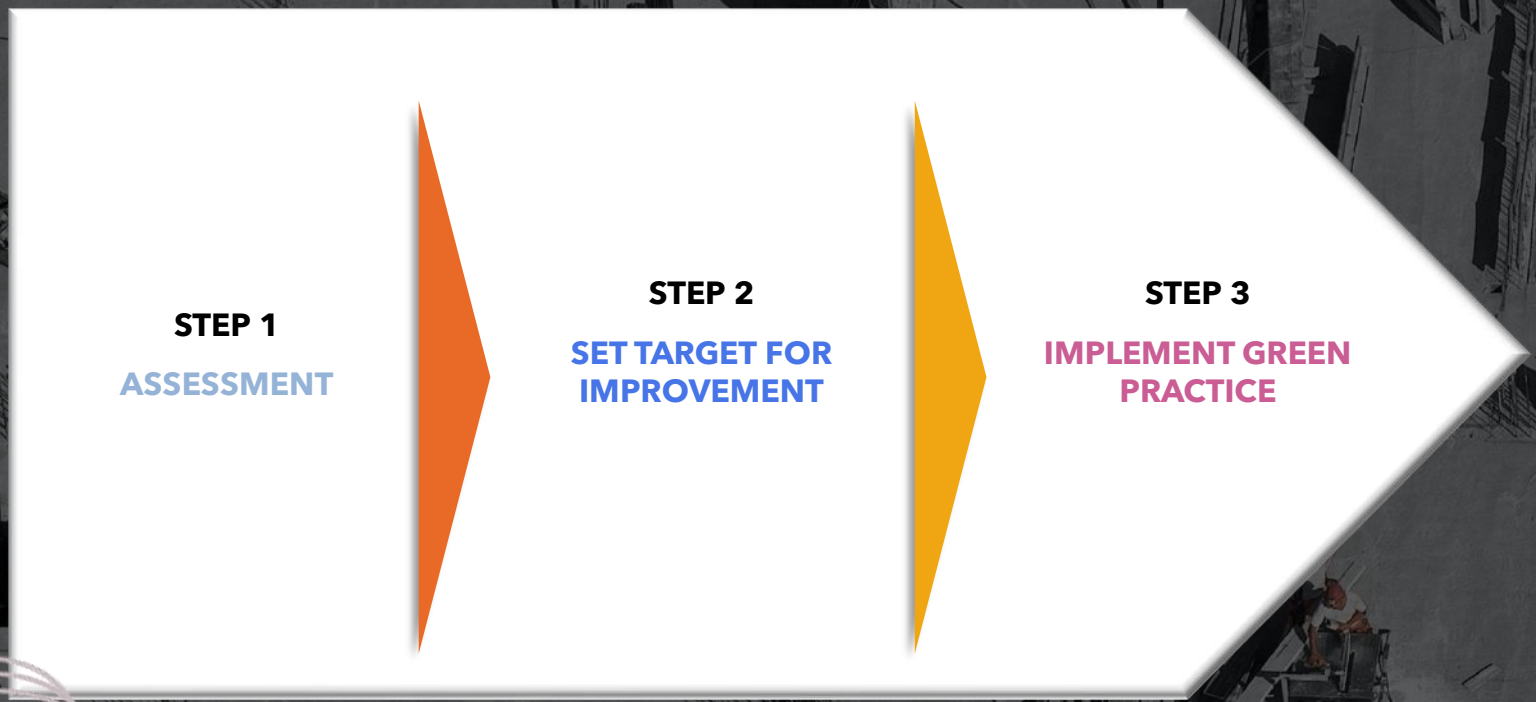
Embracing green building certifications, such as the Green Building Index (GBI) and the Leadership in Energy and Environmental Design (LEED), is an effective way for construction projects to demonstrate their commitment to sustainability. These certifications encourage the adoption of environmentally friendly practices, including energy and water efficiency, indoor air quality, and sustainable site development.

BENEFITS OF GREEN PRACTICES



2.2 GUIDELINE IMPLEMENTATION

To successfully integrate green practices into existing operations and processes, businesses in the construction industry are recommended to follow the following three steps:



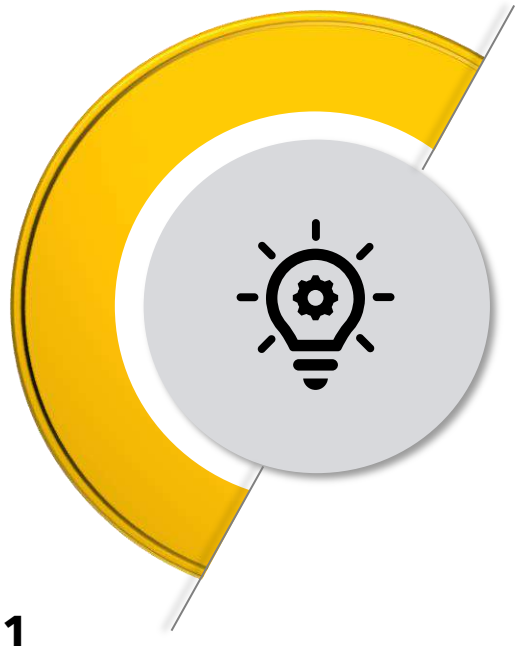
STAGE 1: ASSESSMENT

Understanding the Assessment Requirements: Familiarize yourself with the assessment criteria outlined in the Green Practices Data Collection Form (Appendix 2) for the six indicators described in Section 2.3. These indicators are specifically tailored to the construction sector and include criteria such as energy efficiency, waste management, sustainable materials, water conservation, indoor environmental quality, and social responsibility. Refer to the Indicator Instrument Factsheet (Appendix 3) for detailed information on each indicator, including goals, targets, terminologies, data sources, and collection methods.

Preparing Relevant Documents: Gather the necessary documents and records as evidence of green practices implementation in the construction sector. These may include energy bills, waste management reports, material sourcing documentation, water usage records, indoor air quality tests, and records of social initiatives. These documents will serve as proof of compliance with the green practices criteria.

Conducting Assessment: Evaluate green practices according to the criteria established for each indicator. Present the relevant documents as evidence of implementation during the assessment process. Scores will be assigned based on the criteria, and the overall mark for each indicator will be calculated by multiplying the sum of sub-indicator scores with their assigned weightage. The weightage reflects the importance of each indicator to the construction sector. The total score will be translated into a Star Rating system, providing an overall assessment of the construction project's green practices.

STAGE 2: SET TARGETS FOR IMPROVEMENT



STEP 1

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 construction industry. These objectives may include reducing energy consumption, minimizing waste generation, improving indoor air quality, promoting sustainable material usage, and enhancing social responsibility. Identify areas of improvement required to achieve these objectives based on the assessment results.

STEP 2

Setting Realistic and Attainable Targets:

Align targets for each indicator with the goals and targets outlined in the Indicator Instrument Factsheet and the scoring criteria in the Green Practices Data Collection Form. Assign deadlines or timelines to each target to ensure progress can be measured effectively. For example, set a target to reduce energy consumption by 20% within the next two years or to achieve zero waste to landfill by implementing effective waste management practices.

