ASEAN TAXONOMY FOR SUSTAINABLE FINANCE

VERSION 1

ASEAN TAXONOMY BOARD

Foreword

Message from the Chair of the ASEAN Taxonomy Board (ATB)

The Association of Southeast Asian Nations (ASEAN) has always placed importance on the well-being of its citizens and the need for the region's growth and development to be sustainable. The ASEAN Socio-Cultural Community envisages an inclusive community that provides high quality of life, equitable access to opportunities for all and the promotion and protection of human rights. It also aims for a sustainable community that promotes social development and environmental protection. As the world's fifth largest economic bloc, ASEAN is acutely aware of the role it plays, and can play, in the global sustainability agenda. All ASEAN Member States (AMS) have ratified the Paris Agreement. In 2015, the ASEAN Heads of State and Government adopted the Declaration on Institutionalising the Resilience of ASEAN and Its Communities and Peoples to Disasters and Climate Change (ASEAN, 2015 [1]) where AMS committed to forge a more resilient future by reducing existing disaster and climate related risks, preventing the generation of new risks and adapting to a changing climate through the implementation of economic, social, cultural, physical, and environmental initiatives. All AMS are signatories to the United Nations Sustainable Development Goals (SDG) and have agreed to the Regional Roadmap for Implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific.

The ASEAN region is highly vulnerable to climate change, especially given its coastal populations and reliance on agriculture. Climate change has a profound impact on the citizens, businesses and governments of ASEAN. It has caused economic and physical damage through unpredictable weather patterns, rising temperatures and sea levels, extreme weather events, land degradation, and damage to biodiversity and has resulted in loss of properties, assets and human lives. The challenges faced by AMS in achieving the SDG targets were significant even before Covid-19, but the setbacks caused by the pandemic to the trajectory of these efforts now need to be addressed urgently.

Financing is key in enabling ASEAN to advance its sustainability agenda. The role of sustainable finance was recognised by the ASEAN Finance Ministers' and Central Bank Governors' Meeting (AFMGM) in 2019. ASEAN is a unique construct and has its own context and needs. Its member states are diverse economically and socially there needs to be an orderly transition towards a sustainable ASEAN is critical. Having a common understanding of what is sustainable is essential if ASEAN is going to attract and orient capital towards sustainable investments and away from non-sustainable activities. This is where a credible regional sustainable finance taxonomy, which is interoperable with other regional and international taxonomies, is needed. While each AMS may develop its own national sustainable finance taxonomy to meet its individual needs and domestic stage of development, having a common language and an overarching guide that every AMS can apply across all segments of the economic sector will provide clarity and confidence to all stakeholders. Global, regional and domestic investors would have more information and greater confidence on what their funds will be used for and businesses will have clear guidance on what they need to do for their sustainability journey. A credible taxonomy that is aligned with international benchmarks will also help financial institutions and investors better understand the

risks to their portfolios and make sound sustainable financing decisions. To this end, the ASEAN Capital Markets Forum (ACMF), the ASEAN Insurance Regulators Meeting (AIRM), the ASEAN Senior Level Committee on Financial Integration (SLC), and the ASEAN Working Committee on Capital Market Development (WC-CMD), with the endorsement of the AFMGM, came together to establish the ASEAN Taxonomy Board (ATB) in March 2021 to develop, maintain and promote the ASEAN Taxonomy for Sustainable Finance (ASEAN Taxonomy). The ASEAN Taxonomy will be developed to initially focus on climate change, before moving on to other sustainability aspects.

The ASEAN Taxonomy acts as a map to help guide capital towards activities that can promote the transition of activities in the real economy onto a more sustainable footing. The ATB will be working with our ASEAN public sector colleagues, the private sector as well as other stakeholders to create a framework that can help achieve this. This first version of the ASEAN Taxonomy for Sustainable Finance is meant to provide a framework for discussions with these stakeholders. The ASEAN Taxonomy is designed to be credible and science-based, while being inclusive and catering to the different development stages of AMS. This will be periodically reviewed in order to keep pace with global sustainability goals and technological advancements and thereby stay relevant and effective.

The ATB is grateful to the members of ACMF, AIRM, SLC and WC-CMD and all who have contributed towards Version 1 of the ASEAN Taxonomy for Sustainable Finance. We look forward to working with stakeholders to achieve our mandate of developing, maintaining and promoting an ASEAN taxonomy that will meaningfully and effectively help direct capital where it is needed most to support ASEAN's contribution to United Nation's Sustainable Development Goals and continuous efforts in building a sustainable planet.

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Abbreviations

ACMF	ASEAN Capital Markets Forum
AFCDM	ASEAN Finance and Central Bank Deputies' Meeting
AFMGM	ASEAN Finance Ministers and Central Bank Governors' Meeting
AMS	ASEAN Member States
ANDBI	Activities Not Defined by ISIC
ASEAN	Association of Southeast Asian Nations
ATB	ASEAN Taxonomy Board
BDSIC	Brunei Darussalam Standard Industrial Classification
CAIT	Climate Analysis Indicator Tool
CAPEX	Capital Expenditure
CBI	Climate Bonds Initiative
CCUS	Carbon Capture, Utilisation and Storage
CGT	Common Ground Taxonomy
CIA	Central Intelligence Agency
COVID-19	Coronavirus Disease 2019
CSIC	Cambodia Standard Industrial Classification
DNSH	Do No Significant Harm
DNV	Det Norske Veritas
EIA	Environmental Impact Assessment
ELECTRE	Election and Choice Translated Reality
ERIA	Economic Research Institute for ASEAN and East Asia
ESG	Environmental, Social and Governance
EU	European Union
EV	Electric Vehicles
FF	Foundation Framework
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GICS	Global Industry Classification Standard
GP-SC	Guiding Principles for Screening Criteria
GVA	Gross Value Added
ICMA	International Capital Market Association
ICT	Information and Communications Technology
IRP	International Resource Panel
ISIC	International Standard Industrial Classification
JDIH	Jaringan Dokumentasi dan Informasi Hukum / Legal Documentation and Information Network
KBLI	Klasifikasi Baku Lapangan Usaha Indonesia / Indonesia Standard Industrial Classification
LED	Light-emitting Diode
LSIC	Lao Standard Industrial Classification
MOF	Ministry of Finance
MRC	Mekong River Commission
MSCI	Morgan Stanley Capital International

MSIC	Malaysia Standard Industrial Classification
MSIC	Myanmar Standard Industrial Classification
NACE	Nomenclature generale des Activities economiques dans les Communautes europeennes'/The Statistical Classification of Economic Activities in the European Community
NAICS	North American Industry Classification System
NDC	Nationally Determined Contributions
NGFS	Network of Central Banks and Supervisors for Greening the Financial System
NSIC	National Standard Industrial Classification
Paris Agreement	Paris Agreement under the United Nations Framework Convention on Climate Change
PS	Plus Standard
PSIC	The Philippines Standard Industrial Classification
PV	Photovoltaic
S&P	Standard & Poor's
SCCB	The ASEAN Steering Committee on Capacity Building
SDG	Sustainable Development Goal
SLC	ASEAN Senior Level Committee on Financial Integration
SSIC	Singapore Standard Industrial Classification
TEG	The European Union Technical Expert Group on Sustainable Finance
TSCI	Thailand Standard Industrial Classification
UN	United Nations
UN SDG	The United Nations Sustainable Development Goals
UNEP	The United Nations Environment Programme
UNESCAP	The United Nations Economic and Social Commission for Asia and the Pacific
VSIC	Viet Nam Standard Industrial Classification
WC-CMD	ASEAN Working Committee on Capital Market Development
WHO	World Health Organisation

Executive Summary

The Association of Southeast Asian Nations (ASEAN) is an economic union comprising ten member states in Southeast Asia. The ASEAN Member states (AMS) have seen rapid economic growth, but it has come with a heavy price. Economic development, with the focus on industrialisation, has brought about environmental impacts (water pollution, extraction of natural resources, and poor sanitation) that have become major challenges for AMS to overcome. In addition to those, there is a global environmental problem that could significantly cause a major situation in the region: climate change.

Several AMS such as Myanmar, Philippines, Thailand and Viet Nam have been among the most affected by climate change, with substantial socioeconomic impacts. Moreover, the greenhouse gas emissions are expected to increase and peak in 2030, prompting several AMS to aim for carbon neutrality in the next 20 to 30 years. The increasing demand for energy has encouraged ASEAN to shift towards electrification as a renewable and cleaner source of energy. Therefore, carbon intensity can be expected to be reduced between 2030 and 2050.

The ASEAN Taxonomy for Sustainable Finance[1] has been developed to serve as a common building block that enables an orderly transition and fosters sustainable finance adoption by AMS. The ASEAN Taxonomy will become a larger priority for discussion by the ASEAN Finance Ministers and Central Bank Governors going forward. This is particularly important since across the ten AMS there are a variety of systems and policies on sustainable finance. Therefore, the Taxonomy then will serve as a common language across the different jurisdictions to communicate and coordinate on labelling for economic activities and financial instruments.

The ASEAN Taxonomy will be an overarching guide for AMS that caters to the different ASEAN economies, financial systems and transition paths. It is conceived as a multi-tiered framework that takes into account those differences among AMS. It consists of two main elements: the Foundation Framework which is applicable to all AMS and allows a qualitative assessment of activities, and the Plus Standard with metrics and thresholds to further qualify and benchmark eligible green activities and investments. The environmental objectives of the ASEAN Taxonomy are universal and applicable to all AMS, in alignment with national environmental laws. These objectives include climate change mitigation and adaptation, protection of healthy ecosystems and biodiversity, and promotion of resource resilience and transition to circular economy. The adopted criteria essential for the economic activities are aimed at achieving those objectives in the most transparent manner. Among the most important criteria are the "do no significant harm" (DNSH), and existence of remedial measures to transition.

The Plus Standard provides details on how to determine if an economic activity is eligible for the ASEAN Taxonomy. At the early stage, this will cover economic activities in key sectors that are important to achieving the above-mentioned environmental objectives. These focus sectors have been identified based on their economic and environmental importance to the region, with parameters such as greenhouse gas emissions (GHG) and the gross value added (GVA). The

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1 In this document, the terms 'ASEAN Taxonomy' or 'Taxonomy' (capitalized) mean the ASEAN Taxonomy for Sustainable Finance.

first step was the selection of an industry classification system to group economic activities based on agreed rules. The International Standard Industrial Classification (ISIC)[2] was selected for its compatibility with the National Standard Industrial Classification (NSIC) codes in AMS (UN, 2008). Data on GHG emissions and GVA was used to determine those focus sectors. In addition, several enabling sectors were included as they could significantly contribute to climate change mitigation, among others, through the development of green financial products, frameworks and services to support implementation of green projects. On the other environmental objectives, particular attention is given to circular economy, which actually cuts across many different sectors. This will have significant effects on manufacturing with recycling and reuse in mind, operational activities utilising recycled and recyclable material, and sorting and reusing of materials.

Going forward, the activity classification system becomes crucial as it provides the mechanism by which a particular activity can be assessed and classified into green, amber, or red, based on its contribution to the environmental objectives of the Taxonomy. Among the environmental objectives set out earlier in this document, climate change mitigation is the main objective that governs how an activity is classified. Later on, the other environmental objectives can be scoped into the process.

Following the issuance of Version 1 of the ASEAN Taxonomy, a targeted consultation process will be undertaken with key stakeholders. The input received from this exercise will be utilised in the further development of the ASEAN Taxonomy.

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[2] In all places in this paper, the term 'ISIC' means ISIC Revision 4.

1 Introduction

1.1   Overview of ASEAN Diversity

The ASEAN region encompasses a population of approximately 650 million people spread over ten AMS covering 4.5 million square kilometres across 20,000 islands and landmasses. The region boasts significant diversity in every dimension with an immense range of populations, stages of economic structure and development, financial systems, peoples, histories, languages, religions and cultures. This diversity exists between the AMS, but also within individual member states. The inherent diversity throughout the regions necessitates an inclusive approach to development, regional progress, and cooperation.

The aspirations and resulting policies of the respective AMS are dependent on their economic situations. The member states have varying stages of development and economic structures. The Gross Domestic Product (GDP) per capita ranges from low- to mid-income developing states to high-income developed states. Other than outliers Singapore and Brunei Darussalam, most AMS fall into the low- or middle-income states categories (Figure 1).
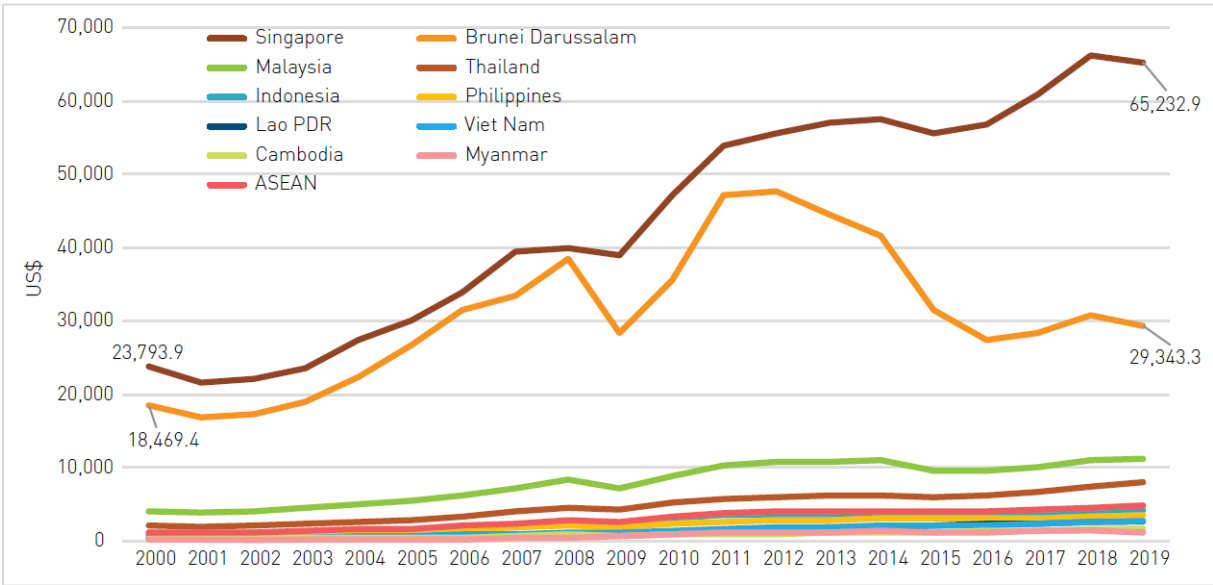
Figure 1: GDP per capita (US$) by ASEAN Member States, 2000-2019 (ASEAN, 2020 [1])

Services tend to predominate in the more developed and middle-income states, with agriculture representing a higher proportion of the economy in the developing member states (see Figure 2).
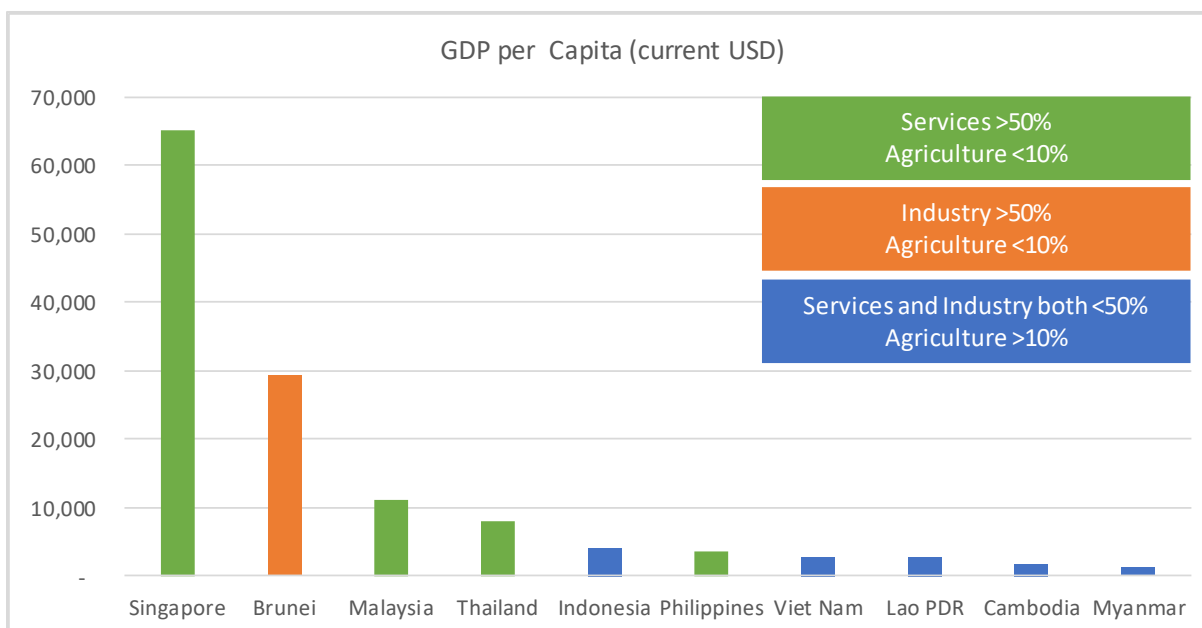
Figure 2: AMS 2019 GDP per capita and Economy Categorisation (ASEAN, 2020 [1])

More than 60% of economic activity in Singapore, Malaysia, Thailand, and the Philippines are services-based, compared with Cambodia, Lao, and Viet Nam, where this figure is less than 40%. Conversely, Brunei Darussalam's economy is predominately industrial, the result of large hydrocarbon production. Cambodia, Indonesia, Myanmar, and Viet Nam derive more than 10% of their GDP from agriculture, compared with Singapore, where this is effectively zero.

1.2   Economic Development and Challenges

At the core of the ASEAN region's foci and objectives has been economic development, which has progressed significantly as emerging AMS grow and evolve, converging with more developed neighbours. This is evident by the growing number of service-related activities (e.g., tourism, processing, transport) as well as industrial activities (e.g., oil and gas, mining, and electronics) which contribute to majority of all AMS GDPs (see Appendix A).

