BANK NEGARA MALAYSIA
CENTRAL BANK OF MALAYSIA

Climate Change and Principle-based Taxonomy

Discussion Paper

Applicable to:

1. Licensed banks
2. Licensed investment banks
3. Licensed Islamic banks
4. Licensed international Islamic banks
5. Licensed insurers
6. Licensed takaful operators
7. Professional reinsurers
8. Professional retakaful operators
9. Prescribed development financial institutions

Issued on: 27 December 2019 BNM/RH/DP 028-10

The Climate Change and Principle-based Taxonomy discussion paper aims to provide an overview of climate change and its impact on the financial system. It serves as a guidance to facilitate financial institutions in identifying and classifying economic activities that could contribute to climate change objectives. The document will undergo a period of public consultation before it is finalised. In this regard, Bank Negara Malaysia invites written feedback on this discussion paper. Responses may include issues and areas for clarification or alternative suggestions that Bank Negara Malaysia should consider. To facilitate an effective consultation process, the written feedback should be supported with clear reasons including accompanying illustrations and relevant data. Responses are to be submitted to Bank Negara Malaysia by **31 March 2020**. In addition, financial institutions are to report data to Bank Negara Malaysia as per the survey template in **Attachment I** by **15 July 2020**.

Submissions are to be directed to:

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Jabatan Penyeliaan Konglomerat Kewangan
Bank Negara Malaysia
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Electronic submission is encouraged (email: climatechange@bnm.gov.my)

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TABLE OF CONTENTS

PART A: OVERVIEW

1. Introduction

Environmental degradation is a serious issue that brings a host of negative outcomes that affect human beings and wider eco-systems, both directly and indirectly, which includes extreme weather, extinction of species, diseases, famine and increased poverty[1]. There is scientific evidence that global climate change is one of the critical causes of environmental degradation apart from factors such as industrialisation, technocentrism, unplanned construction, pollutants and chemical effluents, population growth and deforestation[2].

Scientists attribute the global warming trend to human expansion of the greenhouse effect. Carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4) and chlorofluorocarbons (CFC) are the primary greenhouse gases (GHG). These gases absorb and emit radiation at specific wavelengths in the earth's atmosphere which lead to the greenhouse effect. When the atmosphere traps heat radiating from earth towards space it causes global warming and climate change (refer to **Appendix I** for illustrations on the effects of climate change).

As part of the Paris Agreement 2015, 197 countries committed to a common goal of reducing GHG emissions and to increase resilience and adaptation ability to the adverse impacts of climate change[3]. Malaysia, as a Paris Agreement signatory is committed in reducing GHG and has pledged to reduce GHG emissions intensity of gross domestic production (GDP) by 45% by 2030 relative to emissions intensity of GDP in 2005 under the Intended Nationally Determined Contribution (INDC)[4].This commitment tothe Paris Agreement represents Malaysia's pledge to contribute to the mitigation of changing climate effects. Malaysia has committed to reduce emissions intensity of three types of GHGs namely carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O).

This global commitment implies increased focus towards clean and energy-efficient technologies. The transformation and shift of focus on these economic activities would result in changes to the dynamics of economic sectors and industries as well as changes in customers' preference towards sustainable and environmentally friendly goods and services. Therefore, the movement towards a low-carbon economy not only poses financial challenges but also creates significant opportunities for economic activities that focus on climate change mitigation and adaptation solutions[5].

[1] Earth Science Communications Team NASA's Jet Propulsion Laboratory, "The Causes of Climate Change," NASA, https://climate.nasa.gov/causes/
[2] Sonia Madaan, "What is Environmental Degradation?", Earth Eclipse, https://www.eartheclipse.com/environment/10-striking-reasons-environmental-degradation.html
[3] United Nations Climate Change, "What is the Paris Agreement?," UNCC https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement
[4] United Nations Climate Change, "NDC Registry (interim)," UNCC https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx
[5] Final Report – Recommendations of the Task Force on Climate-related Financial Disclosures, June 2017

1.1 Characteristics of climate change

Climate change is fast becoming a material source of structural change that has or may have significant impact to the financial system and wider economy. Its societal impacts are clearly seen from the recent catastrophic natural disasters and subtle yet noticeable changes in the environment such as rising temperatures. The costs of such natural disasters can significantly impact communities, business operations and the economic environment causing loss of livelihood, lower productivity and financial losses. The distinctive characteristics of climate change are further explained in **Table A**.

Table A: Characteristics of Climate Change

Characteristic	Description
Far-reaching in breadth and magnitude	Climate change will affect all agents in the economy (households, businesses, governments), across all sectors and geographies. The risks will likely be correlated with and, potentially aggravated by tipping points, in a non-linear fashion. This means the impacts could be much larger, and more widespread and diverse than those of other structural changes.
Foreseeable nature	While the exact outcomes and time horizon are uncertain, there is a high degree of certainty that some combination of physical and transition risks will materialise in the future.
Irreversibility	The impact of climate change is determined by the concentration of GHG emissions in the atmosphere and there is currently no mature technology to reverse the process. Above a certain threshold, scientists have shown with a high degree of confidence that climate change will have irreversible consequences on our planet, though uncertainty remains about the exact severity and time horizon.
Dependency on short-term actions	The magnitude and nature of the future impacts will be determined by actions taken today, which thus need to follow a credible and forward-looking policy path. This includes actions by governments, central banks and supervisors, financial market participants, firms and households.