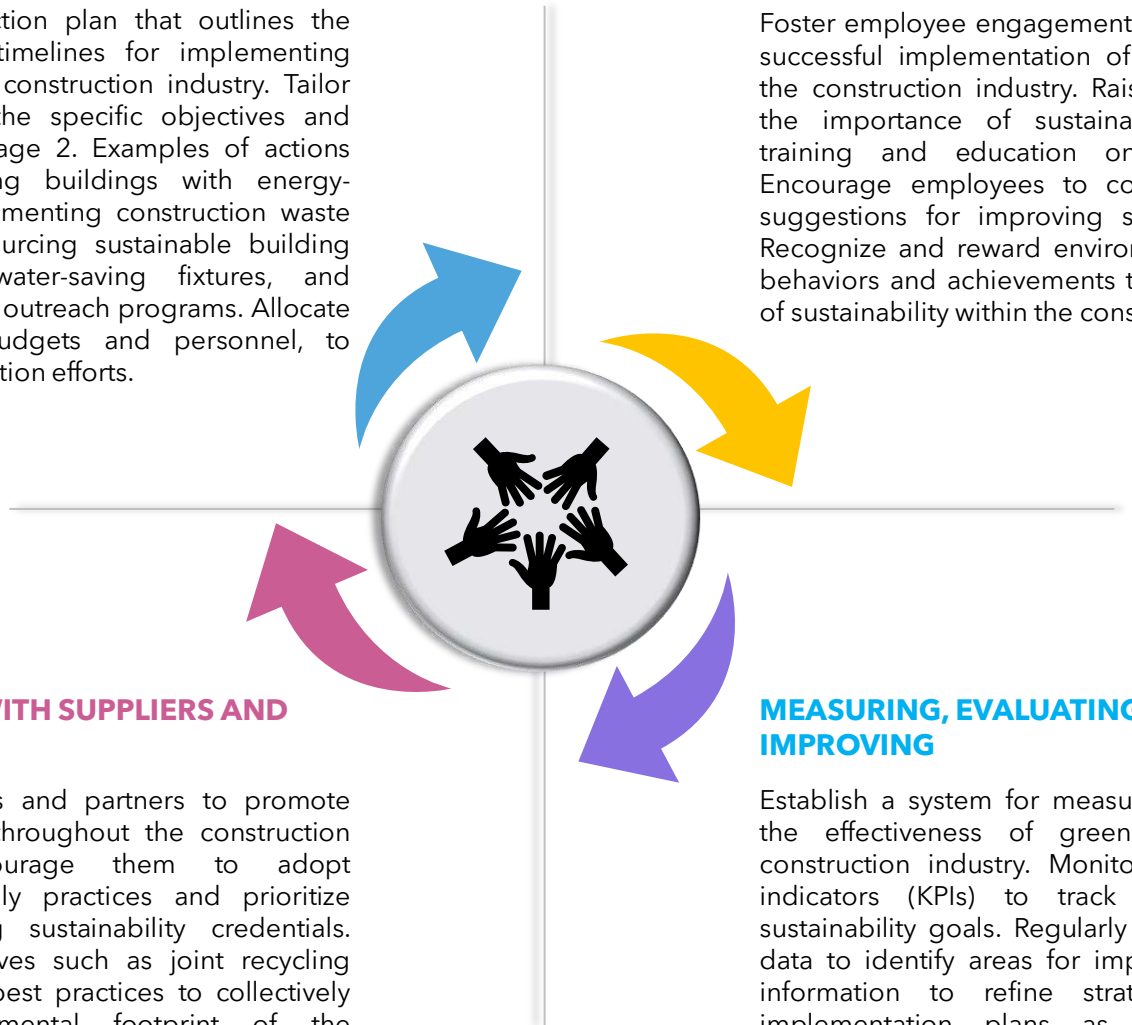
STAGE 3: IMPLEMENT GREEN PRACTICES

FORMULATING AN ACTION PLAN

Develop a detailed action plan that outlines the necessary steps and timelines for implementing green practices in the construction industry. Tailor the plan to address the specific objectives and targets identified in Stage 2. Examples of actions may include retrofitting buildings with energy-efficient systems, implementing construction waste recycling programs, sourcing sustainable building materials, installing water-saving fixtures, and engaging in community outreach programs. Allocate resources, such as budgets and personnel, to support the implementation efforts.

ENGAGING EMPLOYEES

Foster employee engagement at all levels to drive successful implementation of green practices in the construction industry. Raise awareness about the importance of sustainability and provide training and education on green practices. Encourage employees to contribute ideas and suggestions for improving sustainability efforts. Recognize and reward environmentally conscious behaviors and achievements to cultivate a culture of sustainability within the construction sector.



COLLABORATING WITH SUPPLIERS AND PARTNERS

Engage with suppliers and partners to promote sustainable practices throughout the construction supply chain. Encourage them to adopt environmentally friendly practices and prioritize suppliers with strong sustainability credentials. Collaborate on initiatives such as joint recycling programs or sharing best practices to collectively reduce the environmental footprint of the construction industry.

MEASURING, EVALUATING, AND IMPROVING

Establish a system for measuring and evaluating the effectiveness of green practices in the construction industry. Monitor key performance indicators (KPIs) to track progress towards sustainability goals. Regularly review and analyze data to identify areas for improvement. Use this information to refine strategies and adjust implementation plans as needed, ensuring continuous improvement in the industry's green practices.

By following these steps, construction companies can effectively integrate green practices into their operations, promoting sustainability, minimizing environmental impact, and contributing to the long-term viability of the construction industry in Malaysia.

2.3 INDICATORS

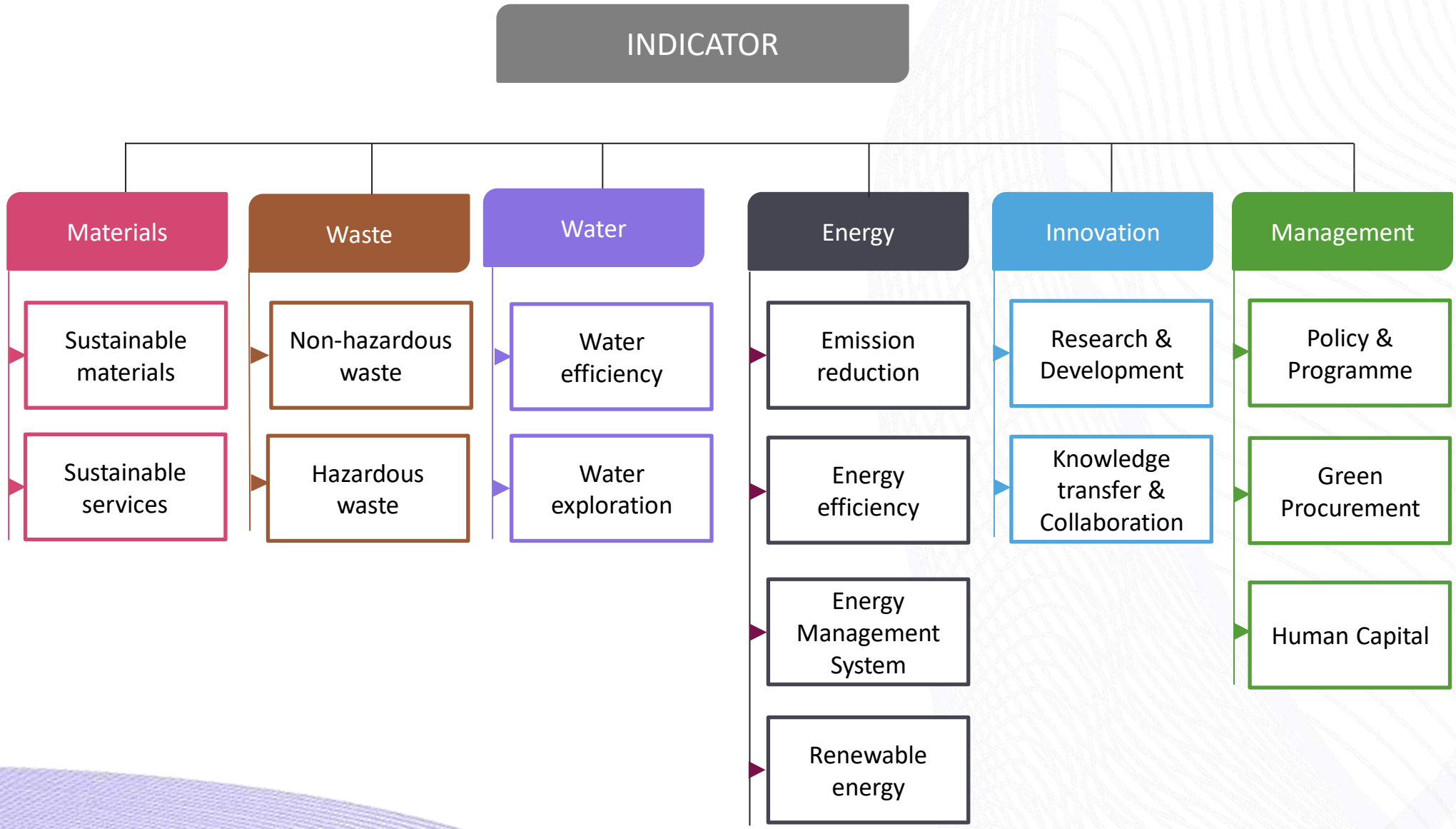
Indicators are crucial for evaluating and comparing the performance of industries in adopting green practices. These indicators provide a standardized framework for assessing the environmental sustainability efforts across various sectors. In order to ensure a comprehensive and meaningful evaluation, 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 utilizing 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.

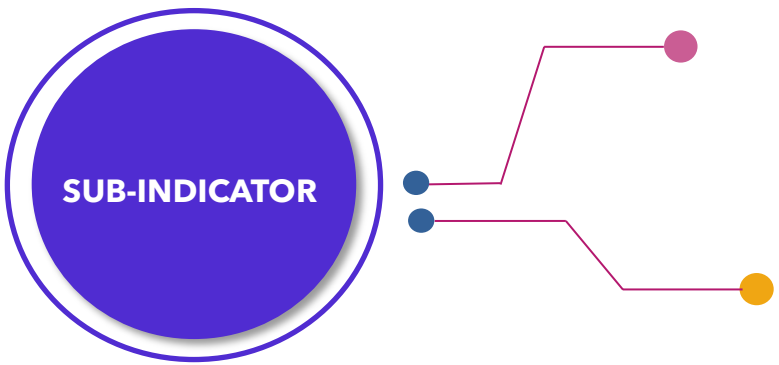
These indicators serve as a valuable tool for decision-making, enabling industries to identify areas for improvement, set targets, and track their performance over time. Furthermore, they facilitate benchmarking exercises, allowing industries to compare their performance against sector peers and best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


INDICATOR
Materials
Sustainable materials
Sustainable services
Waste
Non-hazardous waste
Hazardous waste
Water
Water efficiency
Water exploration
Energy
Emission reduction
Energy efficiency
Energy Management System
Renewable energy
Innovation
Research & Development
Knowledge transfer & Collaboration
Management
Policy & Programme
Green Procurement
Human Capital

2.3.1 MATERIALS

The Material Indicator for Green Practices focuses on the responsible and sustainable management of materials utilized 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.



SUSTAINABLE MATERIALS

This sub-indicator assesses the demonstration of purchasing and utilization practices related to sustainable materials within industries. It requires industries to showcase a clear direction and vision towards sustainable material utilization, 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 utilization 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 utilization and contributes to the long-term viability and success of industries across diverse sectors.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	GREEN PRACTICES
Sustainable Materials	Demonstration on purchase or use of sustainable materials	• Company sustainability report • Businesses sustainability policies • Sustainability monitoring activity • Certification or recognition of sustainable material	• Use local resources to reduce the environmental impacts from operations and activities • Use natural products and bio-based construction materials in building operations and activities
Sustainable services	Demonstration on purchase or use of sustainable services	• Company sustainability report • Businesses sustainability policies • Sustainability monitoring activity • Certification or recognition of sustainable material	• Encourage services that promote a green lifestyle, for example, the use of technology in construction management.