The growth of industrialisation in ASEAN has brought with it a range of environmental issues. Poor air quality, water pollution, improper waste management, over-extraction of natural resources, and poor sanitation are just some of the challenges that AMS are experiencing to varying degrees (see Appendix B). As well as these local challenges, the region is increasingly a contributor to, and is becoming a victim of, the global environmental challenges of climate change.

Some of these environmental problems are being addressed partially through clean technologies. However, the growing challenges will need a more fundamental transition, including the shift in business model and supply chain operations.

1.3   Climate-related Issues, Causes and Mitigation

Climate change is projected to have disproportionate impacts on the AMS, with significant threats to welfare, livelihood, and economic activity. ASEAN is one of the world's most vulnerable regions, with Myanmar, Philippines, Thailand, and Viet Nam amongst the 10 nations with the greatest economic and humanitarian impacts from climate change-related weather events over the past two decades (Overland, 2021). Typhoons have become more severe and flooding events more frequent in low-lying coastal areas of Southeast Asia (IMF, 2018). In 2013, Typhoon Haiyan hit the Philippines, injuring 28,000, killing 6,300 and causing USD 3 billion in damage (WHO, 2013). Future socioeconomic impacts in Asia may be more severe than in many other parts of the world, particularly as related to expected extreme heat events, drought, and flooding. Projections of the socio-economic impact of climate change on AMS are shown in Appendix C.

GHG emissions in the ASEAN region are set to peak in 2030, with some GHG projections expecting net zero by 2050 (Climate Analytics, 2019). ASEAN is set to realise net-zero GHG emissions as early as possible in the latter half of the 21st century (ASEAN, 2021). Among AMS, Malaysia has recently announced its ambition to achieve carbon neutrality as early as 2050 (Argus, 2021), Thailand's target is to achieve carbon neutrality by 2050 and net zero by 2065 2070 (Bloomberg, 2021) and Indonesia has stated that it will meet a carbon neutral target by 2060 (IESR, 2021).

The outlook for the emissions trajectory shows energy-related emissions increasing to 2030 but still being lower than nationally determined contribution (NDC) pledges, suggesting that regional NDC pledges will be met and exceeded. By 2050, the region is expected to reduce its energy-related emissions by over 25% compared to 2019 levels, the result of the displacement of coal and oil with increasing use of natural gas and renewables. In 2050, the region's emissions are forecast to be 1.74 tCO2/person, below the global average (ASEAN, 2020 [1]).
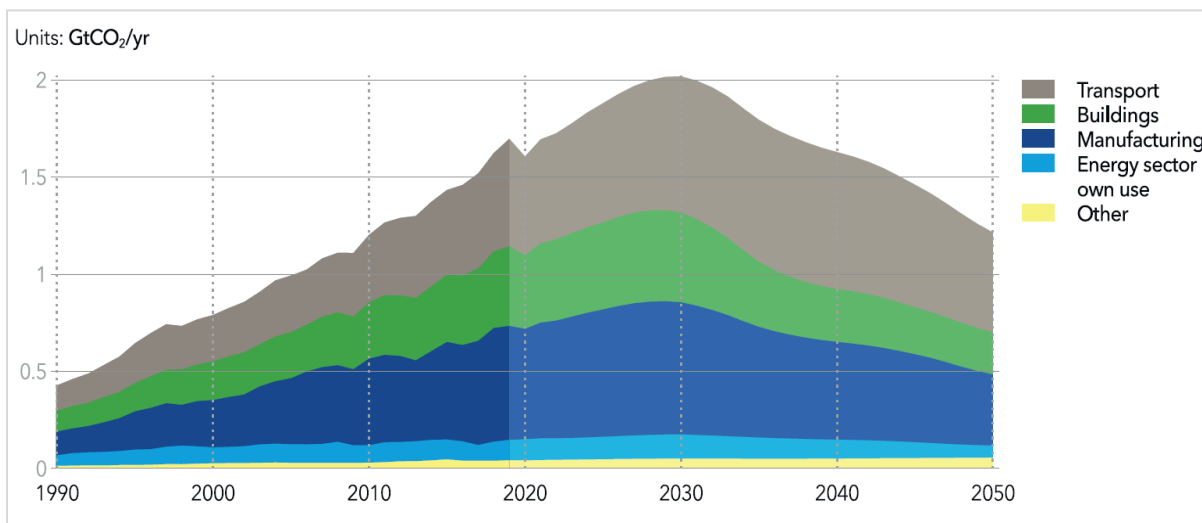
Figure 3: Southeast Asia Energy-Related CO2 Emissions by Sector (DNV, 2021)[3]

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[3] NDC targets do not necessarily use 1990 as a baseline; DNV back-calculated to a 1990 baseline to allow for comparisons

The energy landscape across ASEAN is varied and reflects both geography and resources within the AMS as well as development progress and economic activity levels. Most member states are net importers of hydrocarbon energy sources. Half of its members (Cambodia, the Philippines, Singapore, Thailand, and Viet Nam) are reliant on net imports of oil for their transport needs, and gas and/or coal for power generation. In the more developed AMS, electricity is edging out bioenergy, which has traditionally been used for cooking in Southeast Asia. Gas demand is projected to grow until 2030, before declining by 2050 due to emergence of innovative renewable energy solutions which will help lessen the use of fossil fuels in the coming years (Figure 4).
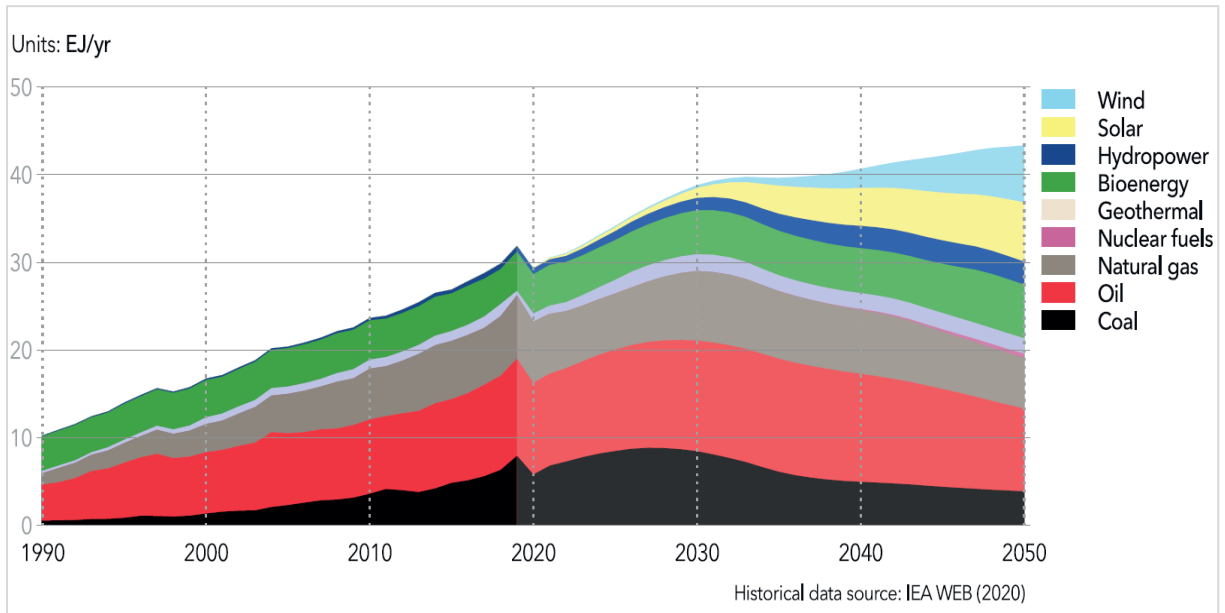
Figure 4: Southeast Asia Primary Energy Consumption by Source (DNV, 2021)

Furthermore, complementary solutions, such as ongoing national policies for diversification into clean energy technologies (see Figure 5), aim to reconcile growth with concerns over air quality and health, and to enhance self-reliance.
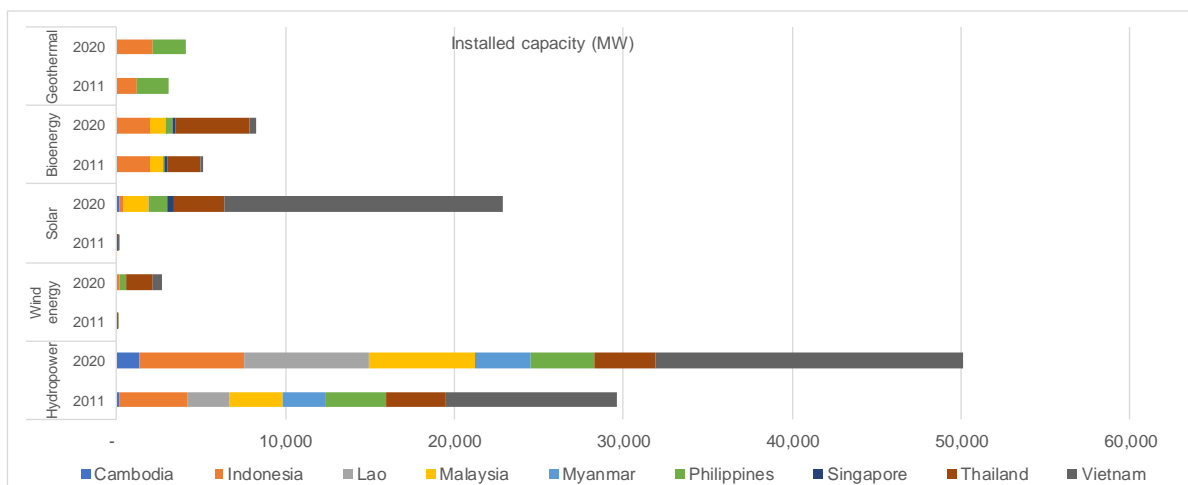
Figure 5: Renewable Electricity in Southeast Asia, 2011 and 2020 (IRENA, 2021)

The region is experiencing increasing demand for energy, driven partly by population growth, but principally by growth in GDP. This trend was reversed slightly in the COVID-19 years of 2020 to 2021, which saw a fall in the demand for energy products in Southeast Asia. However, this drop is expected to be temporary and the long-term trend will be increasing (Figure 6).
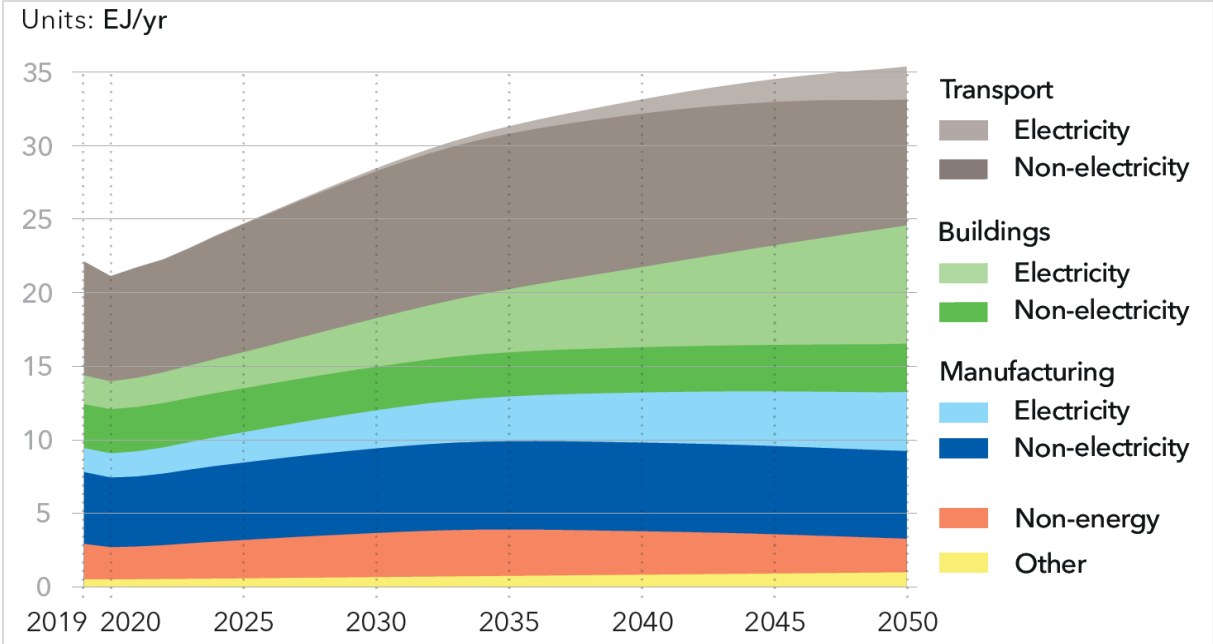
Figure 6: Southeast Asia Final Energy Demand by Sector (DNV, 2021)

Economic growth is a prominent policy driver in AMS, particularly in the developing states. Associated with this is a drive to implement universal access to electricity and improved security of supply. However, greater efficiency will tend to mitigate a rise in energy consumption. Between 2019 and 2050, energy use is expected to grow 34%, whilst the population will grow by 16%, and GDP by 180% (DNV, 2021).

1.4   Local Environmental Issues and Mitigation

AMS are also impacted by local environmental issues, such as urban air quality, waste management and conservation of natural resources. In ASEAN, air quality challenges largely result from agricultural clearing, burning of waste materials, and vehicle exhaust. Six of the ten AMS are in the top 50 most PM 2.5 polluted countries in the world (IQAir, 2020). Air pollution is endemic in several large ASEAN cities, with air-quality warnings, school closures and mask recommendations as common occurrences in some cities.

Interlinked with the natural environment in the region is the built environment encompassing the cities, infrastructure, and public and private assets. The built environment shares many of the risks associated with climate change, including flooding, sea level rise, and increased storm frequency and severity. With a large portion of its population living at or close to sea level, the people and economy of ASEAN are particularly endangered. The region is also home to several

rare species and areas of scientific interest, which will also be in danger if mitigation is not enacted.

With its growing population and increasing urbanisation, ASEAN is generating ever more waste. Organic waste still predominates in most AMS, but the proportion of plastic, paper, and metals is growing. Waste from healthcare, industry, construction, and demolition is also increasingly significant. There are well-established traditions of composting of organic wastes, and there is a large informal industry in the collecting and recycling of valuable items, such as plastic, metal, and paper. However, waste dumping and burning are common practices (UN, 2017).

The demand for transportation infrastructure is increasing in ASEAN, where many large cities suffer traffic congestion and poor air quality. Thailand, Viet Nam, Malaysia, Indonesia, and the Philippines have built or are expanding light rail systems to counter these problems in their major cities. Southeast Asia is transitioning to electric vehicles (EV) more slowly than other regions, and high costs are hampering EV ownership. However, Thailand, Viet Nam, Indonesia, and Malaysia all aim to roll-out nationwide EVs and associated charging systems. For example, Indonesia has set a roadmap for EV development until 2030 (JDIH, 2020) and Thailand plans for 30% of local production to be EVs in the same year (The Nation, 2021). Singapore, which is the largest net importer of hydrocarbons, is pioneering smart-grid technology, EV uptake, and potential hydrogen use in transport. The share of fossil fuels as a primary energy source is forecast to be 75% in 2030 and 43% in 2050 (DNV, 2021).

Water scarcity is an issue in many parts of ASEAN and water consumption is expected to grow. A particular area of concern is the management of water in the Mekong basin (MRC, 2021). Access to fresh water is also an ongoing challenge in Singapore. The management of water resources has been recognised as a key challenge, specifically with respect to water supply, demand, and allocation, as well as water quality and sanitation (ASEAN, 2005).

1.5 Sustainable Development Goals (SDGs) and Nationally Determined Contributions (NDCs)

1.5.1 AMS Commitments to meet SDGs

The 2016 Paris Agreement resulted in the United Nations' 2030 Agenda for Sustainable Development, which set the Sustainable Development Goals (SDGs). These SDGs are intended as a roadmap to the achievement of a sustainable future. Under this Agenda, 17 SDGs (ASEAN, 2020 [2]) have been identified, including, "Ensure access to affordable, reliable, sustainable, and modern energy for all" (SDG 7); and, "Take urgent action to combat climate change and its impacts" (SDG 13). ASEAN member states have made commitments at the international, regional, and national levels to work towards a low carbon and sustainable development, including implementation of the SDGs (ASEAN, 2015 [2])᠂ (ASEAN, 2016).

1.5.2   AMS Achievement of NDCs

By September 2017, all AMS were signatories of the Paris Agreement, which has the following long-term goals:

1. Keep global average temperature increase well below 2°C compared to pre-industrial levels; pursue efforts to limit the temperature increase to 1.5°C;
2. Improve the ability of countries to adapt to the impact of climate change, to maintain a low GHG emissions trajectory, and climate resilience in a way that does not threaten food production; and
3. Direct financial flows in line with a low-emissions and climate-resilient pathway.