Source: Network For Greening the Financial System: First Comprehensive Report (A call for action: Climate change as a Source of Financial Risk), 2019

1.2 Dimensions of climate-related risks

Climate change and its impacts can manifest in three dimensions of risk namely physical risk, transition risk and liability risk.

Physical risk arises from climate-related events that damage property, reduce productivity and disrupt trade. Physical risks directly impact the continuity of business operations and economic activities which in turn increases credit risk to financial institutions when revenue generating capacity and credit worthiness of borrowers are materially impacted. In addition, this would lead to increased insurance premium/takaful contribution or potential reduction in the availability of insurance/takaful cover on assets. Physical risk also impacts collateral value, where assets pledged as collateral to banks could be destroyed or significantly damaged by climate events, impacting the recovery value. These risks are rarely

well accounted for by the banks, therefore under-pricing risks of such climate-related occurrences.

Transition risk arises from transitioning to a lower-carbon economy which may entail extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change. The changes in the legal/regulatory framework (e.g. disclosure requirement, implementation of carbon pricing), technological advancements (e.g. reducing cost of renewable energy) or consumer sentiments (e.g. certification scheme, fossil fuel divestment campaign) may translate into financial and/or reputational risk to financial institutions. The multifarious societal responses to climate change could lead to systemic risks that may have wider implications to financial stability.

Liability risk entails legal risks and claims on damages and losses incurred from the effects of physical and transition risks. This risk impacts financial institutions, particularly the insurance and takaful sectors as climate-related liabilities are transferable to insurance and takaful operators via liability protection. Generally, liability risk is assessed as part of physical and transition risks.

Impact of physical risks resulting from climate events and natural disasters have been significant. In Malaysia alone, more than 50 natural disasters in the past 20 years have resulted in over RM8.0 billion losses and more than 3 million people affected through displacements, injuries and death[6].

Although most risks largely stem from physical risks, risks posed to the economy and financial system also arise from transition risks arising from disruptions and shifts towards a low-carbon economy. The types of climate-related risks and its impacts are further explained in **Table B**.

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[6] Zurairi, A.R. (2018); Tang, K.H. (2019); Yaacob, O & Chau (2005)

Table B: Types of climate-related risks and its impact

	Description	Impacts
Physical risk	Direct impacts of climate-related events to assets, financials, earnings or reputation: - Changing weather patterns - Sea level rise - Extreme weather events - Climate induced natural disaster	- Damage to physical assets or devaluation of financial assets/investments - Early retirement or abandonment of assets - Reconstruction/replacement of damaged infrastructure - Wider economic deterioration (lower demand, productivity and output) - Disruption to business operations, trade and supply chain - Lower household and business income - Displacement or forced migration - Increase in insurance premiums and takaful contribution as well as higher than expected insurance/takaful claims
Transition Risk	Disruption from adjustment to low-carbon economy: - Policy changes and legal reforms - Political orientation - Scientific breakthrough and technological innovation - Market sentiment and consumer preferences - Social activism	- Stranded, obsolescence, or unanticipated write-downs of assets - Asset replacement costs - Revaluation of financial assets - Threat to viability of business - Higher business operation cost - Impact on pricing and demand - Increase in default risk
Liability Risk	Legal cost and claims incurred as a result of not considering or responding to the impacts of climate change - Stakeholder litigation - Regulatory enforcement	- Penalties resulting from litigation action - Business disruption or cessation of business operations

1.3 Interactions between physical and transition risks

The interactions between physical and transition risks are complex. A significant increase in physical risks would necessitate a swift response to build resilience and withstand shocks. This will translate into higher transition risk. Where resources are limited, higher cost of transition can involve significant trade-offs between competing social-economic priorities.

On the other hand, if the required adaptation and transition measures are not taken in a timely manner, physical risk will escalate and manifest in heightened damages and financial losses. In a worst case scenario of inaction, the increased probability of disruptive events will inevitably force a sudden and radical change in the economic structure.

1.4 Transmission channels of climate-related risks

Bank Negara Malaysia takes the view that climate-related risk is a risk driver that has an impact on most of the commonly known risk types such as credit risk, market risk, liquidity risk, insurance risk, operational risk and strategic risk. Climate-related risk transmits to these other risk types via the manifestation of physical risk, transition risk and liability risk.

For example, extreme weather events could cause damage to business assets and its surrounding areas, which would lead to increase in cost of doing business arising from repair or replacement of assets. This is further exacerbated by the loss of income from disruption of business operations which heightens the risk of business' ability to repay debt obligations. For insurers/takaful operators, this will lead to increase in weather-related insurance/takaful claims.

Meanwhile, companies that do not consider climate change risk in their business models and implement transition measures to increase resilience could face decline in investment values (refer to **Appendix II** for illustrations on how climate-related risks lead to financial and non-financial impacts through commonly known risk types and **Appendix III** for examples by the Task Force on Climate-Related Financial Disclosures). In **Part B** of this discussion paper, a classification system is proposed to facilitate supervised institutions in assessing economic activities that promote transition towards a low carbon and climate resilient economy.