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. Businesses 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 prioritize 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, businesses can significantly reduce their environmental impact, conserve resources, and promote a circular economy approach in the handling of waste.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	GREEN PRACTICES
Non-hazardous waste	• Targeted percentage of non-hazardous waste recycled achieved by the business • Number of biogas capture facility within the business	• Records on monitoring non-hazardous waste generated and recycled in the business • Number of biogas facility	Reuse and/or recycle and/or repurpose other non-hazardous construction waste by transforming them
Hazardous waste	Targeted percentage of hazardous waste recycled achieved by the business	Records on monitoring hazardous waste generated and recycled in the business	Reduce usage of chemical-based products and replace them with a more environmentally option such as those with eco labels

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.

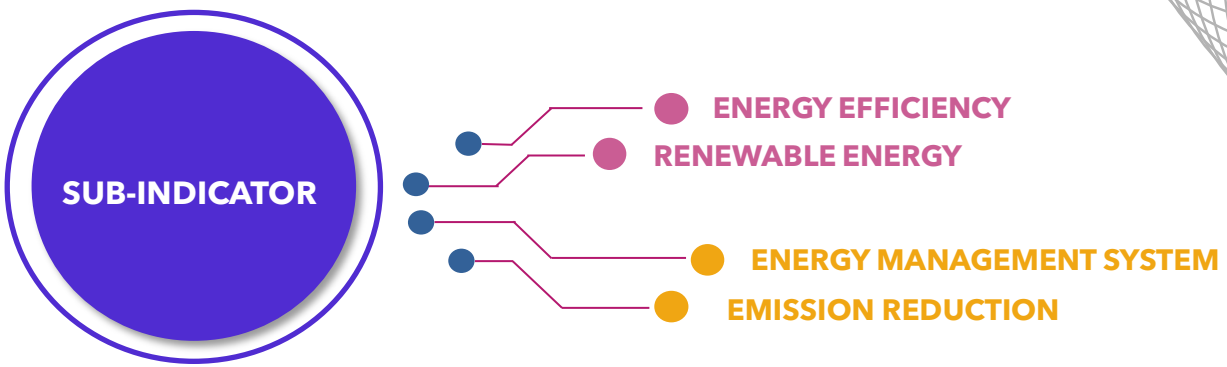
Certain industrial processes and products necessitate the use of water, which may vary in quality requirements. While water may not be directly consumed in the production process, it is often indirectly utilized for cooling, heating, or washing purposes. Enhancing the rate of recirculation and minimizing 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 prioritizing 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 optimizing recirculation systems, reducing water losses, and implementing technologies that minimize water requirements, can help decrease water consumption and preserve water resources. Additionally, adopting water management strategies that prioritize 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.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	GREEN PRACTICES
Water Exploration	Targeted percentage of alternative water used by the business	Records on monitoring city water and alternative water use	• Adopt efficient water usage techniques and utilize water efficient techniques and technologies • Installation of a rainwater harvesting system to enable alternative water resources
Water Efficiency	Targeted percentage of water consumption reduction achieved by the business	Records on monitoring city water use	• Avoid unnecessary usage of water during construction to reduce water consumption

2.3.4 ENERGY



Energy consumption plays a pivotal role in achieving decarbonization 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 decarbonization 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 decarbonization and achieve long-term environmental sustainability, industries must prioritize energy-saving measures and the adoption of energy-efficient technologies. This includes optimizing manufacturing processes, implementing smart energy management systems, and investing in energy-efficient equipment. Additionally, exploring innovative solutions like energy recovery systems, waste heat utilization, 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 decarbonization 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.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	GREEN PRACTICES
Energy Efficiency	Targeted percentage of electricity and fuel consumption reduction achieved by the business	• Meter energy usage readings • Bills of quantities for fuels • COA for fuels	• Minimize energy consumption during the use phase by using the lowest energy consumption components, using the default power saving mode, and insulating the heating components. • Conduct energy audits to identify feasible energy-saving options applicable to the operations or processes • Adopting energy-efficient lighting (e.g., LED) • Utilizing green technology and machinery during construction.
Renewable Energy	Targeted percentage of renewable energy used by the business	• Meter energy usage readings • Bills of quantities for fuels • COA for fuels	• Utilization of renewable energy from process residues • Application of waste-to-energy technologies. • Facilitate circular economy through resource sharing and fuel optimization (especially when transporting materials to the project site). • Installation of solar panels for energy supply to reduce electricity consumption.
Energy Management System	Demonstration of an Energy Management System setup within the business	Records supporting the setup, operation, and performance achieved by the Energy Management System	• To establish policy or standard in the organization which clearly indicates the green practice in the mission and vision statement • Periodically report on energy usage as a monitoring tool. • Developing and implementing a systematic procedure for the energy management system
Emission Reduction	Targeted percentage of emissions reduction achieved by the business	GHG Inventory reports	• Regular maintenance of equipment • Utilisation of alternative energy sources such as biofuels for use in building services systems in a building such as a system of air-conditioning, electrical, fire-fighting, etc to reduce emissions from the direct combustion engine/equipment. • Implementation of greenhouse gas inventory for fuel use

2.3.5 INNOVATION

Innovation plays a crucial role in driving green practices within the industry as businesses strive to adapt their business processes and activities to meet the demands of a competitive global market. By prioritizing 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. Businesses 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. Businesses 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 organizational progress. Establishing robust research and development processes, output, and policies enables organizations to streamline their innovation efforts and focus on sustainable solutions. Increasing investment and incentives to support innovation in green practices further promotes the commercialization of environmentally friendly products. This can involve securing intellectual property rights, receiving awards and recognition, and fostering a culture of innovation within the organization.

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

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

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	GREEN PRACTICES
Knowledge Transfer and Collaboration	Demonstration of knowledge transfer and strategic collaboration occurring in the business	Records and documentations such as MOUs, MOAs, IPs, etc.	• Strategic partnership or collaborative project to commercialize the green product for commercialization, create social value in targeted communities, and improve current green practice • Develop strategic of partnership/collaborated project MoU/MoA and proved of ROI in building operations and activities to optimize lifetime of building services system within building compound area
Research and Development (R&D)	Demonstration of R&D activities occurring in the business	Records and documentations such as organisation chart, procedures, blueprints, proposals, etc.	• Develop and implement policies related to the allocation of resources towards R&D within the organization • Making strategic investments in R&D and innovations that enable green technologies to be embedded into existing infrastructure, systems, and processes

2.3.6 MANAGEMENT

Management plays a crucial role in driving and implementing green practices within the industry. The administration of an organization, 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 minimize 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 organization, 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 prioritize green practices and demonstrate commitment to environmental sustainability are better positioned to thrive in this evolving economic landscape. By proactively adopting green manufacturing principles, businesses can align their initiatives with the goal of achieving a greener future.

Businesses have the flexibility to choose and prioritize 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 optimizing resource usage, businesses 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. Programs such as the MyHijau SME & Entrepreneur Development Program, 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 businesses 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 minimize their environmental footprint, meet the demands of a changing economic landscape, and contribute to a more sustainable future.

SUB-INDICATOR	REQUIREMENT	OBJECTIVE EVIDENCE FOR ASSESSMENT	GREEN PRACTICES
Green Procurement	Demonstration of green procurement practices occurring in the business	Records and documentations such as policies and standards, agreements, purchase records, etc.	• Include environmental requirements in specifications with contractors, suppliers, and service providers. • Establish a mechanism to determine the level of greenhouse gas emissions generated by suppliers.
Policy and Programme	Demonstration of policies and programs practices occurring in the business that support Green Practices	Records and documentations such as MOUs, MOAs, IPs, etc.	• Promotion of recycling and reuse practices to raise awareness of responsible and sustainable consumption. • Develop green policies or operating standards to integrate sustainability in business operations across several departments, foster innovation, and boosts engagement.
Human Capital	Demonstration of a human capital development program in the business that support Green Practices	Records and documentations such as policies and standards, records of training, etc.	• Open opportunities to the current workforce to become competent persons for environmental management and green practices. • Carry out capacity building and training periodically to enhance the skill and competency of staff in construction work.

CHAPTER 3
IMPLEMENTATION OF GREEN PRACTICES

3.1 INDICATOR ALIGNMENT

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

Existing Initiatives	Agency/ Institutions	Description	Criteria for Assessment	Green Practices indicator	Benefits	Reference (Scan for link)
Green Investment Tax Allowance (GTA)	MIDA	Incentive for companies that undertake Green Technology projects involving capital investments	Renewable Energy (RE); Energy Efficient (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 Efficient (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 recognized 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 products standards or specifications and the criteria, as well as relevant provisions in the Environmental Quality Act		Boost acceptance of products in international 'green markets' that favour green products with price premium	
Anugerah Industri Hijau	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	

Existing Initiatives	Agency/ Institutions	Description	Criteria for Assessment	Green Practices indicator	Benefits	Reference (Scan for link)
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	Renewable Energy (RE); Energy Efficient (EE);		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 issues; Training and communication; Legal and other compliance; Environmental emergencies; Employee participation; Supply chain; Environmental social programme; Environmental accounting; Eco-designs; 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	
Low Carbon Cities Framework (LCCP)	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.	