A summary of the NDC targets for ASEAN is shown in Figure 7. The target year for the majority of these reductions is 2030, while the GHG reduction commitment of selected AMS against their GDP per capita and their total GHG emissions is shown in Appendix D.
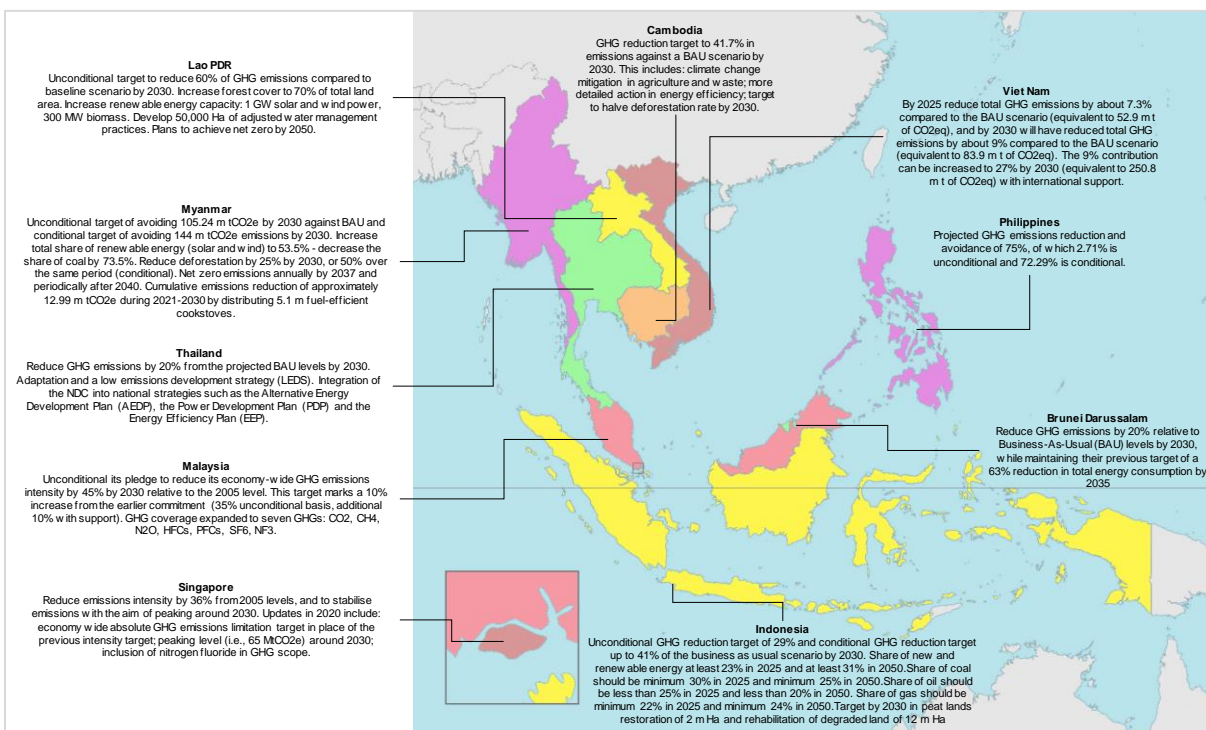
Figure 7: Nationally Determined Contributions (NDCs) by AMS (SFIA, 2020) (RoI, 2021)

Southeast Asia is making progress in terms of the implementation of NDCs (see Table 1). Most of the AMS have scored as 'Engaged' or 'Capable' on most of the assessment criteria.

Table 1: Progress on NDC implementation in ASEAN (UNESCAP, 2020)

Activities	BN	KH	ID	LA	MY	MM	PH	SG	TH	VN
Mainstreaming	Nascent	Engaged	Capable	Capable	Engaged	Engaged	Engaged	Capable	Capable	Capable
Coordination	Engaged	Capable	Capable	Engaged	Engaged	Capable	Capable	Capable	Engaged	Capable
Finance and resources	Nascent	Capable	Capable	Engaged	Engaged	Engaged	Capable	Capable	Capable	Capable
Measurement reporting and verification (MRV)	Nascent	Engaged	Capable	Engaged	Engaged	Engaged	Nascent	Effective	Capable	Capable

Nascent	Engaged	Capable	Effective

BN – Brunei Darussalam; KH – Cambodia; ID – Indonesia; LA – Lao PDR; MY – Malaysia; MM – Myanmar; PH – The Philippines; SG – Singapore; TH – Thailand; VN – Viet Nam

2 Taxonomy Design and Considerations

2.1 The Case for a Regional Taxonomy

There is a clear need for a common language across AMS to communicate and coordinate on labelling for economic activity and financial instruments (ACMF, 2020) (ASEAN, 2020 [3]) (ASEAN, 2020 [4]). A regional Taxonomy can provide alignment on underlying principles and serve to inform AMS policy makers, AMS stakeholders in financial markets, and international investors.

Stakeholder engagements conducted during the development of the Roadmap for ASEAN Sustainable Capital Markets revealed a lack of transparency of information and quality data. Exchanges in six AMS (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam) require sustainability reporting in accordance with national guidelines. These guidelines are not standardised across countries, which make it difficult for investors to benchmark sustainability performance across companies and industries in ASEAN. There is also no systematic way of assessing economic activities and/or companies that are either low carbon and/or making effort to transition.

A survey of borrowers, lenders, and other market influencers conducted by Economic Research Institute (ERIA) for ASEAN and East Asia (Anbumozhi, 2020) investigated the real and perceived barriers and risks underlying the access to financing. A key finding of this survey was a need for the private sector to work with governments to implement strategies to invest in the low-carbon economy. Market based risks were cited as a significant concern when considering low-carbon financing and investment in ASEAN. This includes general market risks, such as currency and interest rates, as well as the regulatory environment. The greatest technological risk cited was the lack of grid connectivity for power generation, and a general concern with underdeveloped supply chains. Respondents also identified lack of access to information about the carbon emission reduction potential of the projects and programmes.

The need for a taxonomy has been identified as a key impetus to widen participation and access among market players in an inclusive manner. An ASEAN Taxonomy will help harmonise the definitions of green and sustainable activities and assets across the AMS. At the same time, the Taxonomy must consider the specific situation of the AMS, many of which are in a state of development and growth. This will enable it to act as a tool for transition for high emission sectors and provide access to funding for sustainable projects, assets and activities.

2.2 Objectives and Strategic Context of the Taxonomy

In supporting the high-level ASEAN commitments towards sustainability Figure 8, the ASEAN Capital Markets Forum (ACMF) launched the ASEAN Green Bond Standards in 2017, and later the ASEAN Social Bond Standards and ASEAN Sustainability Bond Standards in 2018. These efforts were also complemented by the ASEAN central banks and insurance regulators. These resulted in the release of three parallel but inter-related documents (ACMF, 2020) (ASEAN, 2020 [3]) (ASEAN, 2020 [4]). The ACMF document maps the pathways to sustainability from 2020 to 2025, in accordance with the Paris Agreement and the United Nations Sustainable Development

Goals (UN SDGs) while the other two documents make recommendations on how ASEAN can collaborate to promote sustainable finance and support ASEAN's transition to a low carbon economy region. Their recommendations appear in Appendix E.

The three documents identified, among other things, a regional taxonomy as a common building block to enable an orderly transition and foster sustainable finance adoption in the ASEAN region. In this regard, the ASEAN Finance Ministers and Central Bank Governors' Meeting (AFMGM) agreed on the establishment of an ASEAN Taxonomy Board (ATB) with the scope of developing, maintaining, and promoting an ASEAN Taxonomy. Additionally, sustainable finance will also be a permanent agenda at the ASEAN Finance and Central Bank Deputies' Meeting (AFCDM) and AFMGM, starting in 2021.
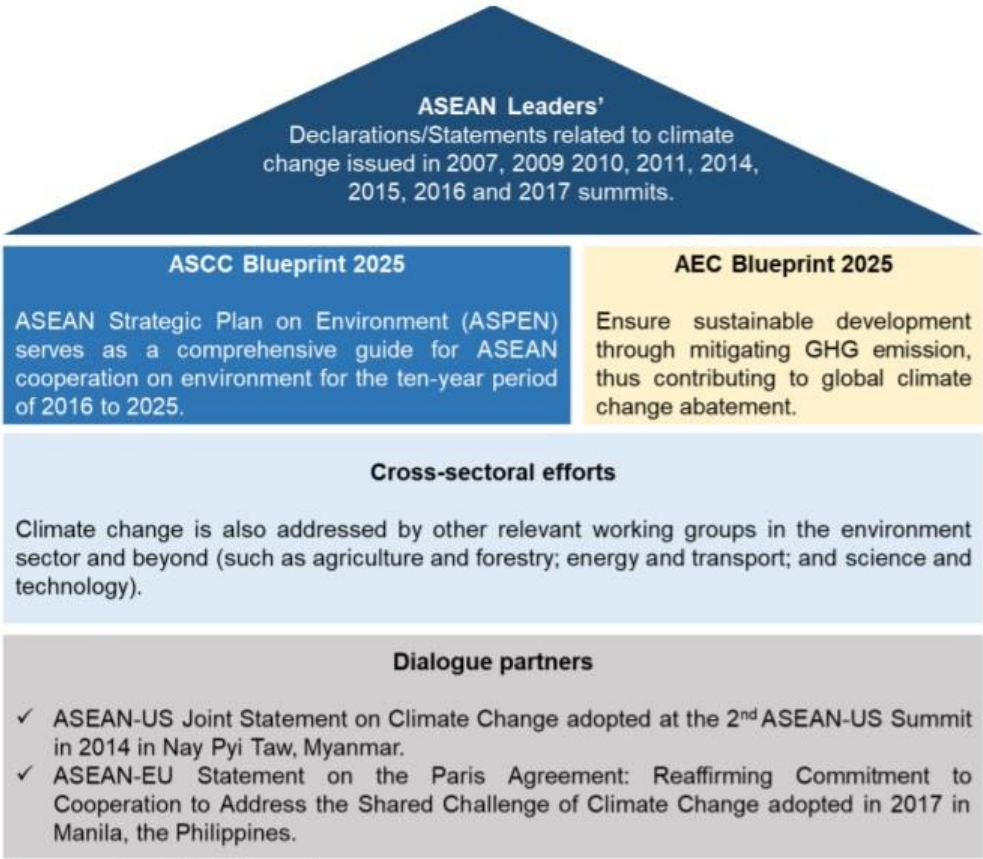
Figure 8: ASEAN's Commitments towards Climate Change[4]

2.3   Scope and Intended Application

The ASEAN Taxonomy is a sustainable finance taxonomy with an initial focus on environmental objectives. It is intended as the reference point for sustainable projects and activities in ASEAN to help issuers and investors understand the sustainability impact of a project or economic activity. This will result in a more informed and efficient decision-making process. As such, it has been

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[4] https://www.bnm.gov.my/documents/20124/914558/2020-11-17+ASEAN+Task+Force+Report_for+publication.pdf

recognised that the ASEAN Taxonomy must be based on five high-level principles (Figure 9) to cater to the different stages of ASEAN economies, financial systems, and transition paths.

Principle 1	Principle 2	Principle 3	Principle 4	Principle 5
The ASEAN Taxonomy will be the overarching guide for all ASEAN Member States, providing a common language and complementing their respective national sustainability initiatives	The ASEAN Taxonomy will take into consideration widely used taxonomies and other relevant taxonomies, as appropriate, and shall be contextualised to facilitate an orderly transition towards a sustainable ASEAN	The ASEAN Taxonomy shall be inclusive and beneficial to all ASEAN Member States.	The ASEAN Taxonomy shall provide a credible framework, including definitions, and where appropriate, be science-based	The ASEAN Taxonomy will be aligned with the sustainability initiatives taken by the capital market, banking and insurance sectors, or at least not in conflict

Figure 9: ASEAN Taxonomy 5 High Level Principles

2.4   Rationale for a Multi-tiered Taxonomy

ASEAN is composed of ten member states, which exhibit varied standards of development and economic activity, as described in Chapter 1. To further understand the challenges AMS face in addressing sustainable development, the ATB conducted a survey on national policies and strategies of AMS that are relevant to climate change, environmental issue, and sustainable development. Specific AMS-level challenges to mobilising climate-related mitigation, adaptation, and resilience solutions to climate change were considered and have been summarised in Table 2, which was compiled based on responses from eight of the ten AMS. These challenges include technological limitations, structural economic challenges and geographic constraints for the deployment of renewable energy.

Table 2: AMS Challenges to Addressing Climate Change, AMS ATB Survey 2021

	Geographic limitations	Funding Gap / Hurdles	Tech Capacity Gap	R&D Gap	Financial Markets Engagement / Capacity	Transition of Economy Challenges	General Lack of Awareness / Data
Number of AMS (out of 8 respondents) stating this as an issue	1	5	5	1	1	2	4

There are regional challenges with funding, technological capacity, and general awareness. These can be addressed by capacity building and guidance in financial markets. A Taxonomy can help align principles and inform financial markets policy makers and stakeholders, as well as international investors. The Taxonomy will also help to clearly identify technologies which can most effectively help AMS to reach their net-zero goals. This includes low carbon technologies themselves, such as renewable power generators, but also enabling technologies, such as control, communication and monitoring of these generators and their associated networks. A common language will make it simpler to gather data in a consistent way and to disseminate this to investors, state agencies, and other stakeholders.

This Taxonomy-driven capacity building may also help compensate for a perceived lack of standards in the market both globally and regionally as well as help coordinate and guide regulatory frameworks, national taxonomies, and financial market policies for climate change mitigation, adaptation, and resilience investment and solutions.

Considering the above, a 'one-size-fits-all' Taxonomy is not regarded as the best solution for ASEAN. For this, reason, the ASEAN Taxonomy has been conceived according to a multi-tiered concept; namely a 'Foundation Framework' and a 'Plus Standard', as illustrated in Figure 10.
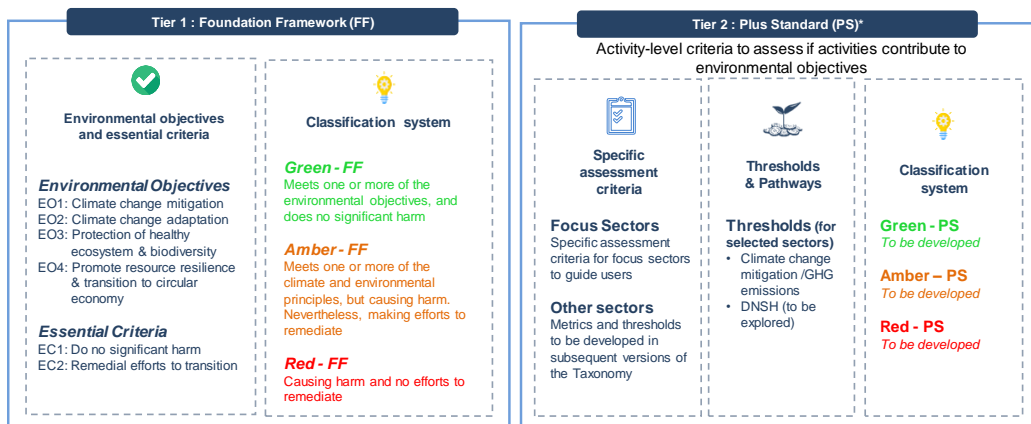
Figure 10: Multi-tier Taxonomy Design[5]

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[5] Thresholds & Pathways relating to the other EOs to be developed in subsequent versions of the Taxonomy.

Foundation Framework

The Foundation Framework is applicable to all AMS, stakeholders in the financial sector and business enterprises.

The Foundation Framework (and Plus Standard below) is underpinned by ASEAN's commitment to:

1. limit the global average temperature increase to well below 2°C, preferably 1.5°C, above preindustrial levels;
2. make each AMS climate resilient; and
3. protect the environment, whereby the guiding principles for the assessment of economic activities act as the foundation to safeguard the climate and environment.

Under the Foundation Framework, economic activities must fulfil at least one of the environmental objectives and all essential criteria, which are discussed in more detail in Chapter 3.

Plus Standard

The Plus Standard provides additional guidance and scope for AMS to further qualify and benchmark eligible green activities and investments. It also sets activity-level criteria and thresholds to determine if an activity contributes to the environmental objectives of the Taxonomy and can therefore be considered Taxonomy-aligned.

Chapter 4 sets out the process of selecting the focus sectors for activities to be covered under the Plus Standard, while Chapter 5 provides an overview of the proposed approach to setting thresholds.

3 Environmental Objectives & Essential Criteria

Overview

ASEAN's environmental objectives apply to all AMS, players in the financial sector, as well as business enterprises. Notwithstanding this, the economic activities should also be assessed against the relevant environmental laws instituted by AMS (refer Appendix F) as a minimum safeguard to ensure there is no contravention with local environmental regulations.

Environmental Objectives

1 Climate change mitigation

2 Climate change adaptation

3 Protection of healthy ecosystems & biodiversity

4 Promote resource resilience and transition to circular economy

Essential Criteria

1 Do no significant harm

2 Remedial measures to transition
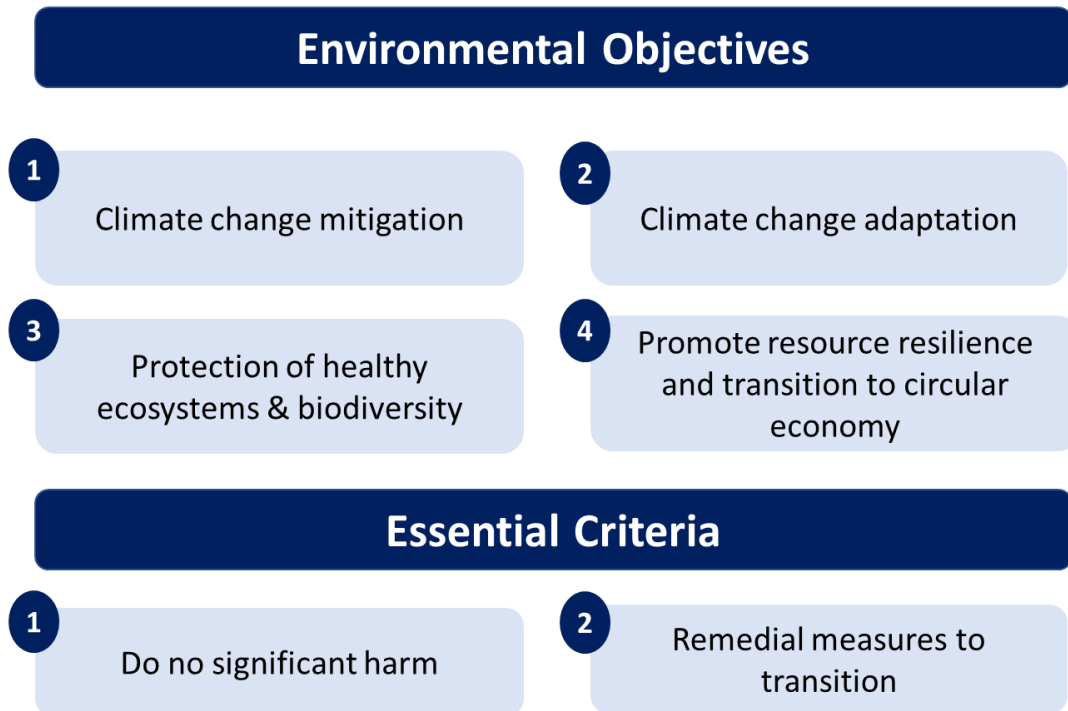
Figure 11: Environmental Objectives and Essential Criteria

3.1   Environmental Objectives

Environmental Objective 1: Climate change mitigation

The objective of climate change mitigation is to reduce GHG emissions into the atmosphere. An economic activity shall be considered as fulfilling the objective of climate change mitigation if such activity makes a substantial contribution in one or more of the following:

1. Avoids GHG emissions;
2. Reduces GHG emissions; or
3. Enables others to avoid or reduce GHG emissions.

Common climate change mitigation activities include, but are not limited to, renewable energy generation, rehabilitation, retrofitting and/or replacement of energy-inefficient technology, production of energy-efficient technologies, as well as maintenance and strengthening of land-based carbon stock and sinks, above and below ground. An activity which is not already low or

zero-emissions should demonstrate the capability to avoid or reduce GHG emissions in line with relevant best practices compared to the baseline scenario without the mitigating action.