1.5 Integration of climate-related risks

Bank Negara Malaysia considers climate change as a material source of risk that could pose threats to financial stability. Supervised institutions are therefore expected to integrate climate-related risks and considerations into their business strategies and risk management practices.

- Enhance governance arrangement, oversight and organisational structure to consider climate change factors.
- Increase awareness and understanding, build competencies and capabilities to integrate climate-related risks into the existing risk management framework and work processes.
- Promote transparency through voluntary disclosure of climate-related risks and information in line with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD)[7].

2. Objective

Bank Negara Malaysia recognises the risks and impacts that climate change has on financial stability and the economy. The objectives of this document are for financial institutions to:

a. Increase awareness and actively respond to climate change;
b. Identify economic activities that contribute to climate change objectives; and
c. Prepare and build capabilities in managing the financial risks from climate change.

With the increased awareness on climate-related risks, Bank Negara Malaysia encourages financial institutions to take actions to embed climate-related risks considerations in their business operations and decision making. This includes

[7] 2019 Task Force on Climate-related Financial Disclosures, https://www.fsb-tcfd.org/

promoting financial flows to activities that will support transition to a low carbon and climate resilient economy.

This document is developed in reference to international standards and guides as well as *the Value-based Intermediation Financing and Investment Impact Assessment Framework (VBIAF) Guidance Document*. The VBIAF is anchored on Shariah tenets and serves as reference for developing environmental, social and governance (ESG) risk management frameworks. This discussion paper builds on and extends the VBIAF with a specific focus on climate change and its impact to the wider financial system.

The VBIAF may serve as a reference for supervised institutions that seek to incorporate the consideration of broader ESG risks in their risk management system.

3. Applicability

This document is developed to serve as a guide for institutions supervised by Bank Negara Malaysia (supervised institutions):

- Licensed banks
- Licensed investment banks
- Licensed international Islamic banks
- Licensed Islamic banks
- Licensed insurers/ reinsurers
- Licensed takaful/ retakaful operators
- Prescribed development financial institutions

In addition, this document can be used as a reference by other players in the financial system such as asset management companies, rating agencies and research houses.

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PART B: ASSESSMENT OF ECONOMIC ACTIVITIES

4. Guiding principles for the assessment of economic activities

Recognising the impact of climate change to communities, business operations and the wider economy, there is a need to alleviate the impact of climate change and promote transition towards a low carbon and climate resilient economy. These can be done by incentivising transitions, supporting economic activities in low-carbon sectors and facilitating decarbonisation of existing industries. As such, supervised institutions are to assess an economic activity and its impact to the broader environment based on the guiding principles outlined below.

4.1 Guiding Principle 1 (GP1): Climate change mitigation

The objective of climate change mitigation[8] is to reduce GHG in the atmosphere. An economic activity can be considered to meet climate change mitigation if it makes substantial contribution towards the following:

- Avoid GHG emissions;
- Reduce GHG emissions; or
- Enable others to avoid or reduce GHG emissions

Examples of economic activities[9] that can be considered as meeting GP1 include, but are not limited to the following:

a. Increase contribution of renewable energy in power generation
   E.g. Solar farm, biogas power plant, hydro power plant
b. Optimise energy consumption
   E.g. Promote energy efficient and energy savings based projects
c. Encourage low carbon mobility
   E.g. Energy efficient vehicles and transport
d. Promote green buildings
   E.g. Adoption of green technology in the construction, management, maintenance and demolition of buildings

Reduction of emissions can be performed via several mechanisms[10], such as increasing energy efficiency, use of renewable forms of energy and carbon capture and storage technology. Examples of economic activities generally labelled as green and environmentally friendly are provided in **Appendix IV**.

4.2 Guiding Principle 2 (GP2): Climate change adaptation

The objective of climate change adaptation is to increase resilience in order to withstand the negative physical effects of current and future climate change. An economic activity can be considered to meet climate change adaptation through the following:

- Implement measures to increase own resilience; or
- Enable other economic activities to adapt to climate change.

Examples of economic activities that can be considered as meeting GP2 include, but are not limited to the following[11]:

[8] Based on The Eleventh Malaysia Plan 2016-2020
[9] Based on The Eleventh Malaysia Plan 2016-2020
[10] Guidelines on Environmental and Social Risk Management (ESRM) for Banks and Financial Institutions in Bangladesh, Bangladesh Bank Sustainable Finance Department, February 2017
[11] EU Taxonomy, Technical Expert Group on Sustainable Finance

a. Implement measures to increase own resilience
   E.g. Implement early warning system to reduce risk of flooding
b. Contribute to the adaptation of other economic activities to mitigate physical effects of climate change
   E.g. Develop flood sensor technology

4.3 Guiding Principle 3 (GP3): No significant harm to the environment

An economic activity is generally location specific and interacts directly or indirectly with the surrounding environment. While an economic activity may contribute towards climate risk mitigation and adaptation, the overall business may bring about unintended harm to the broader environment which may precipitate permanent adverse impacts to the climate. Therefore, there must be adequate consideration directed at the impact on the wider ecosystem where the economic activity takes place.