Existing Initiatives	Agency/ Institutions	Description	Criteria for Assessment	Green Practices indicator	Benefits	Reference (Scan for link)
Feed-in-Tariff	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 CO2 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 2020	Residential customer (100kWh per block); Non-residential customer (100kWh per block)		Subscribes able to receive Malaysia Renewable Energy Certificate (MREC) based on international REC standards and exempted from ICPT charge	
Malaysia Electricity Supply Industry Trust Account (MESITA)	KeTSA	Funding for programs or projects that support the development of national power industry including renewable energy R&D, human resource and energy efficiency	Electricity supply		Funding for programs and projects	
Energy Management Gold Statement (EMGS)	MGTC	Certification system delivered under the ASEAN Energy Management Scheme (AEMAS) based on excellence in energy management	Energy management		Recognized as a leader in energy management	

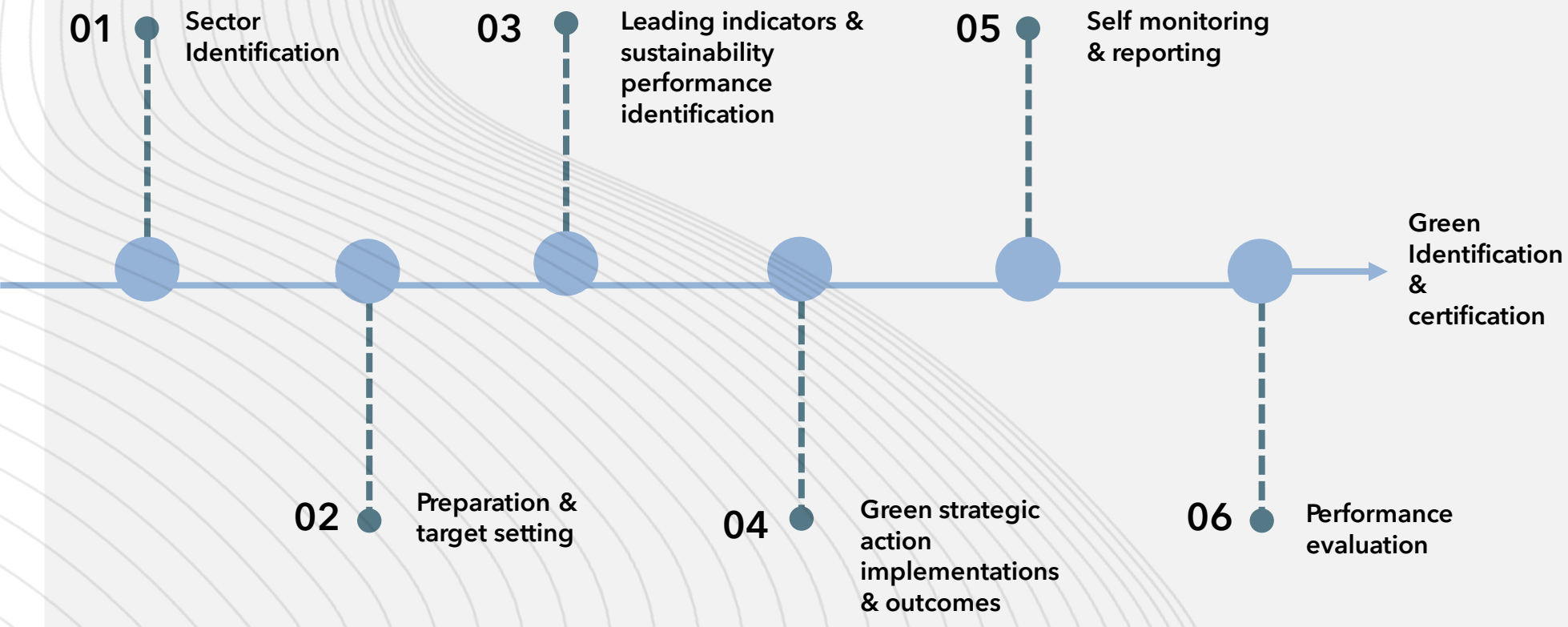
3.2 TOWARDS GREEN RECOGNITION

- This guideline presents recommendations and proposed actions for the construction sector to implement green practices in their daily operations. It is driven by the vision of establishing a Green Certificate that recognizes and rewards sustainable practices within the construction industry.

- To support the industry in implementing green practices, a comprehensive Green Certificate Roadmap has been developed specifically for construction companies. This roadmap serves as a strategic guide, assisting construction players 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 construction companies that have successfully implemented green and best practices to apply for the Green Certificate. This certification would serve as a formal recognition of their commitment to sustainability and environmental stewardship. As part of the proposed roadmap, construction companies meeting the eligibility criteria for the Green Certificate may also benefit from proposed financing incentives and support.

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


01
Sector Identification
02
Preparation & target setting
03
Leading indicators & sustainability performance identification
04
Green strategic action implementations & outcomes
05
Self monitoring & reporting
06
Performance evaluation
Green Identification & certification

3.3 WAY FORWARD

To remain competitive and contribute to environmental protection in the construction sector, businesses must proactively adopt green practices and integrate ESG factors into their operations. This includes adopting circular business models, embracing ESG disclosure, transitioning to renewable energy sources, implementing decarbonization efforts, and exploring green financing and investment opportunities.

The integration of green practices within the construction sector is essential for fulfilling environmental responsibilities and aligning with the broader ESG framework. Investors increasingly consider ESG factors when making decisions, recognizing the value of sustainable and responsible construction practices. Regulatory requirements, such as those introduced by Bursa Malaysia, emphasize the importance of ESG disclosure for listed companies in the construction industry.

By incorporating ESG disclosure, construction companies can communicate their environmental initiatives, such as implementing energy-efficient building designs, incorporating waste reduction measures, utilizing renewable energy sources in construction projects, 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 construction 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.

Embracing ESG factors and integrating green practices in the construction sector not only positions businesses as responsible environmental stewards but also provides a competitive edge in the market. By proactively addressing environmental challenges, adopting sustainable construction practices, and incorporating ESG considerations, construction companies can secure their long-term viability, attract investment, comply with regulations, and contribute positively to the transition towards a sustainable and resilient economy.

REFERENCES

Ahmed, S. M., Hampton, P., Saul, A. D., Azhar, S., Smith, N. A., Campbell, S. C., & Mahaffy, K. L. (2019). Environmental Sustainability : Impact of Construction Activities Proceedings of the 11 th International Conference on Construction in the 21 st Century London , United Kingdom September 9-11 , 2019 Editors : Construction in the 21st Century 11th International Conference, September, 421–429.

Airaksinen, M., & Matilainen, P. (2011). A Carbon footprint of an office building. Energies, 4(8), 1197–1210. https://doi.org/10.3390/en4081197

Azman, M. N. A., Mohamad Kamar, K. A., & Mohd Nawi, M. N. (2013). Industrialised building system in reducing waste of construction industry. Journal of Science and Technical Education, 2(February), 96–103.

Chin Yee, H., Ismail, R., & Terh Jing, K. (2020). The Barriers of Implementing Green Building in Penang Construction Industry. Progress in Energy and Environment, 12, 1–10.

CIDB. (2015). Guidelines on Construction Waste Management. In Construction Industry Development Board Malaysia.

CIDB. (2017). HEIGHTS: Elevating Sustainable Construction in Malaysia. CIDB Malaysia, 2, 50.

CIDB. (2021). Standard Industri Pembinaan.

Dixit, M. K., Culp, C. H., & Fernández-Solís, J. L. (2013). System boundary for embodied energy in buildings: A conceptual model for definition. Renewable and Sustainable Energy Reviews, 21, 153–164. https://doi.org/10.1016/j.rser.2012.12.037

Economic Planning Unit. (2021). Twelfth Malaysia Plan 2021 - 2025.

Fishbein, B. (1998). Building for the Future: Strategies to Reduce Construction and Demolition Waste in Municipal Projects.

Global Alliance for Buildings and Construction. (2019). 2019 Global Status Report for Buildings and Construction Sector | UNEP - UN Environment Programme. In United Nations Environment Programme.

Hamid, Z. A., & Ali, M. C. (2012). Towards a Sustainable and Green Towards a Sustainable and Green. Malaysian Construction Research Journal, April 2015.

Hammond, G. P., & Jones, C. I. (2008). Embodied energy and carbon in construction materials. Proceedings of Institution of Civil Engineers: Energy, 161(2), 87–98. https://doi.org/10.1680/ener.2008.161.2.87

Haynes, R. (2010). Embodied Energy Calculations within Life Cycle Analysis of Residential Buildings. In Etool.Net.Au (Vol. 2010, Issue Revised).

Kim, H., & Park, W. (2018). A study of the energy efficiency management in Green Standard for Energy and Environmental Design (G-SEED)-certified apartments in South Korea. Sustainability (Switzerland), 10(10). https://doi.org/10.3390/su10103402

Ministry of Energy, Green Technology and Water Malaysia (2017). Green Technology Master Plan Malaysia 2017-2022. https://www.pmo.gov.my/wp-content/uploads/2019/07/Green-Technology-Master-Plan-Malaysia-2017-2030.pdf

New report: The building and construction sector can reach net zero carbon emissions by 2050. World Green Building Council. (2019). Retrieved December 29, 2021, from https://www.worldgbc.org/news-media/WorldGBC-embodied-carbon-report-published

Onubi, H. O., Yusof, N. A., & Hassan, A. S. (2020). Understanding the mechanism through which adoption of green construction site practices impacts economic performance. Journal of Cleaner Production, 254, 120170. https://doi.org/10.1016/j.jclepro.2020.120170

Rahim, A., & Qureshi, S. (2018). A REVIEW OF IBS IMPLEMENTATION IN MALAYSIA AND SINGAPORE. Journal of the Malaysian Institute of Planners, 16(2), 323–333.