Environmental Objective 2: Climate change adaptation

Climate change adaptation is the process or actions taken to lower the negative effects caused by climate change and increase resilience to withstand the adverse physical impact of current and future climate changes.

The adaptation activity can benefit AMS, financial sector players, and business enterprises. An economic activity engaged in by an organisation shall be considered as meeting the objectives of climate change adaptation if it fulfils either one or both of the following criteria:

1. Implements measures to increase that organisation's own resilience to climate change; and/or
2. Enables other stakeholders to increase resilience to climate change.

While meeting either one or both criteria above, the economic activity must not adversely affect adaptation efforts, or increase the physical risks of other stakeholders.

In order to demonstrate that an economic activity contributes to increasing resilience to the negative physical effects of climate change, it is necessary to:

1. Identify expected negative physical effects of climate change by leveraging evidence and appropriate climate information; and
2. Demonstrate how the activity or measures taken can build resilience, prevent an increase in, or shift the identified negative impact of climate change.

The activity shall positively contribute to a reduction in material physical climate risk and/or shall reasonably reduce material physical risk from current and future climate change. This can include obvious physical risks, such as flooding, but also less immediately visible effects, such as impact on health from higher temperatures. Impact assessments under a broad range of climate scenarios shall be conducted to provide better understanding and insights on the effectiveness and benefits of the adaptation activity. An activity that enables adaptation of other economic activities should reduce the impact of material physical risk from other economic activities and/or reduce barriers to adaptation through the use of technology, services or products.

Environmental Objective 3: Protection of healthy ecosystems & biodiversity

While economic activities in natural resource intensive sectors such as agriculture, construction, and extractive industries are important to ASEAN's economic development, operations in these sectors should not be made at the expense of the natural ecosystem and biodiversity.

Ecosystem restoration is not only important in terms of reducing the carbon load in the atmosphere. It is also important to protect water basins and support biodiversity, both of which

are crucial for food and water security. For example, conserved or restored habitats can remove carbon dioxide from the atmosphere, thus helping to address climate change by storing carbon. Meanwhile, ecosystem-based adaptation uses biodiversity and ecosystem services in an overall adaptation strategy. This includes the sustainable management, conservation, and restoration of ecosystems to provide services that help people adapt to the adverse effects of climate change.

Therefore, there is a pressing need to incorporate the element of conservation of natural ecosystem and biodiversity into the economic activities.

There are various direct and indirect pressures on the natural ecosystem and biodiversity which must be managed and significantly reduced. Anthropogenic threats to natural ecosystem and biodiversity include, but not limited to, those shown in Table 3.

Table 3: Anthropogenic Threats to Natural Ecosystem and Biodiversity

No	Key drivers	Examples
1	Land use change and degradation	• Land-use and land-cover change due to developing large-scale intensive agriculture (e.g. oil palm, rubber, and sugarcane) and logging activities have become key drivers of habitat fragmentation or loss in South East Asia and threatened many endemic species. • Land-use and land-cover change processes also affect freshwater and marine biodiversity and associated ecosystem services with habitat fragmentation as well as other factors such as flow modification, pollution and alien species invasion impacting on freshwater fish.
2	Pollution	• Untreated wastewater and industrial effluents drained into local streams and rivers. • Open agricultural burning practices that lead to regional air pollution. • Over-fertilisation in agriculture that results in the loss of low-nutrient ecosystems. • Overuse of artificial fertilisers, pesticides and insecticides.
3	Resource over-harvesting	• Farming practices such as overexploitation of natural resources. • Overexploitation from unregulated hunting, harvesting and fishing practices.
4	Invasive alien species	• Animals, plants or other organisms that are introduced into places out of their natural range and prey on native species either by competing for similar resources, transmitting diseases or changing the existing genetic pool through hybridisation, which threatens the existence of native species and biological diversity of the ecosystem.

This environmental objective aims to minimise or eliminate negative effects of business operations on natural ecosystem and biodiversity. In this regard, an economic activity shall be considered as meeting the objective of environmental protection by fulfilling some or all of the following criteria, where applicable:

1. Enable ecosystem restoration and/or facilitate protection of ecosystems;

2. Implement necessary measures to protect ecosystems and biodiversity;
3. Prevent soil erosion and run-off into watercourses;
4. Enforce and empower existing policies related to the protection of natural areas;
5. Adopt sustainable logging practices and ensure timber products are sourced from sustainably managed forests;
6. Meeting the goals set by Convention on Biological Diversity 1992:
    a. Terrestrial and marine biodiversity conservation;
    b. The sustainable use of its components;
    c. The fair and equitable sharing of the benefits arising from utilisation of genetic resources;
7. Business decisions take into consideration the equitable use of biodiversity and ecosystem services;
8. Avoid or minimise adverse impacts on the environment by implementing pollution control mechanisms;
9. Avoid or minimise emissions of short and long-lived climate pollutants;
10. Avoid or minimise generation of hazardous and non-hazardous waste; and
11. Minimise and manage the risks and impacts associated with pesticide use.

Environmental Objective 4: Promotion of resource resilience and transition to circular economy

Sustainable use of natural resources, including energy, water, and raw materials is critical as natural resources are key to human survival and economic development. Material resources such as biomass, fossil fuels, metals, and non-metallic minerals are being consumed at an unprecedented rate to meet the global demand of an ever-growing human population and to fuel an economic boom (IRP, 2019). The extraction and processing of natural resources account for more than 90% of biodiversity loss and water stress, and approximately half of the global climate change impact (Figure 12).
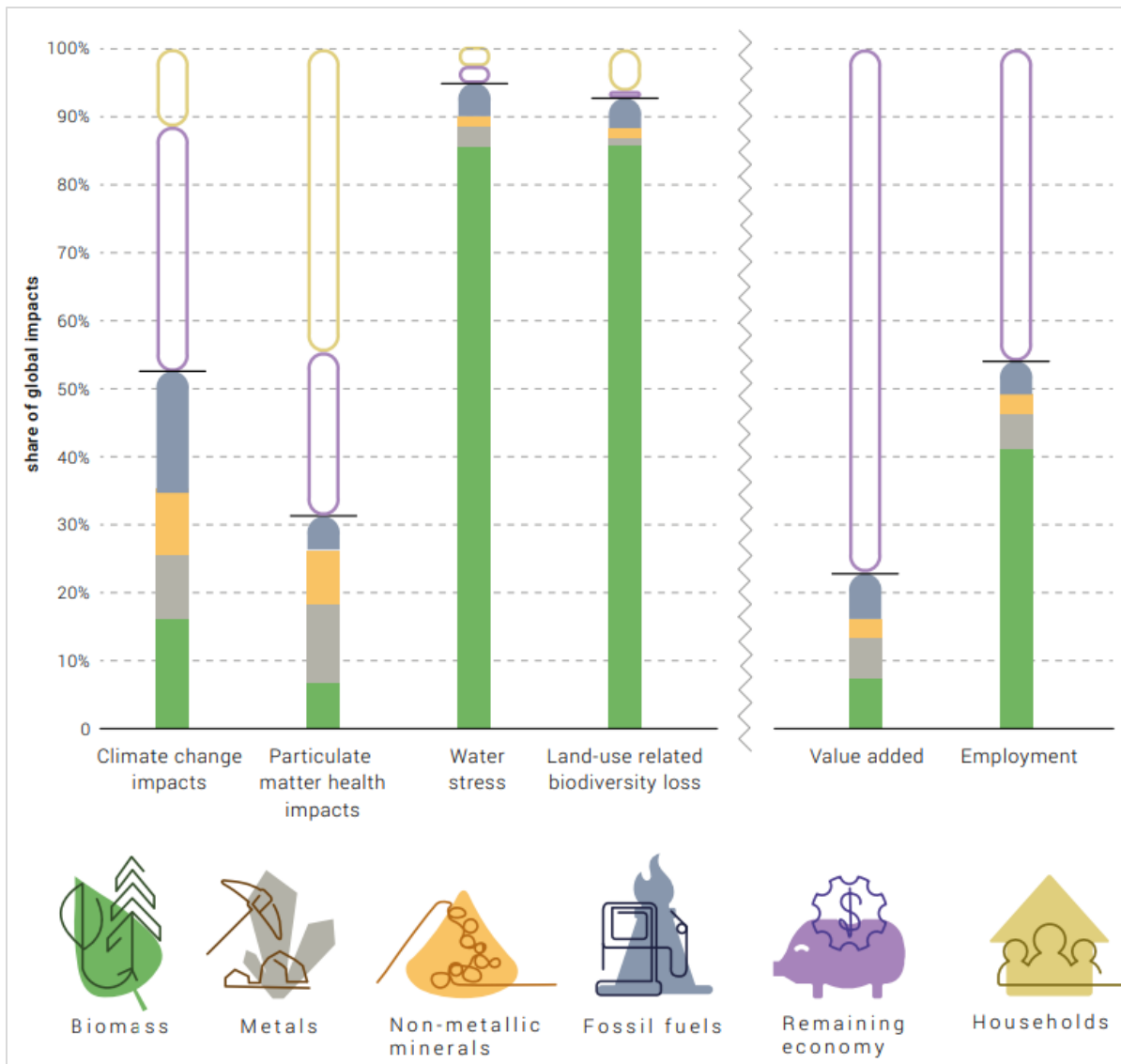
Figure 12: Global impacts split by resource type, remaining economy and households (IRP, 2019)

There is a need to decouple economic growth from resource use and environmental impacts. ASEAN has set out an ambitious long-term vision for a circular economy, building on current initiatives to achieve maximum possible benefit with least possible resource input, while enhancing economic competitiveness and environmental benefits (ASEAN & ERIA, 2021).

The circular economy objective cuts across many different sectors. A circular economy has been defined as, "a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products as long as possible" (European Parliament, 2021). To achieve this, "products and production systems need to be designed for circularity, materials need to be efficiently processed, and waste needs to be sorted and recycled. Interactive platforms need to be set up that enable people and product connectivity" (ERIA, 2018). As such, the precepts of the circular economy must be considered in many different

sectors, such as: building and manufacturing with recycling and reuse in mind; operational activities which use recycled or recyclable material; and the eventual collection, sorting, and re-use of material.

This can be achieved through adoption of the following principles of circularity:

1. minimising resource use;
2. optimising resource yield; and
3. closing resource loops through effective waste management.

For businesses, this necessitates a shift in product design and manufacturing to ensure the product life is extended via repair and maintenance and can be reused, remanufactured, and recycled.

An economic activity shall be considered as meeting this environmental objective by fulfilling either one or both of the following criteria:

1. adjusting business operations so as to conserve raw materials, energy, water, and other natural resources; and
2. implementing circular economy principles via adapted products, production, technologies, and processes.

3.2   Essential Criteria

A. Do no significant harm (DNSH)

An economic activity is generally location and context-specific, and interacts directly or indirectly with the surrounding environment. While the economic activity may contribute towards environmental objectives, the economic activity may cause unintended harm to the broader environment. The principle of DNSH means that an economic activity which contributes substantially to an environmental objective shall also not significantly harm any of other environmental objectives. An assessment must be undertaken to ascertain whether the economic activities are causing significant harm to the broader environment while fulfilling one or more of the environmental objectives. In developing the criteria for DNSH going forward, ASEAN will take into consideration parallel activities elsewhere, including the EU.

B. Remedial measures to transition

Proposed actions to mitigate climate and/or environmental impacts should be assessed against the following considerations:

1. Actions should anticipate and avoid risks and impacts at the outset; and
2. If avoidance is not possible, minimise or reduce risks and impacts to acceptable levels.

The depth and breadth of assessment should be proportionate to the scale of business operations. While due diligence may be deemed as sufficient for smaller operations, large scale

projects are often subjected to more scrutiny by relevant authorities, which require businesses to conduct Environmental Impact Assessments (EIA) prior to project commencement. Any remedial actions taken to reduce risks and impacts need to be taken at the business entity or activity level, namely as close as possible to the place and time at which they occur.

4 Sector Coverage

4.1   Purpose of Identifying Focus Sectors

4.1.1   Sector Prioritisation

The Plus Standard should ideally cover all economic activities in ASEAN. However, this first version of the Taxonomy covers key sectors and activities important to achieving climate change mitigation through their own performance, and those that enable the climate mitigation contribution of other sectors and activities. As there will be detailed screening criteria specific to each economic activity, there is a need to identify the scope of activities to include in the Taxonomy by selecting focus sectors.

The Taxonomy is intended to be a living document that is periodically reviewed to reflect technological, scientific, economic, and other relevant developments, regionally and globally. More sectors will be scoped into future versions based on the other environmental objectives in Chapter 3. Accordingly, it will be necessary to develop screening criteria specific to each economic activity. The Plus Standard will provide details on how to determine if economic activities are eligible for the ASEAN Taxonomy.

4.1.2   Parameters for Analysis

Sectors have been assessed according to their environmental and economic importance to ASEAN. However, given that this initial work focuses on climate mitigation as its key objective, the following parameters were chosen to encompass both environmental and economic criteria:

- GHG emissions
- Gross value added (GVA)

These parameters were chosen to aid in understanding the importance of key economic sectors in reducing GHG emissions, and are used to identify focus sectors that have significant potential to make substantial contributions to environmental and climate objectives in ASEAN.

4.2   Process/Methodology: Industrial Classification System and Sectoral Mapping for ASEAN Member States

4.2.1   Background on Industry Classification Systems

In order to identify the focus sectors, it was necessary to first select an industry classification system to be used. Industry classification systems are used to group economic activities based on agreed rules. The systems codify a standard format for organising detailed information about the state of an economy. This allows economic data to be collected and reported in a format suitable for economic analysis, decision-taking, and policy-making. This enables policy makers and other stakeholders to monitor, analyse, and evaluate the performance of an economy at the level of narrowly defined activities.

For the Plus Standard, the focus sectors have been chosen based on ISIC. The primary reason for using ISIC is its compatibility with AMS NSIC codes, as well as with industrial classification codes used in other major taxonomies. This will enable interoperability between taxonomies.

4.2.2 Background to ISIC

ISIC is a hierarchical classification system using letters and numbers to denote specific economic activities, used globally for the collection and reporting of statistics of economic activities. It allows for monitoring, analysis, and evaluation of the performance of an economy, and is used in statistics and economic analysis, where information needs to be provided for narrowly defined economic activities.

ISIC is structured as a four-level hierarchy. There are 21 industry sectors at the highest level, which are called 'sections' and are identified by letters. Each section contains one or more 'divisions', each of which has a 2-digit code. Divisions are further divided into 'groups', denoted by a 3-digit code. Groups are divided into 'classes', with a 4-digit code. Details of these classification levels are shown in Appendix G.

4.2.3 Industrial Codes in ASEAN

Since the publication of the original version of ISIC in 1948, the majority of countries around the world have adopted ISIC as their national classification system or have developed national classifications derived from ISIC. In ASEAN, each of the member states has developed its own NSIC code of economic activities based on ISIC.

It was also important to consider the degree of commonalities between each AMS NSIC with ISIC and with other NSICs. It was found that the sections of the AMS NSICs are mostly uniform across ASEAN countries and with ISIC. Where there are variations in sections across the NSICs and with ISIC, these occur in sections with lower potential relevance to the Taxonomy based on emissions and/or GVA impact. Some examples of deviations are shown in Appendix G.

There is a good degree of commonality across NSICs and with ISIC at the division and group levels. However, the degree of divergence across NSICs increases further down the four-level hierarchy, with significant variations between the NSICs occurring at the class level.

Another key difference between ISIC and NSICs is that the latter have a fifth level of 'sub-classes', which are denoted by a 5-digit code. The definitions of 'sub-classes' vary widely across member states. However, this divergence is not deemed to be a significant obstacle as activities will not require referencing the most granular level of 'sub-classes'.

4.2.4 Compatibility of ISIC with Other Industrial Classification Systems

The Taxonomy should be compatible with other taxonomies used in other regions for reasons including enabling investment portfolios, which span more than one region; allowing financiers and developers in one region to invest or seek capital across regions; facilitating international

agreements and treaties on environment-related targets; and allowing the collection of internationally comparable statistics on sustainable investments.

Overall, ISIC is largely compatible with other widely used industry classification systems used in taxonomies and for more general purposes, and this will lay a good foundation for enabling interoperability between the ASEAN Taxonomy with other taxonomies in the future.

A comparison of ISIC with other classification systems is made in Appendix G.

4.3   Degree of Granularity

Following the selection of ISIC, the level of granularity to use in the Plus Standard was considered. As shown in Chapter 3, three is a high degree of commonality among the AMS NSICs and with ISIC down to the group level. For this reason, the ISIC sections, divisions, and groups have been used as the starting point for the identification of focus sectors.