To align with the broader environmental objectives[12], the following criteria should be considered for the overall business:

a. Prevent and control pollution (air, water and land);
b. Protect healthy ecosystem and biodiversity; and
c. Sustainable and efficient use of energy, water, and other natural resources.

4.4 Guiding Principle 4 (GP4): Remedial efforts to promote transition

In supporting the transition efforts towards a low carbon and climate resilient economy, supervised institutions are expected to take into account the remedial efforts and improvement programmes undertaken by the businesses. This include commitment or willingness demonstrated by businesses through development of action plans, implementation of remedial measures and transition towards sustainable practices which may indirectly contribute to climate change mitigation and adaptation.

4.5 Guiding Principle 5 (GP5): Prohibited activities

Supervised institutions should verify and ensure that the economic activities are not illegal and does not contravene environmental laws. This includes, but is not limited to the National Policy on the Environment, National Forestry Act 1984, Fisheries Act 1985, National Parks Act 1980, Environmental Quality Act 1974 and its Regulations and Orders. Examples of prohibited activities are as follows (non-exhaustive):

a. Illegal waste management including release of untreated toxic and hazardous industrial waste (generate, storage, treatment and disposal);
b. Operations which use fire for land clearance;
c. Operations involving illegal deforestation;
d. Activities within, adjacent to, or upstream of designated protected areas and habitats of rare/endangered species; and
e. Operations which practice drift net fishing or fishing with the use of explosives.

[12] Environmental Quality Act 1974 and National Policy on the Environment

5. External Certification and Verification

Supervised institutions can leverage on third party verification or recognised certifications by local agencies, national authorities or globally accepted standards to provide assurance on environmentally sustainable practices. **Table C** and **Table D** provide examples of third party certifications and verifications.

In circumstances where there is no recognised certification or third party verification, supervised entities can leverage on sustainability reporting assurances or external rating agencies services to assess evidence of substantial contribution to climate change objectives.

Table C: Examples of certification and independent verification

Sector/Issue	Certification and Independent verification
General	• MS ISO 14001: 2015 – Environmental Management Systems* • MS 1722: 2011 and OHSAS 18001 – Occupational Safety and Health Management Systems*
Climate	• ISO 14064: 2006 – Greenhouse gases • Science Based Targets Initiative
Water	• AWS International Water Stewardship Standard Corporate context-based water targets
Agriculture	• Malaysian Standards Palm Oil (MSPO)* • Roundtable on Sustainable Palm Oil (RSPO)
	• BONSUCRO
	• Better Cotton Initiative
	• Common Code for the Coffee Community (4C) • Tropical Commodities Coalition for Sustainable Tea Coffee and Cocoa (TCC) Ethical Tea Partnership (ETP) World Cocoa Foundation (WCF) • Rainforest Alliance
	• Roundtable on Sustainable Biomaterials (RSB)
Fisheries	• Marine Stewardship Council (MSC) • Aquaculture Stewardship Council (ASC)
Forestry	• Malaysian Timber Certification Scheme - Programme for The Endorsement of Forest Certification (MTCS-PEFC)* • Forest Stewardship Council (FSC)
Mining and Metals	• World Gold Council Conflict-free Gold Standard Kimberley Process Certification Scheme (KPCS) • Aluminium Stewardship Initiative (ASI) • Initiative for Responsible Mining Assurance (IRMA) • RJC Chain of Custody (CoC) Certification
Infrastructure	• Sustainable INFRASTAR* • The Standard for Sustainable and Resilient Infrastructure • GRESB • CEEQUAL
	• Greenroads Certification
	• Hydropower Sustainability Assessment Protocol
	• Green Building Index*

* denotes national certification

Source: VBI Financing and Investment Impact Assessment Framework, 2019

Table D: Examples of certification/standards for investment instruments

Instrument	Certification/standards
Sukuk	• Sustainable and Responsible Investment Sukuk framework*
Bond	• ASEAN Green Bond Standards* • Green Bond Principles (International Capital Markets Association) • Social Bond Principles (International Capital Markets Association) • Sustainability Bond Guidelines (International Capital Markets Association)
Equities	• FTSE4Good Bursa Malaysia Index*

* denotes national certification

Source: VBI Financing and Investment Impact Assessment Framework, 2019

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PART C: CLASSIFICATION OF ECONOMIC ACTIVITIES

6. Classification system

A consistent and systematic classification of economic activities can facilitate and promote the channelling of financial flows to activities that support the mitigation and adaptation of climate change including transition towards low carbon and climate resilient businesses. Based on the guiding principles in **Part B**, economic activities can be classified into six categories as per **Table E**.

The classifications in **Table E** are constructed with reference to:

a. Positive effects of economic activities in supporting climate change mitigation and adaptation; and
b. Negative effects from harming the broader environment as a result of business activities undertaken and measures taken (or not taken) to reduce harmful practices.