Rahim, M. H. I. A., Kasim, N., Moham, I., Zainal, R., Sarpin, N., & Saikah, M. (2017). Construction waste generation in Malaysia construction industry: Illegal dumping activities. IOP Conference Series: Materials Science and Engineering, 271(1). https://doi.org/10.1088/1757-899X/271/1/012040

Rostami, R., Khoshnava, S. M., Rostami, R., & Lamit, H. (2015). Green and sustainability policy, practice and management in construction sector, a case study of Malaysia. Research Journal of Applied Sciences, Engineering and Technology, 9(3), 176–188. https://doi.org/10.19026/rjaset.9.1393

Shi, Q., Zuo, J., Huang, R., Huang, J., & Pullen, S. (2013). Identifying the critical factors for green construction - An empirical study in China. Habitat International, 40, 1–8. https://doi.org/10.1016/j.habitatint.2013.01.003

Tam, V. W. Y., Tam, L., & Le, K. N. (2010). Cross-cultural comparison of concrete recycling decision-making and implementation in construction industry. Waste Management, 30(2), 291–297. https://doi.org/10.1016/j.wasman.2009.09.044

Portal Rasmi Banci Penduduk dan Perumahan Malaysia 2020. (n.d.). Retrieved December 29, 2021, from https://www.mycensus.gov.my/

United Nations. (2015). Sustainable Development Goals | United Nations Development Programme. UNDP. https://www.undp.org/sustainable-development-goals#:%7E:text=The%20Sustainable%20Development%20Goals%20(SDGs)%2C%20also%20known%20as%20the,people%20enjoy%20peace%20and%20prosperity.

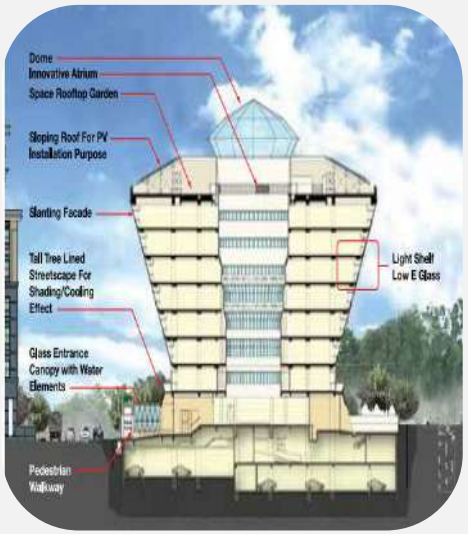
Wong, P. ., & Roslan, S. N. A. (2019). Construction and Demolition Waste Management in Malaysia Construction Industry- Concrete Waste Management. Infrastructure Universiti Kuala Lumpur Research Journal, 7(1), 26–42.

World Green Building Council. (2021). Building to COP26. Retrieved December 29, 2021, from https://buildingtocop.org/

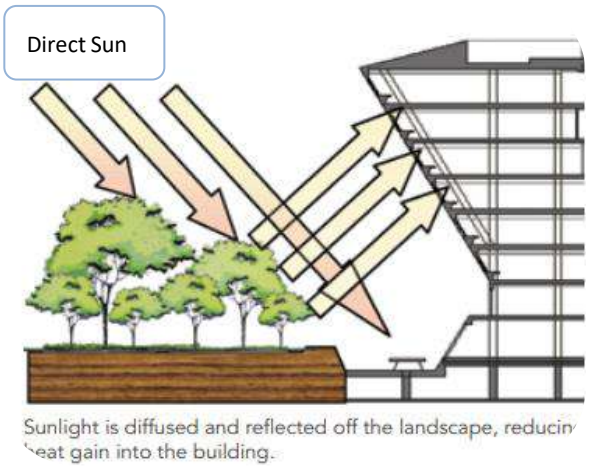
Zaini, N., Ibrahim, S. H., Baharun, A., & Nawi, M. N. M. (2015). A Review on Embodied Energy Through Industrialised Building System Implementation in Construction Industries. Sains Humanika, 6(1), 43–48. https://doi.org/10.11113/sh.v6n1.521

CASE STUDY: MALAYSIA ENERGY COMMISION HEADQUATERS (DIAMOND BUILDING)

Location: Putrajaya, Malaysia (15 miles south of Kuala Lumpur)	
Owner: Energy Commission of Malaysia	
Principle Use: Office	
Employees / Occupants: 400	
Occupancy: 100%	
Gross Square Footage: 158,075	**Conditioned Space:** 123,450
Distinctions/Awards: ASEAN Energy Award, 2012; ASHRAE Technology Award 2013 (Second Place, Category I); Green Mark Platinum, 2010 (Singapore); and Green Building Index (GBI) Platinum, 2010 (Malaysia).	
Total Cost: USD$21.5 million	**Cost Per Square Foot:** $136
Substantial Completion/Occupancy: June 28, 2010	



Design features:
From the dome over its roof to its sunken garden and car park, every space within the Diamond Building is designed with functionality using state-of-the-art technology to optimise energy and water efficiency and indoor and outdoor environmental quality.



Sunlight is diffused and reflected off the landscape, reducin
eat gain into the building.

Façade:
Self-shading e-glazing glass has been used to provide glare-free day-lighting for the building, reducing solar impact by 41% and promoting heat minimisation. The building geometry with the 25-degree inclining facade was sculpted following the solar path.

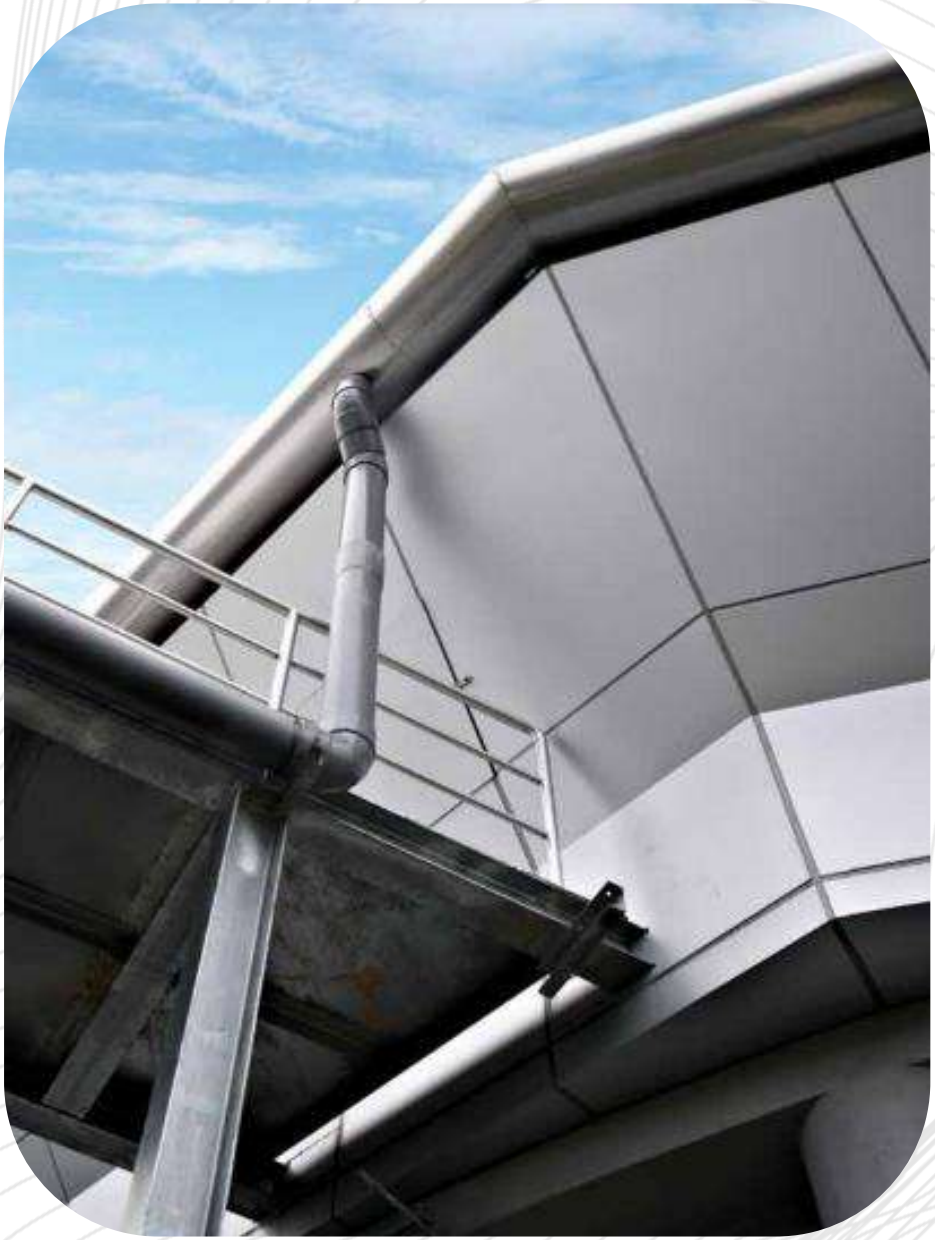
The building's eco-friendly measures cost USD$1 million, representing about 6% of the total construction cost. Savings of almost USD$333,000 annually in operating costs from energy efficiency (USD$317,000) and solar power generation (USD$15,000) result in an estimated payback of 3.5 years despite Malaysia's subsidized utility tariff rates.

Water efficiency:
The Diamond Building incorporates effective management of water resources through the following systems:

- **Rainwater Harvesting:**
  Using rainwater for toilet flushing and irrigation has reduced annual potable water consumption by 35% compared to industry standard fittings and irrigation. Rainwater is collected from the 7,530 ft2 (700 m2) catchment area dome and stored in four 2,600 gallons (10,000 L) rooftop tanks.

- **Efficient Water Fittings:**
  These reduce potable water use by more than 67% compared to conventional plumbing fittings; included dual flush toilet system, waterless urinals and water taps with aerators for economical water flow.

- **Grey Water Recycling:**
  Wastewater (grey water) from toilet washbasins and floor traps are collected and discharged to irrigate the mini wetland area.