Notwithstanding this, there are some instances where ISIC groups do not provide enough detail. As ISIC was not created with the intention for sustainable taxonomy creation, certain activities important for environmental and economic consideration are not covered in enough depth. For example, ISIC group '351 Electric power generation, transmission and distribution' has only one branch at class level, '3510 Electric power generation, transmission and distribution'. Sub-classes within this class vary widely across the AMS. However, most AMS NSICs do not make a distinction between renewable and non-renewable power generation. To address this limitation, new activity descriptions were manually added. For example, different types of renewable power generation have been manually defined for inclusion in the Plus Standard (so called Activities Not Defined By ISIC, or ANDBI – see Appendix I). This includes forms of renewable power generation prevalent in ASEAN such as geothermal energy. This process is illustrated in Figure 13.
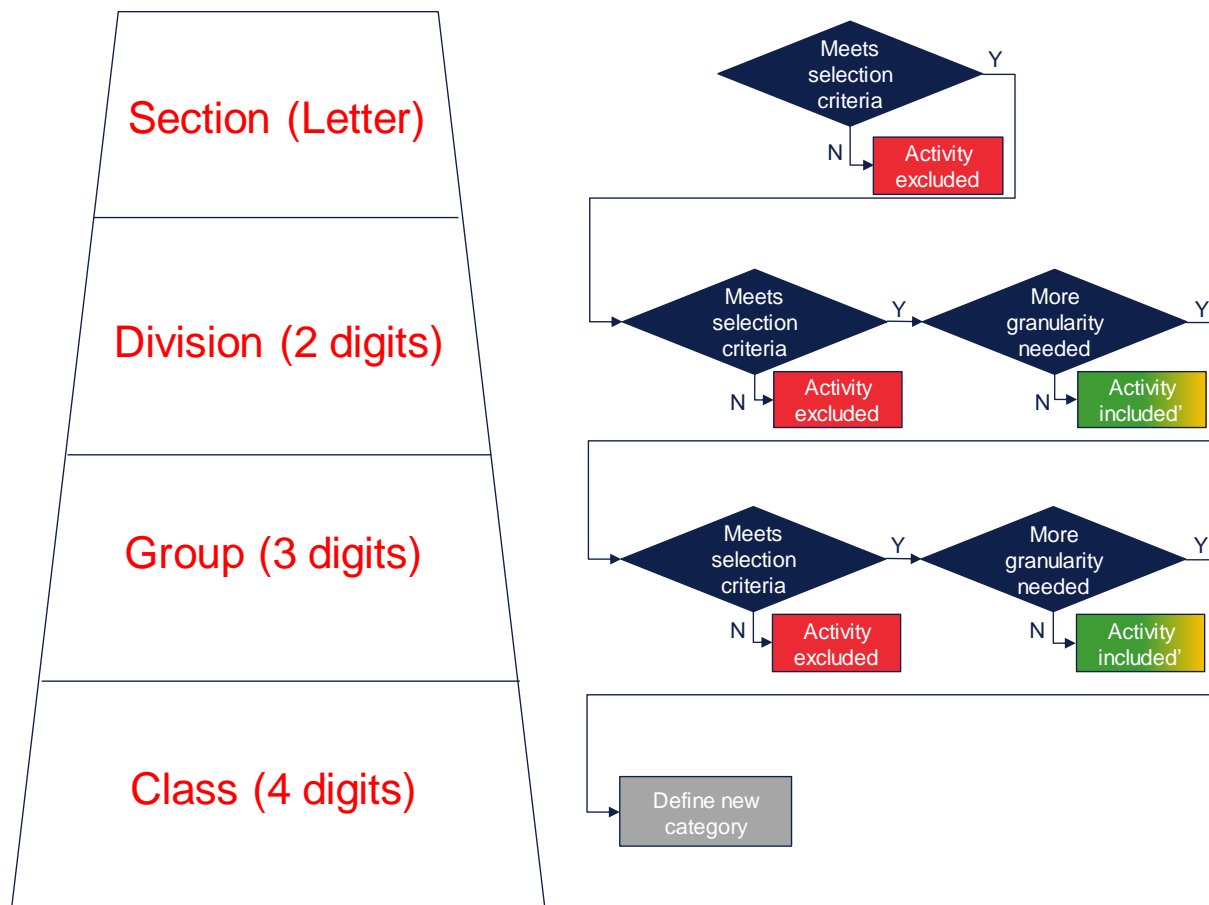
Figure 13: Sector and Activity Selection Flow

4.4   Sector Coverage and Prioritization

4.4.1   Data for Analysis

The parameters for identifying focus sectors are GHG emissions and GVA. The data on these parameters was examined for both ASEAN and individual AMS. The two parameters were analysed using 2018 data, as this was latest consistent data available for the member states. The data sources used were the Climate Analysis Indicator Tool (CAIT) for GHG emissions and GVA databases from national statistic institutions.

Figure 14 shows how different sectors contribute to ASEAN emissions, with over 85% of regional emissions coming from the six sectors of agriculture and land use, energy, transportation, manufacturing, construction, and waste sectors.
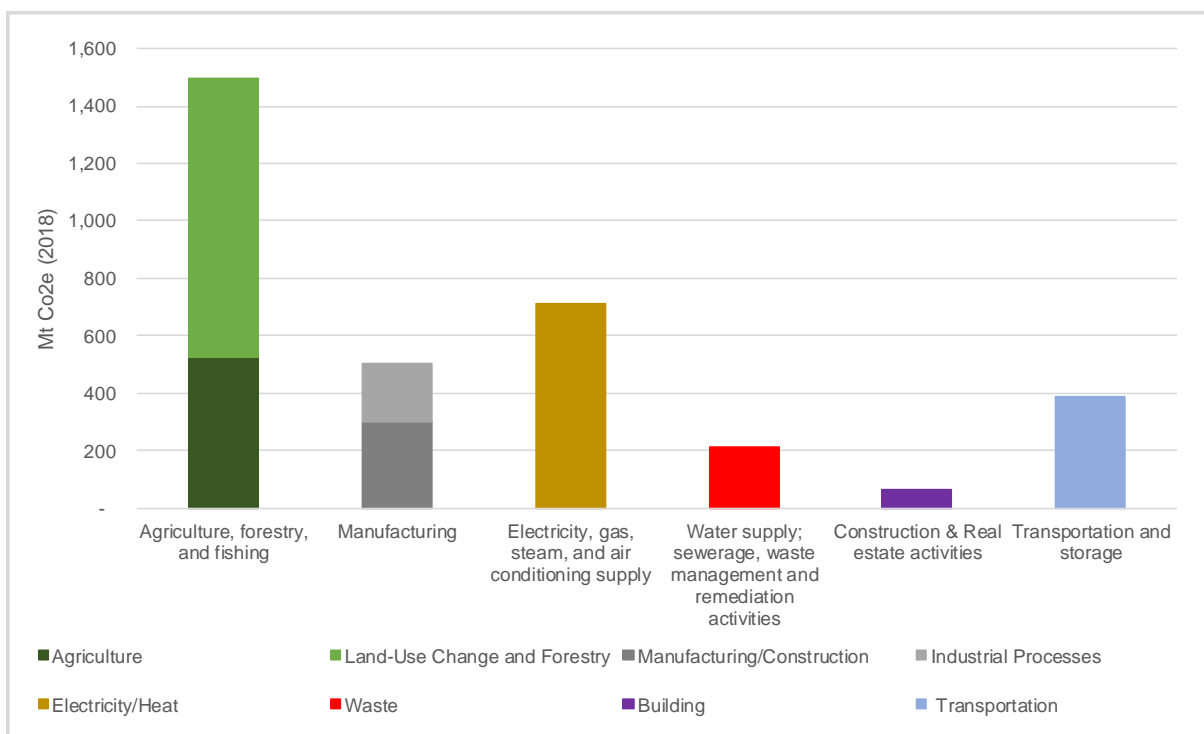
Figure 14: GHG emissions 2018 – all AMS (ClimateWatch, n.d.)[6]

To understand how these sectors contribute to individual AMS emissions, data on each AMS emission was examined by sector. Figure 15 shows the contribution of GHG emissions by the sectors in the AMS.
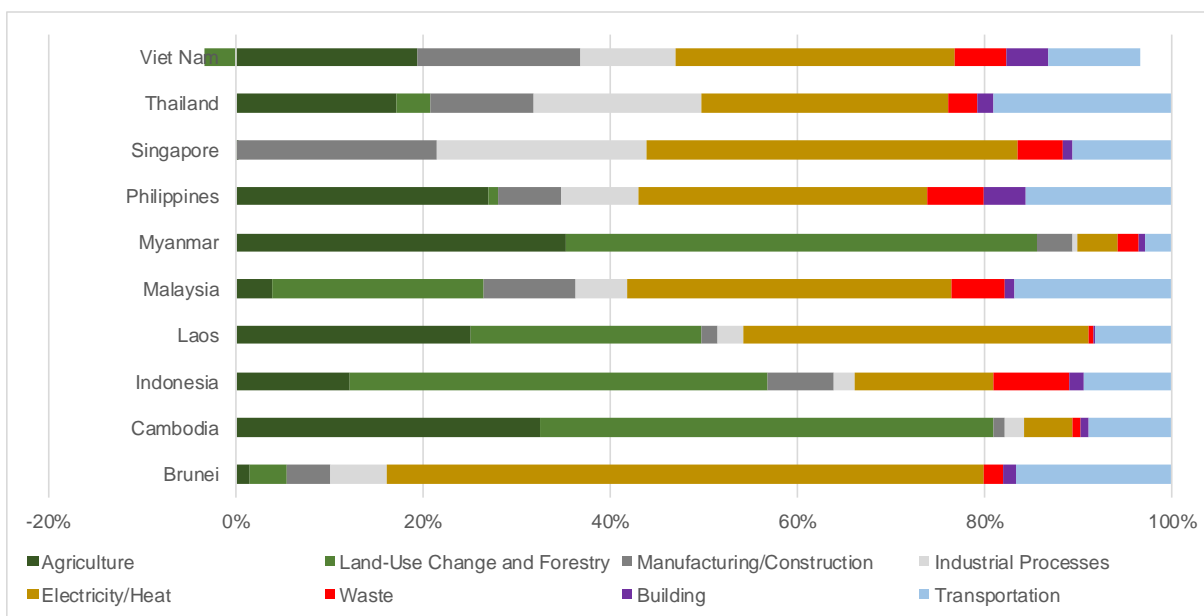
Figure 15: GHG emissions contribution by sectors 2018 – by AMS (ClimateWatch, n.d.)

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[6] Emissions categories, as defined by CAIT, are grouped together according to ISIC Section

With the exception of Singapore and Brunei Darussalam, the six sectors mentioned above contribute to the majority of emissions from each AMS.

For GVA[7], the dollar value of GVA per ISIC section was converted into percentage shares of ASEAN total GVA (Table 4).

Table 4: GVA per ISIC section for all ASEAN

Sector	GVA (million US$) 2018	GVA (%) 2018
A. Agriculture, Forestry and Fishing	25,625,822	7.57%
B. Mining and Quarrying	31,538,948	9.32%
C. Manufacturing	73,279,078	21.66%
D. Electricity and Gas	7,058,468	2.09%
E. Water supply, Sewerage, Waste Management and Remediation Activities	1,807,458	0.53%
F. Construction	16,595,407	4.91%
G. Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	55,688,796	16.46%
H. Transportation and Storage	12,428,199	3.67%
I. Accommodation and Food Service Activities	11,808,042	3.49%
J. Information and Communication	18,817,736	5.56%
K. Financial and Insurance Activities	16,070,010	4.75%
L. Real Estate Activities	5,334,830	1.58%
M., N. Business Activities	10,527,090	3.11%
O. Public Administration and Defence; Compulsory Social Security	27,625,741	8.17%
P. Education	10,693,912	3.16%
Q. Human Health and Social Work Activities	9,697,691	2.87%
R., S., T., U. Other Services Activities	3,734,296	1.10%
Gross value added at basic price	**338,331,523**	**100%**

To understand how the six sectors that account for most of ASEAN GHG emissions fare in terms of GVA share, the data for these two parameters was combined into Table 5.

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[7] The values used were at current prices from 2018, applying an exchange rate from the ASEAN Stat data portal.

Table 5: Data for the GHG Emissions and GVA in ASEAN in 2018 (ClimateWatch, n.d.)[8]

Sectors	GHG Emissions (Mt CO_2 eq)[9]	GVA (%)[10][11]
Agriculture, forestry, and fishing	1,552	7.57
Manufacturing	501	21.66
Electricity, gas, steam, and air conditioning supply	712	2.09
Water supply; sewerage, waste management and remediation activities	212	0.53
Construction & Real estate activities	64	6.49
Transportation and storage	386	3.67
Information and communication	-	5.56
Professional, scientific, and technical activities	-	3.11
Administrative and support service activities	-	3.11
Other service activities	-	1.10

4.4.2 Data and Methodology Used for Analysis

To analyse the emissions and GVA data concurrently, three multi-criteria analytical methods of (i) decision matrix; (ii) weighted average method; and (iii) election and choice translated reality (ELECTRE) were used to evaluate both parameters and prioritise the sectors (see Appendix I). These three methods were used in order to increase the rigour and statistical significance of the analysis. The analytical methods were also selected to ensure that the different units of measurements (% and Mt CO_2 equivalent) in each data set did not influence the results.

4.4.3 Results of the Analysis

The results of the ranking of the priority sectors based on the three methods are shown in Table 6. The results of the multi-criteria analysis revealed that the agriculture, forestry, and fishing sectors rank the highest in all the three methods, and transportation and storage rank fourth across all methods. The other sectors' rankings vary, with the variations mostly remaining within one or two ranking levels.

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[8] CAIT data from the reference cited was used as a basis for GHG figures.
[9] Sectors such as agriculture and land use have methane and nitrous oxide emissions recorded separately from CO_2. These have a global warming potential of 25 and 298 respectively. The values of all the GHG emissions are reported in CO_2 equivalents.
[10] GVA data provided by respective AMS, except for Lao PDR. Lack of availability of data is not considered significant as 99% of ASEAN GVA was accounted for while processing the data.
[11] Primary data for GVA is not consistently reported for all AMS. For example, there are differences in how AMS classify sectors, resulting in varying interpretation of GVA data. The figures here represent the best estimate based on ISIC definitions.

Table 6: Multicriteria Method Results

Ranking	Weighted average method	Decision matrix	ELECTRE
Multicriteria decision analysis			
1	Agriculture, forestry and fishing	Agriculture, forestry and fishing	Agriculture, forestry and fishing
2	Manufacturing	Manufacturing	Manufacturing
3	Electricity, gas, steam and air conditioning supply	Construction & Real estate activities	Electricity, gas, steam and air conditioning supply
4	Transportation and storage	Transportation and storage	Transportation and storage
5	Construction & Real estate activities	Electricity, gas, steam and air conditioning supply	Construction & Real estate activities
6	Water supply; sewerage, waste management and remediation activities	Water supply; sewerage, waste management and remediation activities	Water supply; sewerage, waste management and remediation activities

4.4.4 Ranking of Priority Sectors

Based on the results obtained by these analytical methods, the overall ranking of the priority sectors was derived and is displayed in Table 7. These focus sectors account for over 85%[12] of GHG emissions and 55% of GVA in ASEAN. This provides ample coverage of the material sectors of the ASEAN economy as a starting point. These will be used as a starting point for developing activity-level thresholds and criteria in the next phase of Taxonomy development.

Table 7: Ranking of Priority Sectors

Ranking	ISIC Section	Name
1	A	Agriculture, forestry, and fishing
2	C	Manufacturing
3	D	Electricity, gas, steam, and air conditioning supply
4	H	Transportation and storage
5	F, L	Construction & Real estate activities
6	E	Water supply; sewerage, waste management and remediation activities[13]

4.4.5 Enabling Sectors

In addition to this set of sectors, which are most material in terms of emissions and GVA, the Plus Standard proposes to include enabling sectors, which have significant ability to enable other

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[12] Estimated based on the data reported for sectors on CAIT tool. The data for subsectors such as mining, for example was not available and hence this percentage is an approximation and could have potential errors.
[13] This section could potentially be divided into two sectors – water supply and sewerage and waste management and remediation.

sectors to contribute to climate change mitigation. The identification of sectors in this document was conducted based on climate change mitigation principles. Other sectors, including further enabling sectors, may be added based on other environmental objects in the next phase of Taxonomy development.

Enabling sectors are those which improve the performance of other sectors and activities and do not themselves risk harm to environmental objectives (TEG, 2020). These sectors are important for the decarbonisation of the economy and might not otherwise be included in the Taxonomy if only emissions intensity and GVA are considered.

Enabling sectors identified and included in this version of the Taxonomy are:

- **Information and communication (ICT):** This sector is important for digital transformation and the improvement of efficiency of activities in emissions-intensive sectors. Activities such as data-driven solutions, resource efficiency software, meteorological solutions for adaptation, and direct mitigation, together with physical infrastructure, such as data centres, are essential for overall decarbonisation.
- **Professional, scientific, and technical activities:** The activities of this sector are related to the implementation of efficiency measures across sectors, technical studies, and research linked to the decarbonisation of the economy. Examples include solar water heater installations, retrofit of buildings, renewable energy installations, and equipment and feasibility studies linked to Taxonomy-related activity implementation.
- **Carbon capture, utilisation, and storage (CCUS):** Activities related to the artificial capture, storage, and transformation of carbon emissions into products are essential for enabling activities in high emission sectors such as manufacturing (e.g., manufacturing of cement and steel) and also in the transition of certain sectors (e.g., existing natural gas plants with carbon capture and storage). However, these activities are not extensively captured by ISIC and hence important to add to the Plus Standard coverage.

The financial and insurance activities sector is particularly central to the Taxonomy. The Taxonomy itself is based on a recommendation for a standardised technical screening criteria and a common reference point to identify environmentally friendly economic activities necessary for sustainable capital markets in ASEAN (ACMF, 2020). This sector is key to developing the green financial products, frameworks, and services which will allow the implementation of the projects which will lead to a sustainable ASEAN. Investors can also engage with their portfolio companies to promote corporate governance practices that are consistent with encouraging long-term and sustainable value creation. Organisations working in this sector need to cooperate with government agencies to develop the incentives which will stimulate new green products/services e.g. green investment funds, or green verifiers. Insurance-related activities are critical to cover and mitigate investment risks due to climate change.