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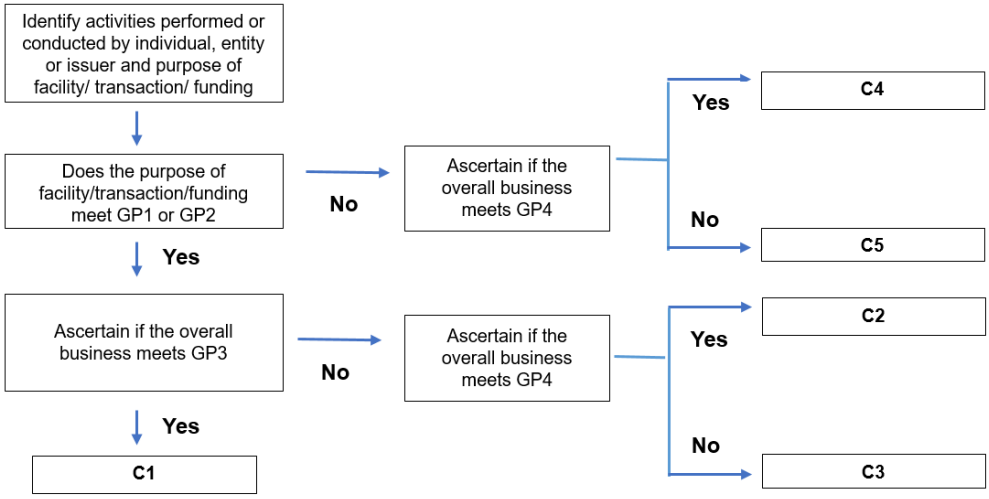
Table E: Classification of economic activities

	Criteria
Category 1 (C1)	a. Economic activity ***supports substantial reduction or avoidance of GHG emissions*** including enabling others to achieve the same objective; or ***Increase resilience*** to mitigate the physical effects of climate change; and b. The overall business activities ***do not cause harm*** to the broader environment.
Category 2 (C2)	a. Economic activity ***supports substantial reduction or avoidance of GHG emissions*** including enabling others to achieve the same objective; or ***Increase resilience*** to mitigate the physical effects of climate change; and b. The overall business activities ***may cause harm*** to the broader environment. However, the business has ***demonstrated commitment and willingness*** to improve practices.
Category 3 (C3)	a. Economic activity ***supports substantial reduction or avoidance of GHG emissions*** including enabling others to achieve the same objective; or ***Increase resilience*** to mitigate the physical effects of climate change; and b. The overall business activities ***may cause harm*** to the broader environment. However, the business ***does not demonstrate commitment and willingness*** to improve practices.
Category 4 (C4)	a. Economic activity ***does not directly support*** substantial reduction or avoidance of GHG emissions including enabling others to achieve the same objective; or ***Does not increase resilience*** to mitigate the physical effects of climate change; but b. The business ***demonstrates commitment and willingness*** to implement remedial measures and transition towards environmentally sustainable practices.
Category 5 (C5)	a. Economic activity ***does not contribute to climate change mitigation and adaptation***; and b. The business ***does not demonstrate commitment and willingness*** to implement remedial measures and transition towards environmentally sustainable practices.
Category 6 (C6)	Involved in ***prohibited activities***.

Illustration of the classification steps is provided in **Diagram A** and use cases are provided in **Appendix V**.

Diagram A: Steps to classify economic activities



An economic activity should not be considered environmentally sustainable independently from the overall business activities. Supervised institutions are expected to conduct holistic due diligence assessments and consider the impact their businesses have on the wider eco-system and ensure that their businesses do not have track records of environmentally damaging practices.

The categories ‘C2’, ‘C3’ and ‘C4’ are introduced to the classification system to recognise the early stages of transition towards a low carbon and climate resilient economy. Exclusion of these categories from access to financing may result in severe negative impact to the economy. The classification process presents opportunities to supervised institutions to take on the role to nurture businesses through promoting sustainable solutions rather than outright rejection of customers or subjecting existing customers to exit mechanism. Supervised institutions may consider appropriate strategies including technical and financial assistance as follows:

- Providing capacity building and training activities;
- Facilitating collaboration with strategic partners;
- Providing relevant advisory and support; and
- Offering green financial products and services.

7. Application and use case

Supervised institutions can use the guiding principles and classification system for development of business strategy and management of risks. It is important for supervised institutions to start collecting data for risk identification, controls and monitoring.

Directing financial flows to support Malaysia's decarbonisation objectives has profound impact on the businesses and communities at large. Apart from economic activities or sectors that are already green, supervised institutions should be mindful to also consider the need to contribute to the greening of other sectors and helping businesses build resilience to climate change. The financing and investment decisions of supervised institutions can signal the strategic orientation and influence the capital flows and behaviour of businesses and investors.