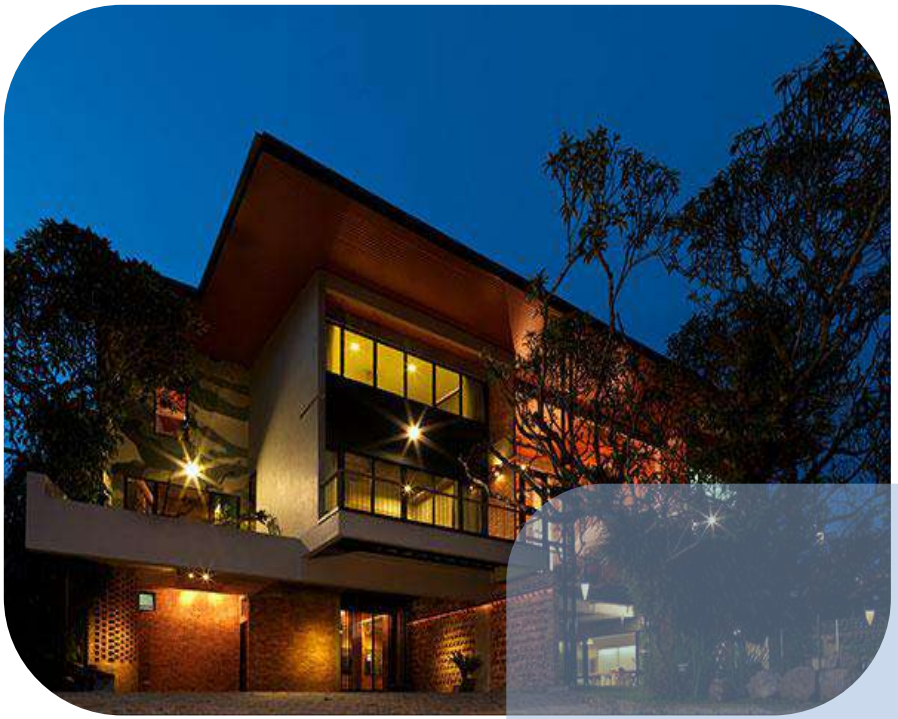


Scarn here for more information
Reference Document:
Diamond Building Brochure

CASE STUDY: S11 HOUSE, PETALING JAYA, SELANGOR, MALAYSIA

S11 House is Malaysia's first Green Building Index Platinum rated house that won the Tropical Building Category of the ASEAN Energy Awards in 2013. It is in Petaling Jaya, Selangor and it is designed by Ar. Dr. Tan Lake Mun. It is a green tropical house which is conceptualized along the lines of a tree. A lot of sustainable design strategies and passive designs are used in order to maintain the thermal comfort of the building such as the stack ventilation, cross ventilation, overhang roof, building orientation and building material.

The S11 house has a clear north-south orientation for all its openings and windows. Instead, adjustable windows and openings are used to promote controllable cross ventilation. The double volume family room is positioned on the first floor with the 7-meter-high full sliding glass walls, facilitating maximum cross ventilation whilst also opening the entire internal living space into the outdoor deck. It allows the naturally happening airflow patterns around and, in a building, to lead outdoor air into the space, thus leaving a cross-ventilation effect.

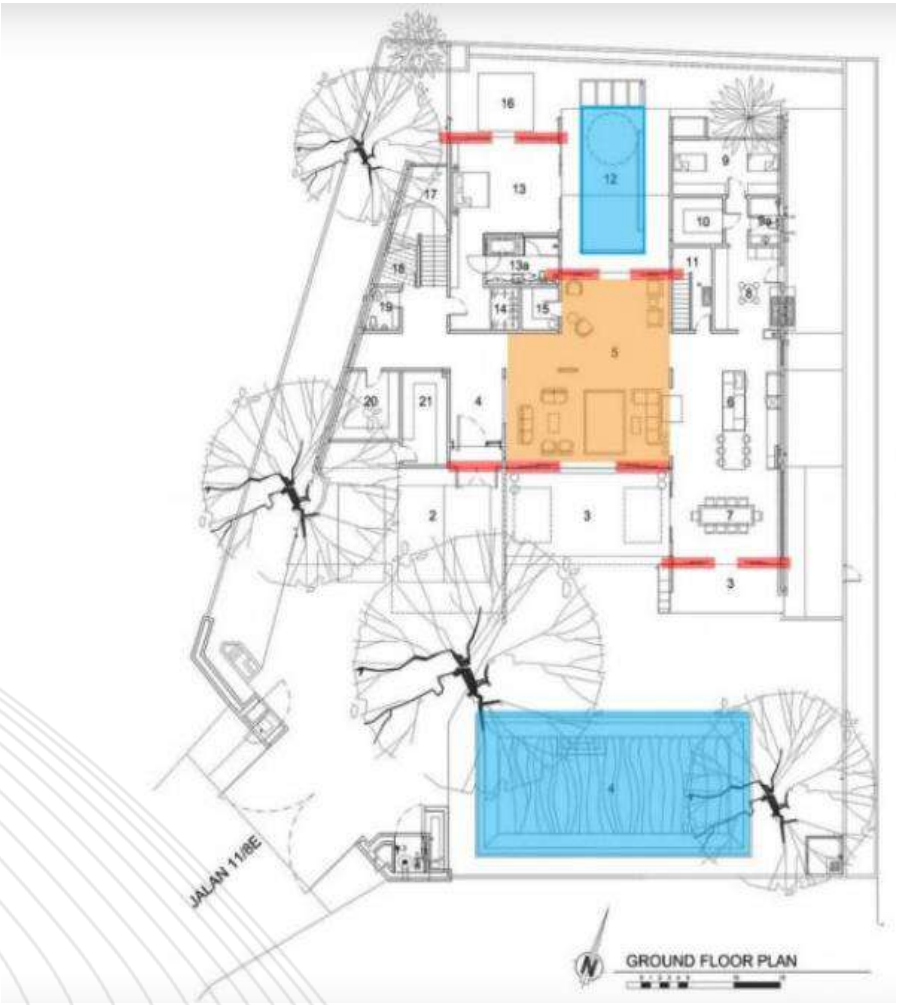


Salvaged materials used in S11 house:
Much of the demolished old house materials from the 1960s house were reused for the constructions of the S11 house.

- **Space Planning:**
  Successful space planning can reduce waste and avoid unnecessary renovation or destruction in the future. Moreover, it can increase energy performance and comfort by placing spaces near or away from the sun, heat, breezes and views. Space planning also provide important economic and environmental value. For example, to reduce the need on artificial lighting and cooling.

- **Rainwater harvesting:**
  Rainwater collected on the canopy roof drains directly into the series of rainwater harvesting tanks. These are aligned in series for sedimentation control and the water from the last tank is used for all the toilet flushing, gardening and car washing requirements. All the tap fittings and sanitary wares have water saving and reduction valves.

  The swimming pool and koi pond are located at the house's extreme north and south ends and provide evaporative cooling. Evaporative cooling acts as a heat sink and assists in passively cooling buildings, lowering the energy required for air conditioning. S11 house is designed to enhance and benefit from natural airflows rather than work against them. Thermal comfort has been achieved in general in S11 house ARC 2213/2234 Asian Architecture.
  The onsite sewerage treatment plant treats the blackwater, and the recycled water is used for garden irrigation. A composting yard composts all organic and garden waste from the home and provides high-quality compost fertiliser for vegetable and fruit gardens. All new trees and plants are tropical natives that require little maintenance and thrive in Malaysia's climate.



Scan here for more information
Reference Document:
BMSPA 2021: One Man's Sterling Model of a Green Home- S11 house


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 minimize 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 (SF_6). 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

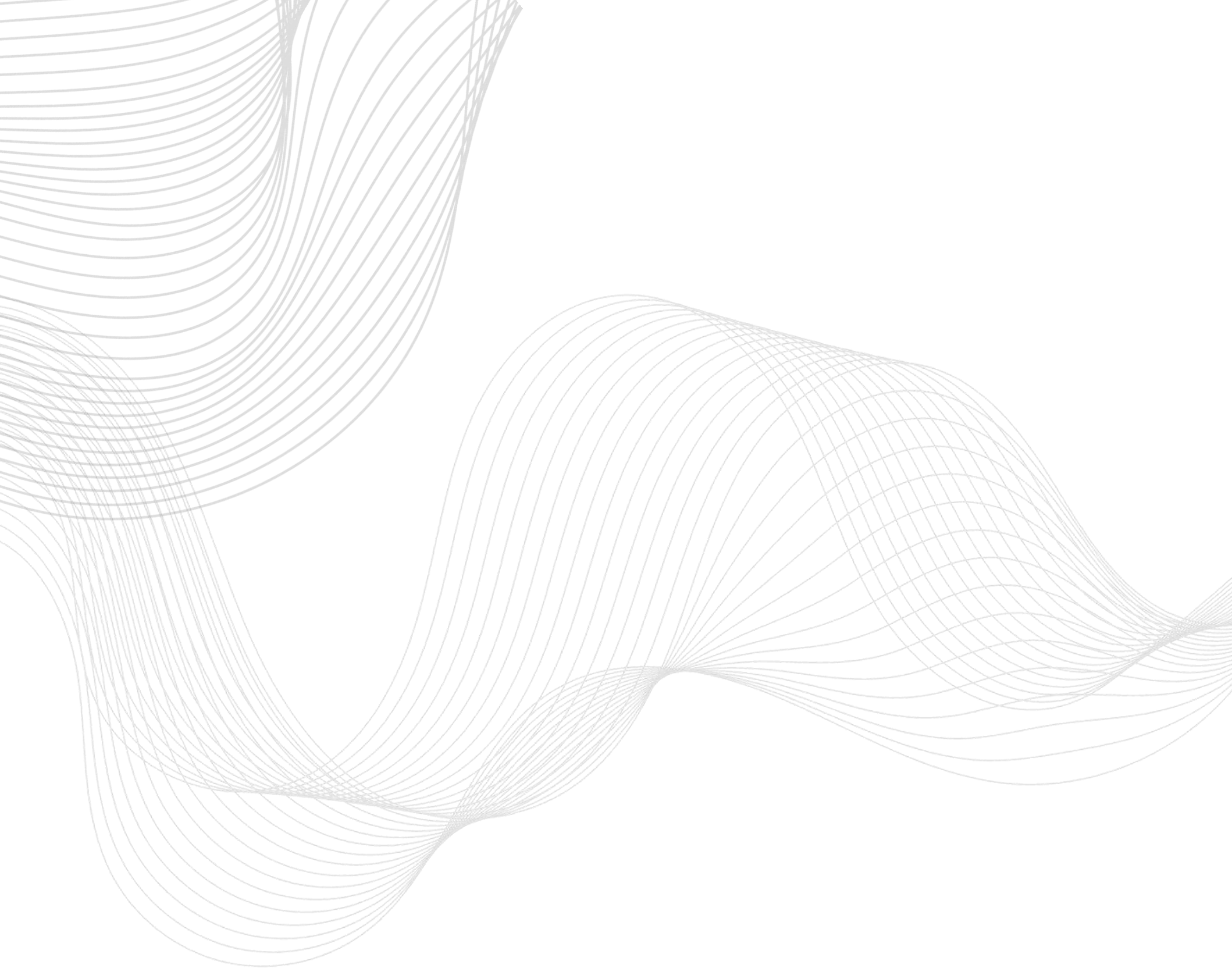
A set of sustainable criteria for assessing level of green practices in an organisation.