While the focus sectors, including enabling sectors, have been identified based on climate change mitigation as the primary consideration for this first version of the ASEAN Taxonomy, due consideration has been given to other environmental objectives where relevant. For example,

promoting the transition to a circular economy is one of the environmental objectives, as described in more detail in Chapter 3.1.

4.4.6 Present and Future Sector Coverage

As mentioned in Chapter 4.4, the focus sectors account for over 85%[14] of the GHG emissions and 55% of the GVA in ASEAN, which provides ample coverage of the material sectors of the ASEAN economy as a starting point. This coverage also aligns with the coverage of other major international taxonomies, which will serve as a good base for interoperability between taxonomies. Appendix H shows a comparison between the coverage of the ASEAN taxonomies and other international taxonomies.

While the focus sectors have been identified for this first version of the ASEAN Taxonomy, the Plus Standard aims to eventually cover as wide a scope of sectors as relevant and possible. As the ASEAN Taxonomy is intended to be a living document, future iterations can include reviews of other sectors for inclusion in the Plus Standard.

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[14] Estimated based on the data reported for sectors on CAIT tool. The data for subsectors such as mining, for example was not available and hence this percentage is an approximation and could have potential errors.

5 Classification Approach

5.1 Purpose

This chapter proposes how activities can be assessed and classified into green, amber, or red, based on their contribution (or lack thereof) to the environmental objectives of the Taxonomy as set out in Chapter 3.

For this Version 1 of the ASEAN Taxonomy, climate change mitigation is the primary objective that is used as a lens for the classification of activities. In the next phase of Taxonomy development, the other environmental objectives will be scoped into this approach, for example using a different set of questions (e.g. 'how does this activity contribute to the transition to a circular economy'), to classify activities based on whether they either substantially contribute to or enable a particular objective.

5.2 Overview of Taxonomy Classification

The classification of activities can take place through the Foundation Framework as well as the Plus Standard. This reflects the tiered nature of the Taxonomy, where the Foundation Framework is qualitative assessment of activities, and the Plus Standard uses metrics and thresholds to further qualify and benchmark eligible green activities and investments.

Under this system, an activity can be classified in one of six ways:

- **Green FF:** Green Foundation Framework
- **Amber FF:** Amber Foundation Framework
- **Red FF:** Red Foundation Framework
- **Green PS**: Green Plus Standard
- **Amber PS** Amber Plus Standard
- **Red PS:** Red Plus Standard

The 'Foundation Framework' uses a single sector agnostic decision tree to classify activities into 'green FF', 'amber FF', or 'red FF'. The decision tree is designed for applicability to all economic activities. The application of the decision tree is explained in 5.4.1.

The 'Plus Standard' The 'Plus Standard' can be used to further assess economic activities using activity-level threshold criteria to determine if they are 'green PS', 'amber PS' or 'red PS'. This approach acknowledges the complexities of defining transition activities. In Version 1 of the ASEAN Taxonomy, the focus sectors of the Plus Standard are set out in Chapter 4, and potential threshold designs are explored in Chapter 5.5. The actual criteria and thresholds of the Plus Standard will be developed in the next phase of the Taxonomy development.

Figure 16 illustrates how the various components fit together as a cohesive overall classification framework.
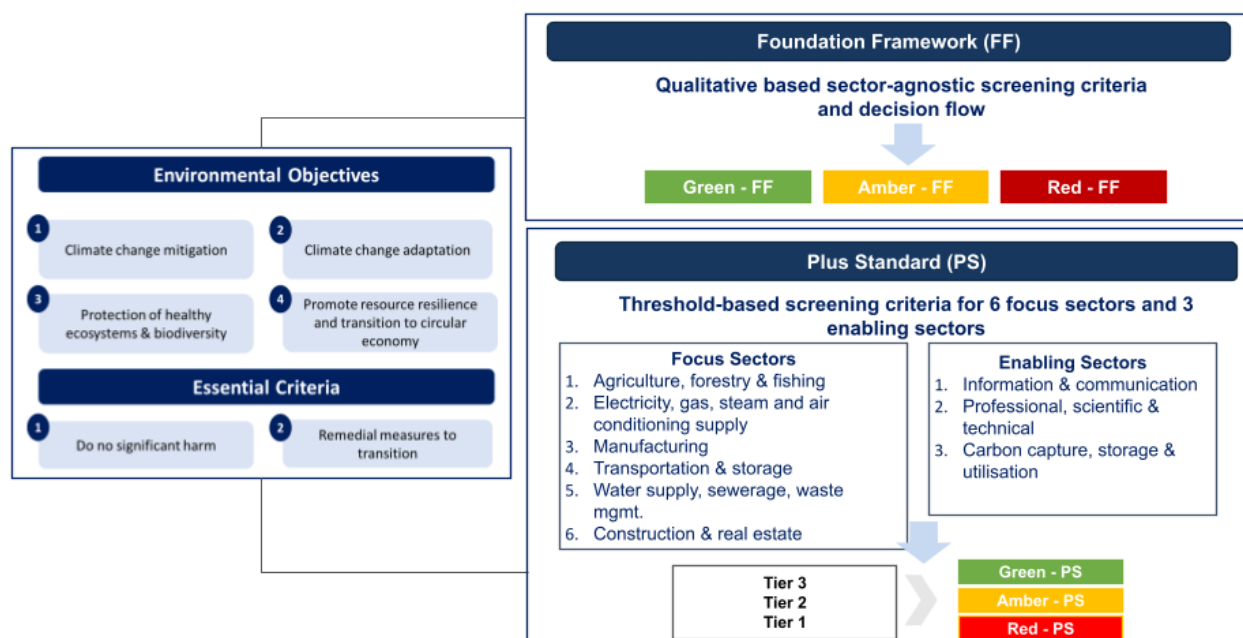
Figure 16: Overview of Taxonomy Classifications

5.3   Explanation of Colour Coding

This chapter provides an overview of the colour coding used in the overall Taxonomy classification system (comprising the Foundation Framework and Plus Standard).

5.3.1   Green

The Foundation Framework has been designed to assess activities without the use of thresholds. The nature of the decision tree allows sufficient clarity for activities to be generally classified as Green FF or otherwise.

For example, zero tail pipe emissions private passenger transport vehicles will directly qualify as green under the Foundation Framework. However, there is a wide range of low emissions vehicles for which further assessment is required to determine if their emissions are low enough to be classified as green or amber. The thresholds to be defined in the Plus Standard will provide clarity using either absolute emissions thresholds or thresholds based on the average emissions of new passenger vehicles available. For an entity looking to purchase a fleet of low emissions vehicles, the data to support the selection as 'green' is easily available from manufacturers and can be used to comply with the thresholds in the Plus Standard.

5.3.2   Amber

An activity can be assessed as amber FF if it fulfils the conditions laid down in the decision tree (Chapter 5.4.1).

For the purposes of the Plus Standard, an activity will need to undergo further assessment on whether it is making a substantial contribution to transition, in line with the decarbonisation trajectory required by the Paris Agreement.

Activities which to be assessed as amber PS will typically belong to one of three types of activities listed below:

- **Activities not currently zero- or near zero emission** that are following a decarbonisation pathway aligned with the trajectory required by the Paris Agreement.
- **Activities facing significant barriers to decarbonisation:** such as where low emissions alternatives are not yet available or economically viable and therefore do not currently have a viable well-established technological pathway towards decarbonisation but are making all available/possible short-term emissions reductions while zero emissions alternatives are being developed (e.g., zero emission marine transport).
- **Interim solutions:** activities which generate less emissions compared to an alternative and need to be carried out for a limited period of time while alternative low carbon technologies are developed into viable and scalable solutions. Such activities will eventually be ineligible in the Taxonomy, with the timeframes for eligibility to be determined in the Plus Standard (e.g., electricity generation from existing natural gas plants with carbon capture and storage).

This proposed approach is aimed at providing clarity on assessing if an activity is substantially contributing to the low carbon transition within the ASEAN context, while also aligning with how transition is assessed in other major taxonomies. The design of activity-level thresholds in the Plus Standard is further discussed in Chapter 5.5.

5.3.3 Red

The activities that do not contribute to climate change mitigation, and/or cause significant harm to other environmental objectives are classified as red.

5.4 Foundation Framework

The Foundation Framework is intended to be a tool that all AMS can use to conduct an assessment of activities within the focus sectors, and in all other sectors as well. Depending on the answers to the guiding questions, the activity will then fall within one of three categories:

- **Green FF**: clearly contributes to or enables climate change mitigation
- **Amber FF**: activities contributing to decarbonisation where mitigation of other harm to environmental objectives is necessary.
- **Red FF**: does not contribute to or enable climate change mitigation and/or fails to meet other safeguards

5.4.1 Decision Tree

As stated in Chapter 5.1, the Foundation Framework decision tree is based on climate change mitigation as the main objective in this first version of the ASEAN Taxonomy (Figure 17). In order to take into account the other environmental objectives of the Taxonomy, considerations for the

other environmental objectives have been integrated into questions further down in the decision trees on whether the activity causes significant harm.
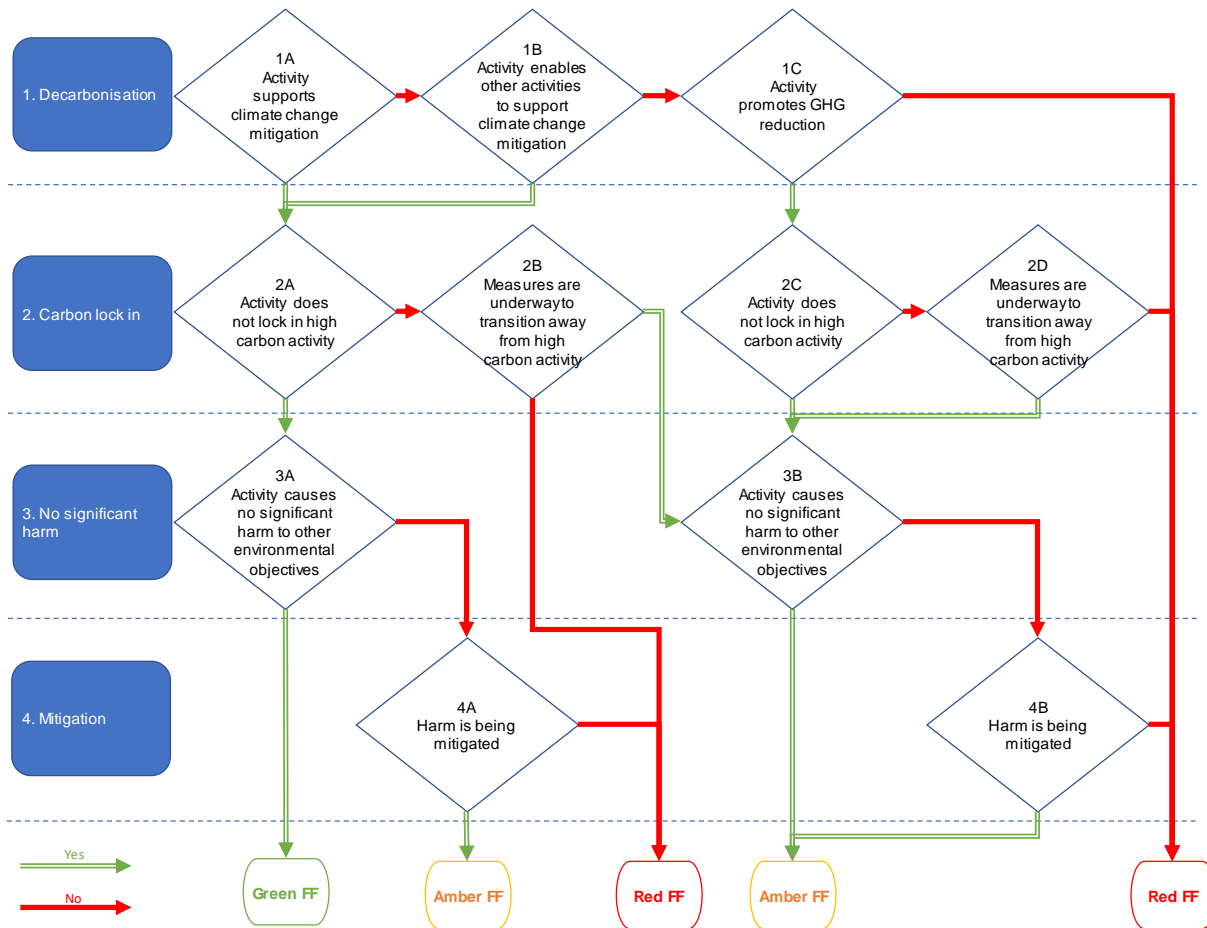
Figure 17: Sector Agnostic Decision Tree

Examples of proposed future sector specific guidance for this process can be seen in Appendix J. This will help Taxonomy users, who seek more specific guidance.

5.5   Plus Standard Framework

The Plus Standard will comprise activity-level technical screening criteria for activities within the focus sectors identified in Chapter 4. The Plus Standard complements the Foundation Framework by providing activity-level criteria and thresholds to determine if an activity is green PS, amber PS or red PS.

The following sections describe the approach to designing the thresholds of the Plus Standard, taking into account the diversity of AMS, the importance of collective ambition, and the need to incentivise transition.

5.5.1 General Guidance for Developing Screening Criteria

The screening criteria are specific thresholds and metrics that determine the eligibility of an economic activity. The screening criteria and thresholds should be based on the following general guidance:

- Clear definitions: The thresholds should clearly define whether an activity is eligible or not, and be simple and quantifiable.
- Based on science: The thresholds must be chosen based on scientific information wherever applicable, aimed at achieving global goals and not be limited by national policies and plans.
- Revisions: The thresholds must be subjected to periodic revisions to achieve the chosen goal over a defined period.

5.5.2 Decarbonisation Pathways

The pace of decarbonisation of activities over time will follow pathways, which are shaped differently, depending on factors such as the barriers to decarbonisation and availability of feasible alternative or low-carbon technologies over time.

Most taxonomies, however, do not provide complete pathways, but rather thresholds that are relevant for defined periods and then designed to ratchet down over time. For the most part, they do not provide clarity over what level the threshold will be in the future. While this clarity would be useful, it is very difficult to provide given a host of unknown factors at play – including the availability and viability of low carbon alternatives. Some activities face significant barriers to decarbonisation which may mean a slower transition pathway.

Examples of different types of pathways are described below for illustrative purposes:

- For activities which face significant barriers to decarbonisation, the decarbonisation trajectory may entail marginal emission reductions in the short run before new technologies come online and enable more rapid decarbonisation. Such barriers may be economic and/or technological or may be political or face a high degree of dependency on external factors. For example, the scale-up of the use of green cement is, in part, blocked by its lack of safely record; major construction companies require a 20-year safety record. Some industrial sectors will likely have this decarbonisation pathway. However, given the importance in the next decade of meeting the Paris Agreement, few activities can take a very slow decarbonisation pathway as the majority will need a more rapid trajectory.
- For activities with a more linear decarbonisation trajectory, the pathway may follow a steady linear decline over time. This may include water and waste sectors where there are some available technologies to decarbonise over time.
- For activities where there are already viable decarbonisation pathways, emissions would be expected to fall significantly and faster in the short and medium term. This could include electricity generation where renewables are already available at low cost to replace existing fossil fuel generation.

In order for the activities covered within a taxonomy to contribute effectively to the overall climate or environmental objectives of the Taxonomy, it is recommended that activities' decarbonisation trajectories should aspire to a common goal, regardless of the slopes of the individual decarbonisation trajectories. The Taxonomy would thus act as a valuable tool for entities as they look to set their own long-term targets. This can incentivise decarbonisation efforts beyond business as usual and contribute to alignment with international investor expectations on sustainability.

5.5.3   Proposed stacked approach to designing thresholds

The Plus Standard will take a 'stacked approach' in developing activity-level thresholds. This means that for each activity, there are multiple decarbonisation pathways and hence there could more than one threshold that can be referenced at a single point in time.

In this approach, there are multiple thresholds per activity at a single point in time. The main motivation for multiple thresholds is to cater for different starting points of entities across ASEAN undertaking a particular activity. This option allows for higher emissions for a limited period, while incentivising progression to lower emissions by having a mechanism whereby those less ambitious tiers have a clearly stipulated expiry year, after which they are no longer applicable. For this approach, it is important that the multiple thresholds are established based on a common set of principles and methodology. This will aid interoperability within ASEAN and with other international taxonomies.

Figure 18 below shows how this could work in practice. In this example, there are three tiers of threshold for a single activity established to reflect different starting points.