The taxonomy can be used by various stakeholders:

Banks	Financing and investment decisions (e.g. asset acquisition, project financing and lending activities)
Insurers/ takaful operators	Underwriting and investment decisions in the capacity of risk manager, risk carrier and investor
Investors/ asset management companies	Investment decision (e.g. equity/bond holdings)

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PART E: Next Steps

8. Next steps

This discussion paper represents an important first step towards the integration of climate-related risks into business strategy and risk management of supervised institutions. The Bank is currently pursuing the following initiatives to support transition to a low carbon and climate resilient economy:

a. Implement the mandates of the Joint Committee on Climate Change (JC3) that was established in September 2019. This includes development of industry best practices and tools on risk management, governance and disclosure, explore various intermediation structures and products that embed consideration for climate-related risks and promote awareness and conduct technical training programmes;
b. Continuous engagement with relevant stakeholders including supervised institutions and government agencies;
c. Commencement of data reporting to quantify exposures at risk to climate change. This will be used to build comprehensive datasets for the purpose of facilitating risk identification, assessment, stress testing and scenario analysis; and
d. Establishment of regulatory and supervisory expectations including disclosures by supervised institutions.

As part of the Bank's supervisory activities, there will be engagements with individual supervised institutions on their plans and progress in implementing the principle-based taxonomy outlined in this document.

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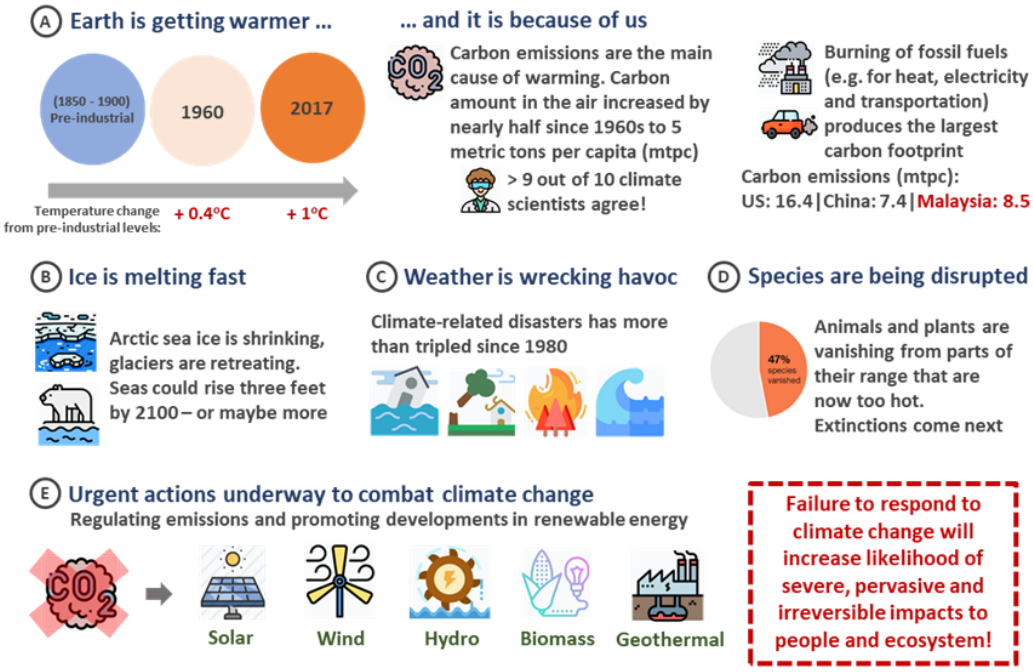
Appendix I

Effects of climate change



Source: National Geographics, 2017: Seven Things to know about Climate Change.

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Appendix II

Climate-related risks and commonly known risk types

PHYSICAL RISK

Direct impact to assets, financials, earnings or reputation due to increased frequency or severity of adverse climate-related events:

- Changing weather patterns
- Sea level rise
- Extreme weather events

TRANSITION RISK

Disruption to business from adjustment to low-carbon economy due to:

- **Regulatory** reforms
- **Technological** advancement
- Shift in **market** sentiment/preference
- **Reputational** risk due to social activism

LIABILITY RISK

Not considering or responding to the impacts of climate change leading to:

- Regulatory enforcement
- Stakeholder litigation
- Liability insurance/takaful claims[1]

FINANCIAL & NON-FINANCIAL IMPACTS[2]

- Increased operating costs
- Reduced demand for products & services
- Unstable asset value due to repricing/impairment
- Fluctuation to revenues
- Increased insurance premium/takaful contribution
- Reduced insurance/takaful coverage for high-risk areas

STRATEGIC RISK

- Inability to achieve business targets as current strategies are not resilient to climate related risks and opportunities

CREDIT RISK

- Borrowers' ability to pay could severely be impaired as a result of higher cost of doing business and drop in market value of collateral
- Downgrade of credit rating of reinsurers/retakaful operators (particularly less-diversified ones), exposing insurers/takaful providers to reinsurance/retakaful losses

LIQUIDITY RISK

- Risk of unavailability of funding due to firms' lack of responsiveness to climate related risk
- Higher insurance policy/takaful certificate cancellations by policyholders/certificate holders to supplement lost income

OPERATIONAL RISK

- A firm's operational risk profile can be impacted due to vulnerability of its area of operations to changing climate.