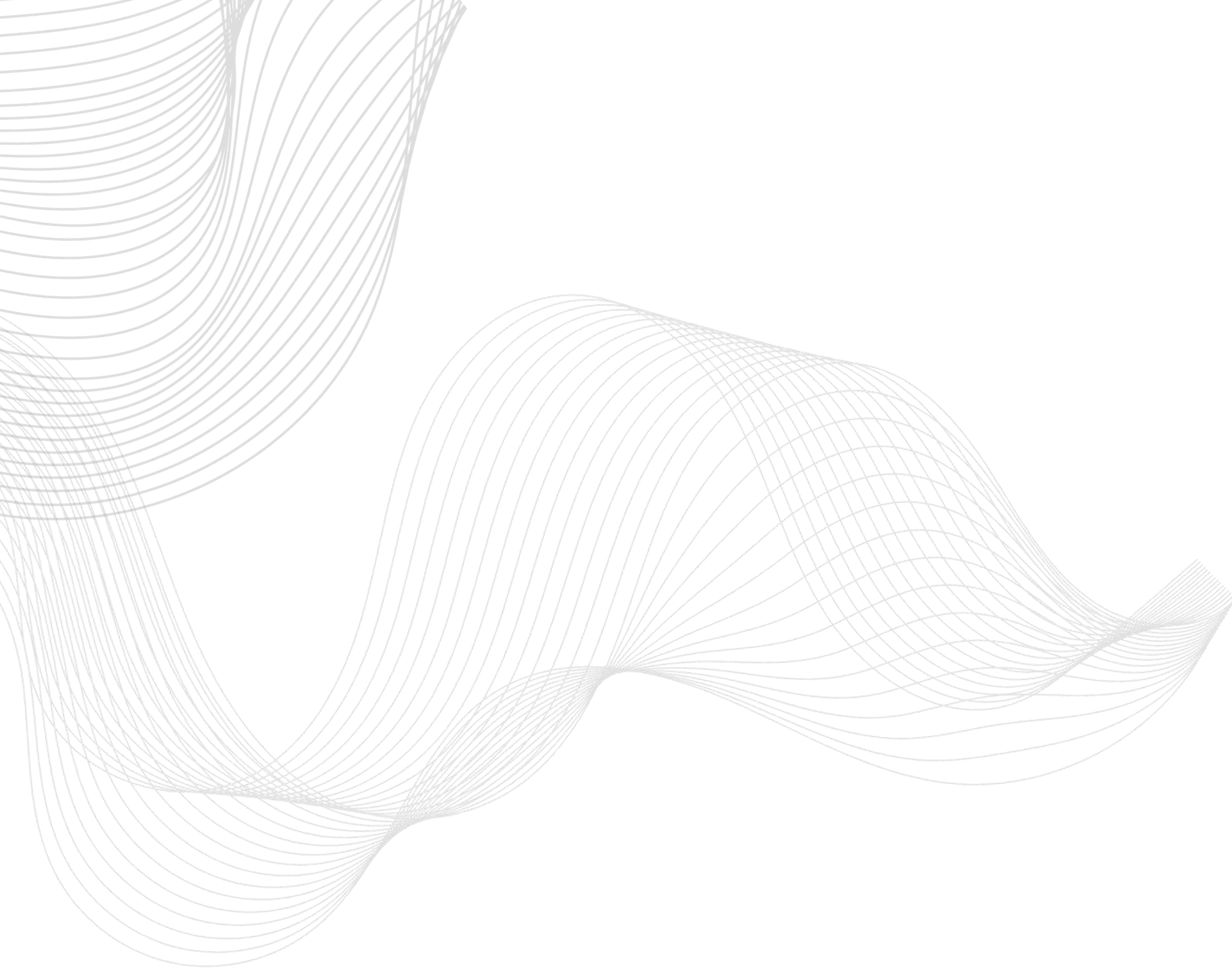
Sustainable Development Goals

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

ACRONYMS

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	Greenhouse Gas
Gg	Gigagrams
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 Corporation
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			
No.	**ITEMS**		**DESCRIPTION**
1	Objective	:	
2	Scope	:	
3	Auditor's Name	:	

INFORMATION OF PREMISE

No.	**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	40	**20**
	Non-Hazardous	40	
	Hazardous waste	20	
Water	Water Efficiency	50	**20**
	Water Exploration	50	
Energy	Emission Reduction	30	**30**
	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 SUB-INDICATOR (A)	INPUT MARKS HERE	WEIGHTAGE BY INDICATOR (B)	MARK BY INDICATOR ∑(A)*(B)/100
Materials	Sustainable materials	50	x / 4 * 50	x	10	
	Sustainable services	50	x / 4 * 50	x		
Waste	Wastewater	40	x / 4 * 40	x	20	
	Non-Hazardous	40	x / 4 * 40	x		
	Hazardous waste	20	x / 4 * 20	x		
Water	Water Efficiency	50	x / 4 * 50	x	20	
	Water Exploration	50	x / 4 * 50	x		
Energy	Emission Reduction	30	x / 4 * 30	x	30	
	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**	
				STAR RATING (***Please tick based on the star rating assessment criteria)***	**1-Star**	
					2-Star	
					3-Star	

STAR RATINGS (ASSESSMENT CRITERIA)

1 Star

- Comply to all regulatory requirements
- Demonstrate leadership in developing systematic environmental reporting practical

2 Star

- Exhibit characteristics of being resource efficient
- Demonstrating positive impacts from green practices
- Incorporate and implement continuous quality improvement initiatives throughout business operations

3 Star

- Demonstrate integration of governance framework related to sustainability and circular economy
- Demonstrate capacity in contributing towards achieving national decarbonization 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

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 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 organization 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 of 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 organization 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 organization 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 organization 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 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 organization 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 of 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 organization 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 organization 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 organization about environmental, social and governance (ESG) impacts.	
	0	None	No initiative at all	

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; WITH ≥ 40% recycle rate; WITH certification/ recognition/ validation	*Validation/ certification/ recognition*: Refers to document 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 recycle rate ≥ 40 %	*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 waste 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.	
	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 organization 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 organization acquiring services or/ and products/ system.	
	0	NO initiative of waste diversion to disposal	*Installation/ maintainance records*: Documents that serve as evidence for installation of technologies in the organization.	

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; ≥ WITH 50% recycle rate; and WITH validation/ certification/ recognition	*Validation/ certification/ recognition*: Refers to document 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 waste 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.	
	2	Initiative/ technology available; 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 organization 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 organization acquiring services or/ and products/ system.	
	0	NO initiative of waste diversion to disposal	*Installation/ maintainance records*: Documents that serve as evidence for installation and maintenance of technologies in the organization. Other initiatives including minimizing 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% alternative water used	Metered water usage readings (i.e., m^3), utility bills (i.e., m^3) or any other documents recording the water consumption for the organization.	
	3	20% alternative water used	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 organization. In the event that consumption data for the alternative water is not available, alternative water production readings can be used.	
	2	10% alternative water used		
	1	5% alternative water used		
	0	NO alternative water used		

INDICATOR: Water

Sub-Indicator: Water Efficiency

Score Please tick (/)	Point	Score Criteria	Data Sources / Evidence	Attachment Reference
	4	30% water savings	Metered water usage readings (i.e., m^3), utility bills (i.e., m^3) or any other documents recording the water consumption for the organization.	
	3	20% water savings		
	2	10% water savings		
	1	5% water savings		
	0	NO water 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% emission 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		
	2	4% 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.	
	1	2% of energy savings	*Certificates of analysis (COA):* COA for fuels shall be referred to determine calorific values of fuels used (if applicable).	
	0	No energy savings		

INDICATOR: Energy

Sub-Indicator: Energy management

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 policies 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; WITHOUT 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 management system	Reports, reviews by third parties, or certifications received by the organization 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), 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	*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.	