- **Tier 3 (Entry):** This threshold is less stringent and determined by agreed metrics – e.g. for public transport it could be the average emissions for public transport in the region (so that every project is better than average and therefore goes beyond business as usual). This tier is static and will be retired at an established point in time which will be determined in the future version, after which this tier would no longer be used to consider taxonomy eligibility.
- **Tier 2 (Intermediate):** This threshold is more stringent than Tier 3 but still higher than the most ambitious threshold. Similar to Tier 3, this tier is static and will be retired at an established point in time which will be determined in the future version, and would no longer be in use after that.
- **Tier 1 (Advanced):** This is the most ambitious threshold – this will be aligned, depending on activity, with global net zero by 2050 and/or Paris Agreement and thus with other major international taxonomies. Tier 3 threshold will decline to zero over time.
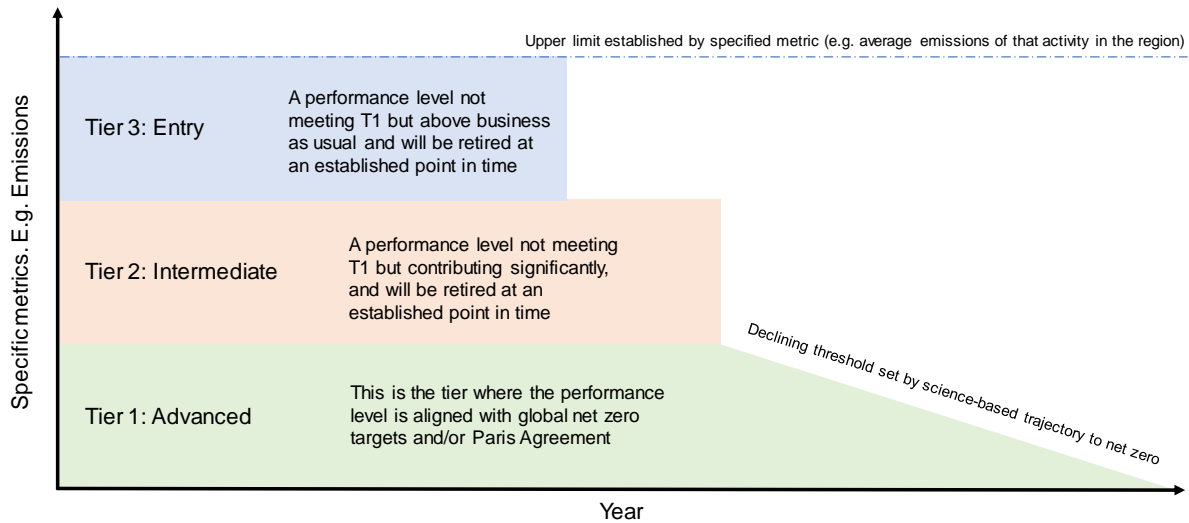
Figure 18: Illustration of the stacked approach[15]

The multi-tiered approach differs from thresholds in other international taxonomies and therefore the following points are key to credibility and practicality:

1. **Thresholds are science-based:** The thresholds are based on the guiding principles for screening criteria (GP-SC) i.e., binary, science based and subjected to periodic revisions.
2. **Thresholds are transparent** to allow investors to understand whether this aligns with their expectations of green.
3. **Tiers will be retired** over time to ensure movement between the tiers – e.g. The entry tier should only be available to users in the short term after which, they will need to shift to the next tier. The time frame established by the criteria will be different for different activities – e.g. it may be 2030 for electricity and 2035 for cement manufacturing etc.
4. **All tiers go beyond business as usual:** Even the Tier 3 should represent an improvement on business as usual for that country – for example, the upper limit set may be the average emissions for that activity in the region. The means that a country cannot aim for emissions that are worse than the current average.
5. **Tier is based on data:** the tier allocated to a country for a specific activity is based on their current starting point, as determined by data rather than by their own selection. This ensures that the thresholds go beyond business-as-usual and have not already been achieved.
6. **Tiers are more stringent for activities with economically viable low carbon options:** For activities with viable low carbon solutions (e.g. electricity generation), thresholds will be set in relation to what is available rather than the current average. This is given that thresholds are applicable to new rather than existing or average generation and that technologies have relatively similar availability across different jurisdictions. This is different to sectors where low/zero carbon alternatives are not

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[15] Depicted for illustrative purposes only

available/viable (e.g. cement) where thresholds will be set relating to current best in class.

It has been recognised that the multiple pathways make the Taxonomy more complex and may require additional efforts for users to understand. It will also take extra effort to map multiple thresholds per activity, as compared to taxonomies which generally use a single set of thresholds per activity. The thresholds will require granular data for activities for all the AMS, which will be an area which will require additional capacity building.

Nevertheless, the advantage of this system is that is takes into consideration the different starting points of emissions generated by different entities for the same activity. This encourages near-term actions to improve emissions performance by providing thresholds which are closer to the current efficiencies, rather than an ambitious distant goal which may not encourage action. It also incentivizes improvements in emissions performance at a certain pace to progress to the next best tier and because tiers are retired over time according to clearly stipulated end-years.

In selecting the approach to be taken, another model was considered, but was not selected after evaluation. Please refer to Appendix K for further information on this model.

5.6   Areas for Further Development
The Taxonomy is intended to be a living document that is frequently revised to account for technological, scientific and economic developments. Suggestions for future developments to the approach to classification can be found in Appendix J.

6 Conclusion and Way Forward

The ASEAN Taxonomy Board recognises the critical role that the financial sector plays in directing capital towards the very urgent sustainability agenda. As the climate agenda becomes more critical, ASEAN is also determined to ensure that it plays its role in the global agenda while also fulfilling its own climate change action goals. In the first ASEAN State of Climate Change Report issued recently, the ASEAN Secretary General noted that "to support the speedy and just transition to net-zero [for ASEAN], there is a need to significantly boost access to climate finance as well as knowledge and technology transfer on key priority areas, such as adaptation and mitigation measures, disaster risk reduction, and clean energy transition". Such action will not be possible without the necessary financing creating an impetus to support industries making sustainable business decisions. A taxonomy, together with a transition pathway and disclosures, is key to ensuring financing flows to where it is needed. Given how intertwined the different segments of the financial sector - banking, capital markets and insurance - are, it is also important that the ASEAN Taxonomy enables all these segments to use a common language. The Taxonomy has also been designed to allow it to have multiple utilities, including as a guide to allocating capital, a tool to support risk assessment and a reference for those undertaking their climate change action journey.

This first version of the ASEAN Taxonomy encapsulates all the key components of a sustainable finance taxonomy that is tailored to address the needs of all AMS while being credible at the same time. No other taxonomy initiative shares the opportunities and challenges of the ASEAN Taxonomy and as such, the ASEAN Taxonomy has taken an innovative approach to enable it to be effective, practical and usable. The multi-tier approach of having a Foundation Framework and a Plus Standard achieves the dual requirements of inclusivity and credibility.

With differing states of development, as well as varying economic and social structures of the AMS, it is critical for the ASEAN Taxonomy to facilitate an orderly transition at all levels towards a sustainable ASEAN. This encompasses not only the large businesses and multinationals who are able to make impactful investments and innovation, but also the small and medium enterprises (SMEs) who are the backbone of the ASEAN economy, making up 69% of employment and 41% of GDP in ASEAN (ADB, 2020).

With the utilisation of the ASEAN Taxonomy by large businesses and multinationals, rapid transformative change will take place through mega projects and investments. The ASEAN Taxonomy allows funders, investors, and governments alike to efficiently direct resources to support businesses who are supporting the climate agenda from solar energy farms, and price efficient production of EVs, to ground breaking innovation and investments in the field of ICT making possible ground breaking green solutions, creating incentives for these influential players to continue moving into sustainability through a virtuous real economic cycle.

At the same time, the ASEAN Taxonomy can have a significant impact on the region's ambitions, by supporting SMEs who are the backbone of the ASEAN economy that involve every area of economic activity, from industrial to agriculture to tourism. As such, it is important that SMEs form a key part of our climate change action efforts. As SMEs who fail to transition will suffer the

consequences of either being left out of the supply chain or the eventual loss of access to financing and even business, a taxonomy that can help SMEs transition is necessary to help ASEAN economies remain resilient and competitive. It is a fact that many SMEs who need to, or even wish to, make this transition are at a loss how to, as they lack capacity, understanding and resources. Some simply do not have the data. This is where the ASEAN Taxonomy can play a critical role is guiding them, just as it can support their large and multinational counterparts.

The Foundation Framework allows the real economy players who want to start their sustainability journey, but who need to take smaller steps, to do so. The Foundation Framework can also serve AMS who need time before being able to take on 'gold standard' commitments and provides for the inclusivity that will allow every AMS as well as users of capital of all sizes to be part of the region's sustainability agenda. At the same time, while the Foundation Framework does not use metrics and thresholds to determine Taxonomy eligibility, its principles-based approach provides users, investors and financiers with an understanding of the impact capital users are making to the climate change agenda and actions that they are taking to improve their impact. The transparency on its approach and the clarity of its intended outcomes will enable the Foundation Framework to be a credible reference to users. The Foundation Framework can also serve as a reference point for activities as the relevant technical criteria in the Plus Standard is being developed.

The Plus Standard will provide a clear view of the climate change impact of activities through its use of quantitative and science-based metrics and thresholds. It is envisaged that the use of the Plus Standard will be the eventual goal of all AMS and users of the ASEAN Taxonomy, helping chart ASEAN's climate change action ambitions. Again, the stacked tier configuration of the Plus Standard is an ASEAN innovation, designed to introduce credible action points while acknowledging the different starting points of AMS who want to embark on the decarbonisation journey. By providing the option to users of the ASEAN Taxonomy, be they AMS or other users of capital, to choose between using the Foundation Framework or the Plus Standard for each sector, and to allow for different starting points under the Plus Standard, the ASEAN Taxonomy is fully inclusive and able to ensure that perfect does not get in the way of good. By having a Plus Standard that uses credible science-based targets and a Foundation Framework that is fully transparent on its approach and clear of its intended outcomes, the ASEAN Taxonomy will be a credible reference for all its users.

It is the ATB's view that this Taxonomy must be able to facilitate transformative systemic changes in the real economy and as such, the ASEAN Taxonomy must be developed in collaboration with the relevant stakeholders from both official and private sectors. The ASEAN Taxonomy must be able to bring capital into the real economy to create value and jobs while reducing emissions or improving climate adaptation. An example of this is in agriculture - investments in agriculture that can help mitigate emissions will also make the associated agricultural products climate friendly and support demand for them. This helps the farmers and also consumers, while attracting cross border capital. The availability of capital will create more supply of climate friendly agricultural investments, thus creating a virtuous cycle.

This first version of the ASEAN Taxonomy is intended to be used as the basis for consultation, discussion and collaboration and as such, intentionally avoids certain details and conclusions that would pre-empt the valuable outcomes of such efforts. The ATB's next step would be to commence its planned interactions towards developing this first version into a more comprehensive and holistically considered Taxonomy.

A non-exhaustive list of potential areas for further Taxonomy expansion has been compiled in Appendix J.

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APPENDICES

Appendix A

A. Summary of AMS economic situation 2019 (ASEAN, 2020 [1]) (CIA, n.d.)[16]

ASEAN Member State	GDP (USD / capita)	Contributions to GDP			Average GDP growth (2000-2019)
		Agriculture	**Industry**	**Services**	
Brunei Darussalam	27,466	0.8%	62.0%	37.2%	3.3%
Cambodia	1,513	18.1%	39.7%	42.3%	7.6%
Indonesia	3,870	12.9%	41.1%	46.0%	5.3%
Lao PDR	2,630	15.6%	40.0%	44.4%	7.7%
Malaysia	10,402	7.2%	37.1%	55.7%	6.5%
Myanmar	1,643	22.3%	36.0%	41.7%	13.2%
Philippines	3,299	9.2%	30.2%	60.6%	5.5%
Singapore	59,798	0.0%	27.6%	72.4%	5.1%
Thailand	7,189	6.1%	33.7%	60.3%	3.9%
Viet Nam	2,786	15.4%	40.8%	43.8%	6.6%

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[16] Due to differences in GDP reporting, Agriculture + Industry + Services do not add to 100% for all AMS. In this, GDP gas been normalized to be equal to 100% for each AMS.

Appendix B

A. Summary of Economic Activities and Environmental Challenges amongst AMS (ASEAN, 2020 [1]) (CIA, n.d.)

ASEAN Member State	Main economic activities	Significant environmental challenges
Brunei Darussalam	a) Oil & gas	a) Air pollution b) Haze - forest fires in Indonesia
Cambodia	a) Apparel b) Construction c) Agriculture d) Tourism	a) Illegal logging, deforestation b) Strip mining c) Soil erosion d) Drinking water access e) Overfishing
Indonesia	a) Oil & gas b) Mining c) Textiles, apparel d) Agriculture	a) Illegal logging, deforestation b) Wildfires, smog c) Overfishing d) Urban air, water pollution e) Water pollution
Lao PDR	a) Agriculture b) Natural resources (mining, hydro, timber etc.)	a) Unexploded ordinance b) Deforestation c) Soil erosion d) Water pollution e) Drinking water access
Malaysia	a) Natural resources (oil, rubber, timber etc.) b) High value products, electronics	a) Urban air, water pollution b) Deforestation c) Haze - forest fires in Indonesia d) Endangered species
Myanmar	a) Natural resource exports (mining, timber etc.) b) Agriculture	a) Air, water, soil pollution b) Deforestation c) Sanitation, water treatment d) Natural resources depletion
Philippines	a) Processing, assembly of high-value products b) Agriculture c) Ship-building d) Automotive parts e) Natural resources	a) Deforestation b) Soil / coastal erosion c) Illegal mining, logging, hunting d) Urban air, water pollution e) Coral degradation f) Endangered species
Singapore	a) High value products b) Transport, shipping c) Business & financial services	a) Air, water pollution b) Limited natural fresh water c) Limited waste disposal options d) Haze - forest fires in Indonesia
Thailand	a) Electronics b) Processed foods	a) Urban air, water pollution b) Water scarcity

	c) Automobiles & parts d) Tourism e) Agriculture	c) Deforestation, soil erosion d) Endangered species e) Hazardous waste
Viet Nam	a) Textiles, apparel b) Electronics c) Processed food & tobacco d) Agriculture	a) Logging, slash-and-burn agriculture b) Deforestation, soil erosion c) Overfishing d) Urban air, water pollution e) Drinking water access

Appendix C

A. Projected socio-economic impact of climate change on AMS (Woetzel, 2020)

	Share of population that lives in areas with a nonzero annual probability of lethal heat waves	Annual share of effective outdoor working hours affected by extreme heat and humidity in climate exposed regions	Water stress	Annual probability of >10% decline in yield of 4 major crops4	Annual share of capital stock at risk of riverine flood damage	Share of land surface changing climate classification
Cambodia	Moderate risk increase	High risk increase	Risk decrease	No or slight risk increase	High risk increase	Moderate risk increase
Indonesia	No or slight risk increase	High risk increase	Risk decrease	No or slight risk increase	Moderate risk increase	No or slight risk increase
Lao PDR	Moderate risk increase	High risk increase	Risk decrease	No or slight risk increase	High risk increase	No or slight risk increase
Malaysia	No or slight risk increase	High risk increase	No or slight risk increase	No or slight risk increase	Risk decrease	No or slight risk increase
Myanmar	Moderate risk increase	High risk increase	Risk decrease	No or slight risk increase	High risk increase	High risk increase
Philippines	No or slight risk increase	High risk increase	Risk decrease	No or slight risk increase	Moderate risk increase	Moderate risk increase
Thailand	Moderate risk increase	High risk increase	Risk decrease	No or slight risk increase	Moderate risk increase	No or slight risk increase
Viet Nam	High risk increase	High risk increase	Risk decrease	No or slight risk increase	High risk increase	High risk increase

Change in potential impact 2018–50 (percentage points)						
Risk decrease	n/a	n/a	<0	<0	<0	<0
No or slight risk increase	0.0–0.5	0.0–0.5	0-3	0-10	0-0.1	0-5
Moderate risk increase	0.5–5.0	0.5–5.0	3–7	10–20	0.1–0.5	5–10
High risk increase	>5.0	>5.0	>7	>20	>0.5	>10

Appendix D

A. Asia-Pacific comparison of historical GHG emissions to GDP per capita and NDC pledges for GHG emission reduction (UNESCAP, 2020)
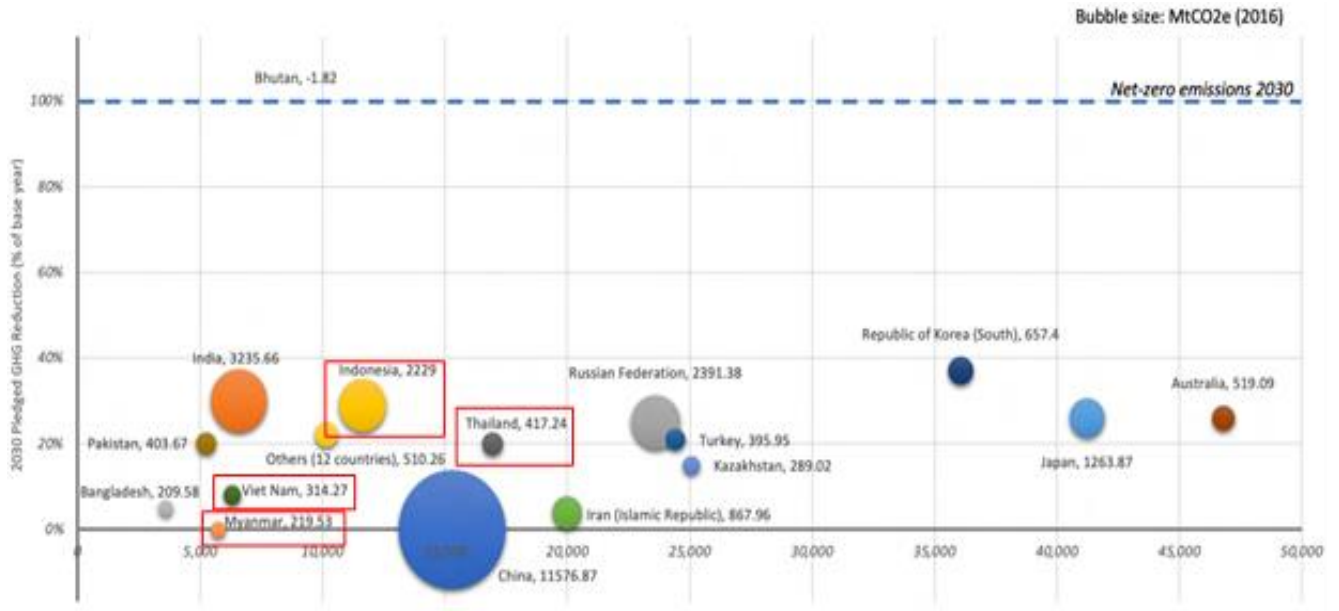
Appendix E

A. SLC Report on the Roles of ASEAN Central banks in managing Climate and Environment-related Risks (ASEAN, 2020 [4])

Capacity Building and Awareness

- Leverage ASEAN Steering Committee on Capacity Building (SCCB), for the matching of demands and supplies of central bank training programmes and courses relating to climate change
- Collaborate and build partnerships with other central banks, multilateral or foreign development partners, climate scientists, or academia on increasing capacity and technical expertise in the industry.
- Join international coalitions established with the objective of advancing sustainability in the financial sector.
- Collaborate with key government agencies and non-governmental organisations.
- Further understand how climate risks affect both cyclical and structural monetary policy variables.
- Develop a network of ASEAN supervisors to exchange experiences in implementing the relevant recommendations by international bodies, such as the five recommendations of the NGFS Guide for Supervisors – integrating climate-related and environmental risks into prudential supervision.