[13] Harding, William et al., "Turning up the heat –climate risk assessment in the insurance sector." *Financial Stability Institute Insights on Policy Implementation Number 20,* November 2019

[14] Final Report: Recommendations of the Task Force on Climate-Related Financial Disclosures, 2017

Appendix III

Climate-related risks and potential impact to financials

Climate-related Risks		Potential impact to financials
Transition Risk	**Policy and Legal**	
	• Increased pricing of GHG emissions • Enhanced emissions-reporting obligations • Mandates on and regulation of existing products and services • Exposure to litigation	• Increased operating costs (e.g. higher compliance costs, increased insurance premiums) • Write-offs, asset impairment, and early retirement of existing assets due to policy changes • Increased costs and/or reduced demand for products and services resulting from fines and judgements
	Technology	
	• Substitution of existing products and services with lower emission options • Unsuccessful investment in new technologies • Costs to transition to lower emissions technology	• Write-offs and early retirement of existing assets • Reduced demand for products and services • Research and development (R&D) expenditures in new and alternative technologies • Capital investments in technology development • Costs to adopt/deploy new practices and processes
	Market	
	• Changing customer behavior • Uncertainty in market signals • Increased cost of raw materials	• Reduced demand for goods and services due to shift in consumer preferences • Increased production costs due to changing input prices (e.g., energy, water) and output requirements (e.g., waste treatment) • Abrupt and unexpected shifts in energy costs • Change in revenue mix and sources, resulting in decreased revenues • Re-pricing of assets (e.g., fossil fuel reserves, land valuations, securities valuations)
	Reputation	
	• Shifts in consumer preferences • Stigmatization of sector • Increased stakeholder concern or negative stakeholder feedback	• Reduced revenue from decreased demand for goods/services – Reduced revenue from decreased production capacity (e.g., delayed planning approvals, supply chain interruptions) • Reduced revenue from negative impacts on workforce management and planning (e.g., employee attraction and retention) • Reduction in capital availability
Physical Risk	**Acute**	• Reduced revenue from decreased production capacity (e.g., transport difficulties, supply chain interruptions) • Reduced revenue and higher costs from negative impacts on workforce (e.g., health, safety, absenteeism) • Write-offs and early retirement of existing assets (e.g., damage to property and assets in “high-risk” locations) • Increased operating costs (e.g., inadequate water supply for hydroelectric plants or to cool nuclear and fossil fuel plants) • Increased capital costs (e.g., damage to facilities) • Reduced revenues from lower sales/output • Increased insurance premiums and potential for reduced availability of insurance on assets in “high-risk” locations
	• Increased severity of extreme weather events such as cyclones and floods	
	Chronic	
	• Changes in precipitation patterns and extreme variability in weather patterns • Rising mean temperatures • Rising sea levels	

Source: Final Report: Recommendations of the Task Force on Climate-Related Financial Disclosures, 2017

Appendix IV

Examples of economic activities that are generally considered as green and environmentally friendly

Economic Activities	
Energy efficiency	• Vehicle fleet energy efficiency and low carbon fuels • Boiler with energy efficient alternatives • Energy saving technology
Pollution prevention and control	• Environmental restoration projects • Commercial production of vermicompost
Green manufacturing	• Recycling, processing and utilisation of renewable resources • Waste paper recycling plant for production of recycled paper • Recyclable baggage manufacturing plant (from raw material e.g. bamboo) • Solar battery recycling plant • Manufacture of low carbon transport vehicles, equipment and infrastructure, electric rail chain supply • Manufacture of energy efficient equipment for buildings • Manufacture of energy efficient retail appliances (e.g. energy efficient fridges, cookers) • Biofuel/hydrogen fuel production facilities • Carbon scrubber facilities and products for clean-up and treatment of exhaust gases from industrial plants • Carbon capture and storage facilities and products dedicated to capture GHG emissions
Clean transportation	• Urban mass transit and non-motorised transport (enabling bicycle and pedestrian mobility) • Electric passenger and freight vehicles • Infrastructure for low-carbon and efficient transport (e.g. charging stations for electric vehicles) • Electrified rails, trams, trains, trolley buses or cable cars
Clean and renewable energy	• Facility construction and operation of wind power generation • Facility construction and operation of solar photovoltaic (PV) power generation • Solar plant assembly • Smart grid and energy internet • Solar thermal application • Hydropower generation
Biogas	• Biogas plant on dairy and poultry farm • Integrated cattle rearing and setup of plant in farm • Organic manure from slurry • Biofuel preparation process facility
Waste management	• Solid waste management (waste management projects that capture or combust methane emissions) • Liquid waste management (waste management projects that capture or combust methane emissions)

Economic Activities	
	• Installation of biological effluent treatment plant (ETP) • Sewage water treatment plant (treatment of wastewater that reduces GHG emissions) • Waste-to-energy projects (waste collection, recycling and management projects that recover or reuse material and wastes as inputs into new products) • Biological treatment facilities (anaerobic digestion facilities, composting facilities) • Recycling and utilisation of industrial solid wastes, exhaust gas and effluent

Source: *World Bank – Project Activities Endorsed for Green Finance: Comparison of Catalogues*

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Appendix V

Use cases

The examples set out below are for illustrative purpose and do not attempt to cover every situation. It must be interpreted by applying expert judgement to the circumstances surrounding each case.