INNOVATION INDICATOR

INDICATOR: INNOVATION **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 commercialization/ intellectual property filling/ registration and award	***Proof of in-house R&D Process:***	
	3	Established in house R&D process to Green Practice/ Sustaible Innitiative with proven investment managed by Innovation unit/ department/ personnel	*Organizational Structure:* Refers to systems which outlines how innovation activities are formalized 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/ Sustaible Innitiative 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 Innitiative	*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	None	***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

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 of 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 recognized 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 commercialization/ 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

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		
	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 completion report or Financial accounting report outlining investment, revenue and net profit based on commercialization/ marketing attribution success of innovative green products/ services, OR	
	0	None	*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.	

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 program, produce a report related to sustainability program, 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 organization.	
	3	A present of policy related to sustainability, participate in any sustainability program, produce report related to the sustainability program and receive recognition or certification.	*Monitoring record*s: Refers 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 program, and produce a report related to the sustainability program.	*Contract agreements:* Documents referred to as evidence for indicating mutual obligations between the parties. Examples are agreement made by the organization with the intention to manage hazardous waste in a sustainable manner.	
	1	A present of policy related to sustainability and participate in any sustainability program.		
	0	NONE of the above		

INDICATOR: MANAGEMENT

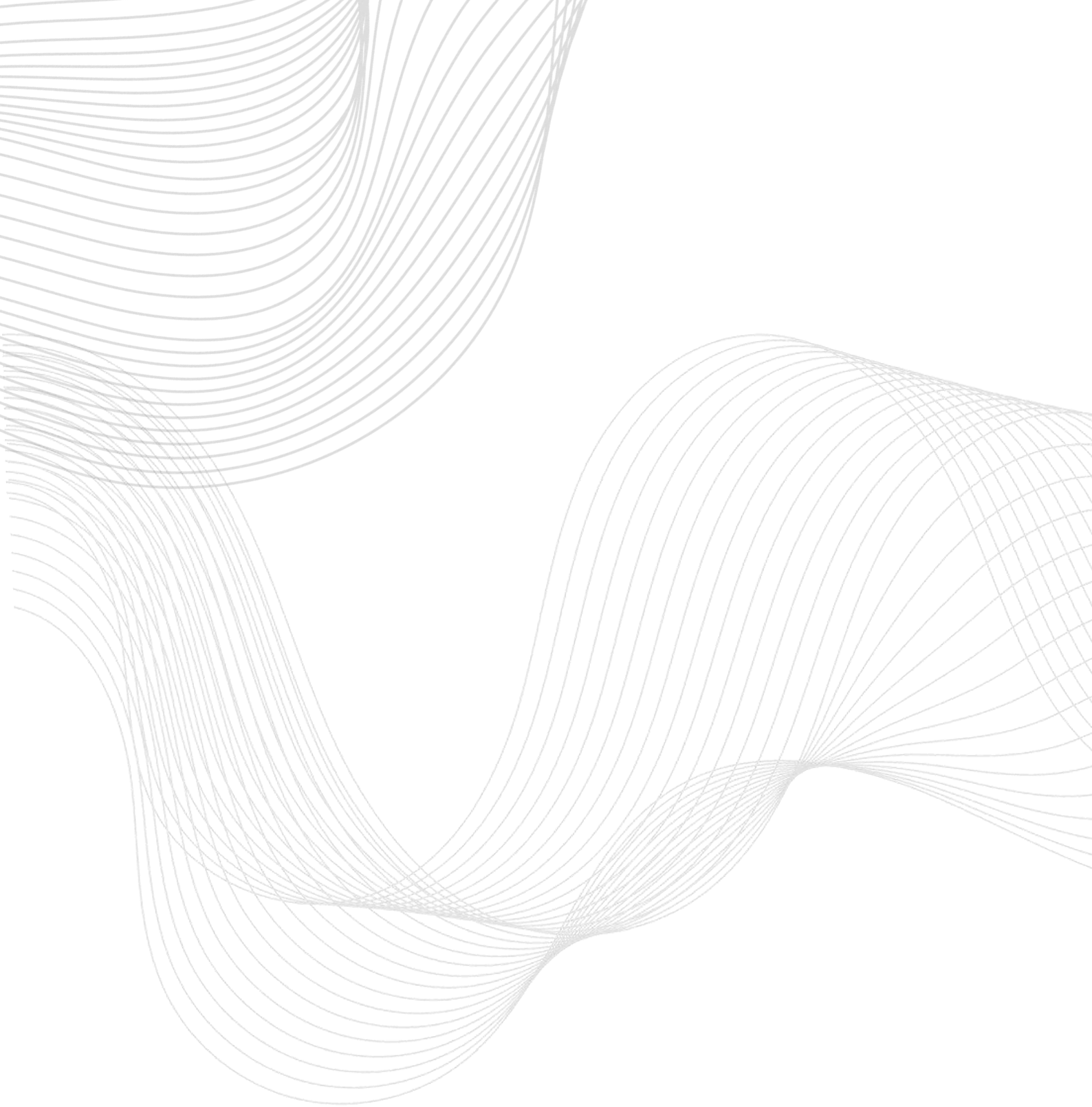
Sub-indicator: Green Procurement

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 organization 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 organization 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 non-toxic, 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 minimize 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 organization 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. COMPUTATION

Not applicable.

3.4. 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. The 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 services: 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 thinking: 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 organization 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:

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

3.3. COMPUTATION

Not applicable.

3.4. 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: 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:

1. Initiative proposal: Business or project planning with budget allocation.
2. 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.
3. Policy in place, documented (e.g., minutes of meeting/policy document/annual budget approval) and disseminated.
4. Monitoring record– look for current record and check for frequency monitoring.
5. 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.

6. Evidence of recycling by third parties e.g., receipt/invoice/financial report etc.
7. Validation of recycling by third parties e.g., contract/validation report/audit report.
8. Evidence of continuous quality improvement (CQI) exercise such as minute of meeting/CQI report. Example of CQI is performance of the selected contractor.
9. 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

1. Goal 1: 50% recycling rate of hazardous waste from the total hazardous waste generated by 2030
2. Goal 2: 40% recycling rate of solid waste from total waste generated by 2025
3. 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. DEFINITIONS

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.[1]

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

2.2. CONCEPT

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

[1] Source: Department of Environment

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

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

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/31082

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. DEFINITIONS

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 minimize the overall water footprint within processes.

Water efficiency: Refers to the optimization and reduction of water usage throughout industrial processes to minimize 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. 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: 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
- Livestock
- Manufacturing
- Mining
- Services

2. DEFINITIONS AND CONCEPTS

2.1. DEFINITIONS

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 minimize the overall water footprint within processes.

Water efficiency: Refers to the optimization and reduction of water usage throughout industrial processes to minimize 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:

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

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 DEFINITIONS

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 standardized methods.

*Scope 1: D*irect 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:

$$\text{Emission reduction} = \frac{[\text{Total emissions for the reporting period}(\text{kg } CO_2e) - \text{Total emissions for the baseline year}(\text{kg } CO_2e)]}{\text{Total emissions for the baseline year (kg } CO_2e)} \times 100\%$$

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. DEFINITIONS

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 Saving: 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.

2.2. 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:

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

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

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 CO_2 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.

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. 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. 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. May 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. May 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 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. COMPUTATION

Not applicable.

3.4. 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 $ktCO_2$ 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. DEFINITIONS

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 =

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

Percentage (%) of renewable fuel consumption =

$$\frac{[\text{Fuel consumption coming from renewable sources (unit for fuel)}]}{[\text{Total fuel consumption (unit for fuel)}]} \times 100\%$$

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 program 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 industrialization, 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 & Commercialization 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. DEFINITIONS

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

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. METHODOLOGY

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 commercialization/ 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 commercialized 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, organization will only need to proof that commercialized 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 commercialization, 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 industrialization, 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 & Commercialization (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 utilization, 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).

Organizational Structure: Refers to systems which outlines how innovation activities are formalized 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 recognized or acknowledged by certified bodies.

Proof of Return on Value:

Economic Value: Financial accounting report indicating outlining investment, revenue and net profit based on commercialization/ 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, Commercialization, 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 organization 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 commercialized 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, organization will only need to proof that commercialized 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 recognized award/ organizer/ provider).

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

- 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 organization. Unless required, otherwise period should be one year.

Management: Management from an organizational perspective refers to planning, organizing, 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 organization'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 organization 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 organization'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 organizations.

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

3.3. COMPUTATION

Not applicable.

3.4. ASSUMPTION AND UNCERTAINTIES

Not applicable.

4. OTHER METHODOLOGICAL CONSIDERATIONS

4.1. COMMENT AND LIMITATION

Not applicable.

4.2. VALIDATION

Any nationally and internationally recognized 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. DEFINITION

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 organization. Unless required, otherwise time span should be one year.

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

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

Program: 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. CONCEPT

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 organization'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 organization (e.g., ISO standards).
3. Developed guidelines or standard operating procedures of any green practice by the organization (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 organization).
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. COMPUTATION

Not applicable.

3.4. 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

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. DEFINITION, CONCEPT, AND CLASSIFICATIONS

2.1. DEFINITIONS AND CONCEPTS

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 organization. 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 organizational 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/organizations.

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 organization 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 organization undertakes to meet its green practices.
3. Policy on human capital development related to green practices applied in the organization.

Monitoring Records:

1. Minutes of meetings related to human capital development.
2. A statement of documented human capital development that the organization shares on its website, social media, and other media of communications.
3. Recognition of organizational human capital development activities (e.g., certificate, award at national and international levels).
4. *Contract agreements: A d*ocumented agreement indicating mutual obligations between the parties that is related to human capital development.

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

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 utilize 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 generalizability? (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)

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