√ - Denotes meeting respective GP

Entity A				
Overall Business	Oil palm plantation			
Activities that require funding	a. MSPO certification **(GP4)** - Certification provides independent assurance on the sustainable and responsible management of business operations such as efficient energy use and waste disposal management - This can be considered as ***commitment and willingness to improve practices of the overall business*** b. Replacement of fuel-based trucks to electric trucks **(GP1)** - Electric trucks reduce GHG emissions - This can be considered as ***supporting climate change mitigation*** c. Water management **(GP2)** - Invest in irrigation and drainage system to minimise the impact of drought and floods - This can be considered as ***supporting climate change adaptation*** d. General working capital - Funding for overall business operations e.g. wages, utilities - Does not directly support climate change mitigation and adaptation. Notwithstanding, Entity A demonstrated ***commitment and willingness to improve practices of the overall business*** *(MSPO certification)*			
Credit Exposure				
Facilities	MSPO certification	Purchase of electric trucks	Water management	General working capital
Assessment (Pre-MSPO certification)				
GP1		√		
GP2			√	
GP3				
GP4	√	√	√	√
GP5				
Classification	**C4**	**C2**	**C2**	**C4**
Assessment (Post-MSPO certification)				
GP1		√		
GP2			√	
GP3		√	√	
GP4				√
GP5				
Classification		**C1**	**C1**	**C4**

Entity B				
Overall Business	Construction (Green-certified and non-green buildings)			
Activities that require funding	a. Construction of green residential homes **(GP1)** - More efficient use of energy and water, uses environmentally friendly materials and reduces GHG emissions - This can be considered as ***supporting climate change mitigation*** b. Solar panels installation **(GP1)** - Solar panels help reduce GHG emissions - This can be considered as ***supporting climate change mitigation*** c. Build embankment **(GP2)** - Make building more resilient to flood - This can be considered as ***supporting climate change adaptation*** d. General working capital - Funding for overall business operations e.g. wages, utilities - Does not directly support climate change mitigation and adaptation.			
Credit Exposure				
Facilities	Construction of green residential homes	Solar panel installation	Build embankment	General working capital
Assessment				
GP1	√	√		
GP2			√	
GP3				
GP4				
GP5				
Classification	**C3**	**C3**	**C3**	**C5**

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<table>
<tr><th colspan="5">Entity C</th></tr>
<tr><td>Overall Business</td><td colspan="4">Manufacture semiconductors</td></tr>
<tr><td>Activities that require funding</td><td colspan="4">a. Purchase of green technology equipment (GP1)
- More efficient use of energy and reduces GHG emissions
- This can be considered as supporting climate change mitigation
b. Purchase of factory certified as green building (GP1)
- More efficient use of energy and reduces GHG emissions
- This can be considered as supporting climate change mitigation
c. Install floodgates (GP2)
- Make factory more resilient to flood
- This can be considered as supporting climate change adaptation</td></tr>
<tr><td colspan="5">Credit Exposure</td></tr>
<tr><td>Facilities</td><td>Purchase of green technology equipment</td><td>Purchase of factory certified as green building</td><td>Installation of floodgates</td><td>General working capital</td></tr>
<tr><td colspan="5">Assessment (Illegal dumping of toxic waste (GP5))</td></tr>
<tr><td>Classification</td><td>C6</td><td>C6</td><td>C6</td><td>C6</td></tr>
</table>

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Entity D				
Overall Business	Manufacture semiconductors			
Activities that require funding	a. Purchase of green technology equipment **(GP1)** - More efficient use of energy and reduces GHG emissions - This can be considered as ***supporting climate change mitigation*** b. Purchase of factory certified as green building **(GP1)** - More efficient use of energy and reduces GHG emissions - This can be considered as ***supporting climate change mitigation*** c. Install floodgates **(GP2)** - Make factory more resilient to flood - This can be considered as ***supporting climate change adaptation*** Entity D has demonstrated ***commitment and willingness to make factory operations and products more environmentally friendly (GP4)***			
Credit Exposure				
Facilities	Purchase of green technology equipment	Purchase of factory certified as green building	Installation of floodgates	General working capital
Assessment				
GP1	√	√		
GP2			√	
GP3				
GP4	√	√	√	√
GP5				
Classification	**C2**	**C2**	**C2**	**C4**

Issuer E		
Overall Business	Energy company (renewable and non-renewable)	
Activities that require funding	a. Coal production b. Construction of solar photovoltaic plant **(GP1)** - This can be considered as ***supporting climate change mitigation***	
Investment / related services		
Type	Bond investment in solar project	Equity investment in the energy company
Assessment		
GP1	√	
GP2		
GP3		
GP4	√	
GP5		
Classification	**C2**	**C5**

Individual F				
	Facility 1	**Facility 2**	**Facility 3**	**Facility 4**
Purpose of credit facility	Electric car	Residential mortgage certified Green Building	Purchase of green unit trust	Personal financing i.e. installation of solar panel
Assessment				
GP1	√	√	√	√
GP2				
Classification	**C1**	**C1**	**C1**	**C1**

Individual G				
	Facility 1	**Facility 2**	**Facility 3**	**Facility 4**
Purpose of credit facility	Purchase of flood insurance cover	House renovation (flood proof)	Personal financing (medical)	Personal financing (wedding)
Assessment				
GP1				
GP2	√	√		
Classification	**C1**	**C1**	**C5**	**C5**