Central Bank Leadership

- Embed sustainability principles including environmental, social and governance (ESG) standards into central bank operations and strategies.
- Take the lead in working with other domestic government agencies to grow the supply of green or sustainable finance.
- Consider providing incentives to financial institutions, where appropriate.

Regulatory and Supervisory Framework

- Study feasibility of adopting principles-based ASEAN-wide taxonomy for green and transitional activities.
- Develop ASEAN green lending principles or guidelines.
- Facilitate information collection and monitoring of climate and environment-related risks by enhancing existing reporting requirements.
- Integrate climate and environment-related risks in the supervisory assessment framework.

ASEAN Green Map

- Consider the development of a roadmap or an "ASEAN Green Map" to ensure a comprehensive development and unified efforts across banking and insurance, capital market and ancillary services (e.g. green certification, advisory services, etc.).

ASEAN Voice

- Communicate ASEAN's common interests and unique circumstances, where appropriate, at international platforms.

Surveillance and Assessment Framework

- Study the possibility of developing a common data collection framework.

Communication Strategy

- Develop a clear communication strategy to support and build central bank's legitimacy and credibility, respectively, in the journey to manage climate change; to guide the financial industry; and to signal commitment towards greening the financial systems.

B. WC-CMD Report on Promoting Sustainable Finance in ASEAN (ASEAN, 2020 [3])

Policy

- R1: WC-CMD should work together with AMS MOFs and other relevant ministries or government agencies (where applicable) to develop an approach for a 'Sustainable Finance First for Sustainable Projects' initiative
- R2: WC-CMD should work together with AMS MOFs and other relevant ministries or government agencies (where applicable) to identify sustainable projects intended to be funded through the national budget and review how they can be instead financed using a combination of public, private and developmental capital
- R3: WC-CMD should work together with AMS MOFs and other relevant ministries or government agencies (where applicable) to develop a framework to apply a strategic and structured approach to financing sustainable projects where the use of a combination of public, private and developmental capital is considered in a systematised way rather than on a project by project basis. The issuance of sovereign, local and government linked bonds that can provide value for money should be considered as part of this framework
- R4: Explore developing a toolkit for issuing SDG Bonds for policy banks and lending institutions in ASEAN that can be used to engage and encourage these institutions to issue SDG Bonds

Co-ordination

- R5: Enhance the existing collaboration between WC-CMD and ACMF (the Joint ACMF and WC-CMD Sustainable Finance Working Group) by having a more structured engagement platform. An independent and dedicated secretariat should be appointed to support this working group. MDBs or regional institutions can host the secretariat or alternatively, the secretariat can be funded by MDBs or developmental aid. With the increased resources, the reconfigured working group should engage more with banking and insurance regulators
- R6: Request for the ASEAN Secretariat to appoint an expert to study the establishment of an entity dedicated to promoting Sustainable Finance for ASEAN

Awareness and Education

- R7: The Joint ACMF and WC-CMD Sustainable Finance Working Group should develop an outreach programme with NGOs for the general public
- R8: The Joint ACMF and WC-CMD Sustainable Finance Working Group should engage relevant professional bodies and industry associations to develop learning and capacity building programmes for key sustainable finance participants
- R9: The Joint ACMF and WC-CMD Sustainable Finance Working Group to collaborate with ministries of education, learning institutions and the relevant stakeholders (which could include the relevant ASEAN sectoral bodies) to create awareness of the impact of sustainable finance for students at all levels

Building demand and supply and creating a virtuous cycle

- R10: Collaborate with ACMF to determine the most appropriate sustainable taxonomy for ASEAN to adopt, taking into consideration global developments and ASEAN's strategic goals, with priority given to the approach for a green taxonomy
- R11: Collaborate with ACMF to promote sustainability disclosures. In the long term, determine if a particular standard can be adopted for ASEAN and the extent of the adoption (i.e. mandatory or voluntary)
- R12: Evaluate whether standards on Transition Bonds and Sustainability-Linked Bonds should be issued
- R13: Explore development of platforms to provide information regionally on investment opportunities and investors. This should be done together with partners from the developmental and/or private sectors
- R14: Explore, with ACMF and other relevant bodies, the establishment of a regional crowdfunding or impact investing platform for sustainable projects including co-funding/co-financing structures
- R15: Explore, with other relevant ASEAN Committees, the creation of an intra-ASEAN sustainability corridor that will allow investments flowing through that corridor to enjoy relief from individual AMS foreign exchange rules
- R16: Explore, with MDBs, the private sector and other relevant bodies, new and innovative credit and currency de-risking mechanisms

C. ACMF's Roadmap for ASEAN Sustainable Capital Markets (ACMF, 2020)

ACMF's Roadmap for ASEAN Sustainable Capital Markets

Priority Area I: Strengthening Foundations

i) Promoting Corporate Sustainability Disclosures;

ii) Promoting Institutional Investor Disclosures;

iii) Examining a Common Taxonomy; and

iv) Exploring Transition Standards

Priority Area II: Catalysing products and enabling access to under-served areas

i) Developing Sustainable and Responsible Fund Standards;

ii) Improving Market Access for Sustainable Products;

iii) Developing ESG Indices; and

iv) Utilising Digital Technology to Facilitate Cross-border Participation in Sustainable Products.

v) Exploring Incentives

Priority III: Raising awareness and capacity building

i) Enhancing Technical Competence;

ii) Promoting Knowledge Transfer; and

iii) Increasing Public Awareness.

Priority Area IV: Increasing connectivity

i) Developing a Public Database of Sustainable Products, Projects and Investors;

ii) Leveraging Multilateral and Philanthropic Efforts; and

iii) Coordinating Efforts with Public & Financial Sectors.

Appendix F

A. Examples of laws established by AMS on environmental protection and efficient use of natural resources

AMS	Legal Framework
Brunei Darussalam	1. Environmental Protection and Management Order 2016. 2. Hazardous Waste (Control of Export, Import and Transit) Order 2013. 3. Brunei Darussalam Fishery Limits Act Cap 130 4. Disaster Management Order, 2006 5. Fisheries Order, 2009 6. Forest Act Cap 46 7. Plant Varieties Protection Order, 2015 8. Prevention of Pollution of the Sea Order, 2005 9. Wild Flora and Fauna Order, 2007 10. Wildlife Protection Act Cap 102 11. Water Supply Act
Indonesia	1. Law on Disaster Management, no. 24 of 2007, dated 26 April 2007. 2. Law on Forestry, No. 41 of 1999, dated 30 September 1999. 3. Law Environmental Protection and Management, No. 32 of 2009, dated 3 October 2009. 4. Law on Water Resources, No. 17 of 2019, dated 16 October 2019. 5. Law on Fisheries, Amendments to Law Number 31 of 2004, No. 45 of 2009, dated 29 October 2009. 6. Law on Geothermal Management No. 21 of 2014; dated 17 September 2014 7. Law on Livestock and Animal Health No. 18 of 2009; dated 4 June 2009 8. Law on Mineral and Coal Mining, Number 3 of 2020 Concerning Amendment to Law Number 4 of 2009, dated 10 June 2020. 9. Law on Energy, no 30 of 2007, dated August 10, 2007. 10. Government Regulation Number 46 of 2017 Environmental Economic Instruments, dated 10 November 2017. 11. Government Regulation on Environmental Impact Analysis, No.27/1999, 7 May 1999. 12. Government Regulation Number 12 Year 2021 Concerning Amendment to Government Regulation Number 14 Year 2016 Concerning Implementation of Housing and Settlement Area, dated 2 February 2021. 13. Regulation of the Minister of Energy and Mineral Resources Number 5 of 2021 concerning Standards for Business Activities and Products in the Implementation of Risk-Based Business Licensing in the Energy and Mineral Resources Sector, dated 1 April 2021. 14. Regulation of the Minister of Energy and Mineral Resources Number 22 of 2019 concerning Guidelines for the Implementation of Greenhouse Gas Investment and Mitigation in the Energy Sector, dated 19 November 2019.
Laos	1. Law on Disaster Management, no.15/NA, dated 24 June 2019. 2. Prime Minister's Decree on Climate Change, no.321/GOL, 18 Sep 2019. 3. Law on Land, (Amended), no. 14/NA, dated 21 June 2019. 4. Prime Minister's Decree on Environmental Protection Fund, no. 94/PMO, dated 08 March 2017.

	5. Law on Forestry, no. 64/NA, dated 13 June 2019. 6. Law Meteorology and Hydrology, no. 36/NA, dated 13 November 2017. 7. Law on Water and Water Resources, no. 010/NA, dated 11 May 2017. 8. Law on Environmental Protection (Amended), no. 029/NA, dated 18 December 2012. 9. Prime Minister's Decree on Environmental Impact Assessment, no. 112/PM, dated 18 Feb 2010 and Environmental Impact Assessment Guidelines, issued on Nov 2011.
Malaysia	1. Environmental Quality Act 1974. 2. Wildlife Conservation Act 2010 3. Protection of Wildlife Act 1972 4. Fisheries Act 1985 5. National Forestry Act 1984 6. National Parks Act 1980 7. Town and Country Planning Act 1976 8. Land Conservation Act 1960 9. National Land Code 1965 10. Local Government Act No. 171 of 1976 11. Sarawak Natural Resources and Environment Ordinance 1997 12. Sarawak Biodiversity Ordinance 1998 13. Sabah Biodiversity Enactment 2001
Philippines	1. Presidential Decree No. 1152 - Philippine Environment Code. 2. Republic Act 9275 Philippine Clean Water Act of 2004. 3. Republic Act 8749 Philippine Clean Air Act of 1999. 4. Republic Act No. 11038 – Enhanced National Integrated Protected Areas System Act. 5. Republic Act No. 9147 - Wildlife Resources Conservation and Protection Act. 6. Republic Act 9003 Ecological Solid Waste Management Act of 2000. 7. Republic Act 6969 Toxic Substances, Hazardous and Nuclear Waste Control Act of 1990. 8. Presidential Decree 1586 Environmental Impact Statement (EIS) Statement of 1978. 9. Presidential Decree No. 705 – Revised Forestry Code. 10. Republic Act No. 7942 - Philippine Mining Act of 1995. 11. Presidential Decree No. 1899 - Small-Scale Mining Law. 12. Republic Act No. 4003 - The Fisheries Act.
Singapore	1. Environmental Protection and Management Act (Cap. 94A) 2. Resource Sustainability Act 2019. 3. Hazardous Waste (Control of Export, Import and Transit) Act (Cap. 122A). 4. Radiation Protection Act (Cap. 262). 5. Smoking (Prohibition in Certain Places) Act (Cap. 310). 6. Transboundary Haze Pollution Act 2014. 7. Sewerage and Drainage Act. 8. Control of Vectors and Pesticides Act (Cap. 59). 9. National Environment Agency Act (Cap. 195). 10. The National Parks Board Act. 11. Public Utilities Act. 12. The Parks and Trees Act.

	13. Animals and Birds Act.
	14. Wildlife Act.
	15. Control of Plants Act.
	16. Endangered Species (Import and Export) Act.
	17. Deep Seabed Mining Act.
	18. Fisheries Act.
	19. Plant Varieties Act.
	20. Energy Conservation Act.
Thailand	1. Enhancement and Conservation of National Environmental Quality Act, (No.2) B.E. 2561 (2018).
	2. National Park Act, B.E. 2504 (1961).
	3. Provincial Waterworks Authority Act B.E. 2522 (1979).
	4. Fisheries Act B.E. 2490 (1947).
	5. Factory Act B.E. 2535 (1992).
	6. Public Health Act B.E. 2535 (1992).
	7. Hazardous Substance Act, B.E. 2535 (1992).
	8. Wild Animal Reservation and Protection Act, B.E. 2535 (1992).
	9. Wild Elephant Protection Act, B.E. 2464 (1921).
	10. Elephant Ivory Act, B.E. 2558 (2015).
	11. National Reserved Forest Act, B.E. 2507 (1964).
	12. Forest Plantation Act, B.E. 2535 (1992).
	13. Chain Saws Act, B.E. 2545 (2002).
	14. Emergency Decree on Control and Operation Gold Mining, B.E. 2483 (1940).
	15. Land Excavation and Land Filling Act B.E.2543 (2000).
	16. Tin Control Act B.E. 2514 (1971).
	17. Fossil Protection Act, B.E. 2551 (2008).
	18. Act on Offences Relating to Offshore Petroleum Production Places, B.E. 2530 (1987).
	19. Mines Act B.E.2510 (1967).
	20. Minerals Act, B.E. 2560 (2017).
	21. Arrest of Ship Act B.E.2534 (1991.
Viet Nam	1. Law on Environmental Protection 2020 (Chapter II).
	2. Law on Biodiversity 2008.
	3. Law on Energy Efficiency and Conservation 2010.
	4. Law on Water Resources 2012.
	5. Law of the Sea 2012.
	6. Law on Natural Disaster Prevention and Preparedness 2013.
	7. Law on Irrigation 2017.

Appendix G

A. Hierarchical activity levels used in ISIC, with examples

The format of ISIC is as follows, in order of hierarchy:

Level	Notation	Number of categories	Relationship with preceding level	Examples
Section	Letter	21	Top level defining main economic sectors	A: Agriculture, forestry and fishing B: Mining and quarrying
Division	2-digit number	88	One or more divisions are collected within each section	[Some divisions within section A] 01: Crop and animal production, hunting and related service activities 02: Forestry and logging
Group	3-digit number	238	Additional digits are added to the end of the division code to create the groups within that division.	011: Growing of non-perennial crops 012: Growing of perennial crops 021: Silviculture and other forestry activities 022: Logging
Class	4-digit number	419	Additional digits are added to the end of the group code to create the classes within that group. Where there is only one class within a group, a '0' is added to the group code.	0111: Growing of cereals (except rice), leguminous crops and oil seeds 0112: Growing of rice 0121: Growing of grapes 0210: Silviculture and other forestry activities

B. ISIC codes by section and division

The categorisation of economic activities into sections and divisions is as shown below:

Section	Name	Divisions
A	Agriculture, forestry and fishing	01, 02, 03
B	Mining and quarrying	05, 06, 07, 08, 09
C	Manufacturing	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33
D	Electricity, gas, steam and air conditioning supply	35
E	Water supply; sewerage, waste management and remediation activities	36, 37, 38, 39, 40
F	Construction	41, 42, 43
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	45, 46, 47
H	Transportation and storage	49, 50, 51, 52, 53
I	Accommodation and food service activities	55, 56
J	Information and communication	58, 59, 60, 61, 62, 63
K	Financial and insurance activities	65, 66
L	Real estate activities	68
M	Professional, scientific and technical activities	69, 70, 71, 72, 73, 74, 75
N	Administrative and support service activities	77, 78, 79, 80, 81, 82
O	Public administration and defence; compulsory social security	84
P	Education	85
Q	Human health and social work activities	86, 87, 88
R	Arts, entertainment and recreation	90, 91, 92, 93
S	Other service activities	94, 95, 96
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	97, 98
U	Activities of extraterritorial organisations and bodies	99

C. National Standard Industrial Classification (NSIC) for AMS

Country	Classification System
Brunei Darussalam	BDSIC
Cambodia	CSIC
Indonesia	KBLI
Lao	LSIC
Malaysia	MSIC
Myanmar	MSIC
Philippines	PSIC
Singapore	SSIC
Thailand	TSIC
Viet Nam	VSIC

D. Examples of NSIC deviations from ISIC at section level

Section code	ISIC description	AMS	AMS NSIC description
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	Singapore	Wholesale and retail trade [note: Singapore includes 'repair of motor vehicles and motorcycles' within section S Other service activities]
K	Financial and insurance activities	Malaysia	Financial and insurance/takaful activities [note: takaful is a form of Islamic insurance system]
N	Administrative and support service activities	Indonesia	Rental and leasing activities without option rights, employment, travel agent and other business support [note: Divisions defined within this section are broadly the same as ISIC and other AMS.]
O	Public administration and defence; compulsory social security	Singapore	Public administration and defence
Q	Human health and social work activities	Singapore	Health and social services
T	Activities of households as employers; undifferentiated products- and services-producing activities of households for own use	Singapore	Activities of households as employers of domestic personnel

E. Comparison of ISIC with other classification systems

Other taxonomies in use or development include the EU Taxonomy and the Common Ground Taxonomy (CGT). ISIC is also being used in the development of the CGT, and while the EU Taxonomy uses the EU industrial classification system 'Nomenclature generale des Activities economiques dans les Communautes europeennes' (NACE), NACE itself is derived from ISIC.

Both NACE and ISIC define the same sections and divisions but deviate in the form of notation and activity codes at the group and class levels[17]. To further determine the commonalities between sector coverage by ISIC and existing taxonomies (Eurostat, 2008). The comparison yielded a high degree of common sectors covered by other taxonomies and ISIC, which lays a strong foundation for interoperability between these taxonomies and the ASEAN Taxonomy Plus Standard.

Other than ISIC and NACE, the Global Industry Classification Standard (GICS) and North American Industry Classification System (NAICS) are widely used industrial classification systems. While not as closely related to ISIC, GICS and NAICS share similarities with ISIC.

GICS was developed in 1999 by Morgan Stanley Capital International (MSCI) and Standard & Poor's (S&P), with several updates since that date. Unlike ISIC and NACE, GICS was not developed by a governmental or intergovernmental organisation and is primarily used by private sector investors rather than state bodies. Like ISIC and NACE, it is a 4-level system, but has fewer categories within its levels. As of 2021:

- ISIC comprises: 21 sections; 88 divisions; 238 groups; 419 classes.
- NACE comprises: 21 sections; 88 divisions; 272 groups; 629 classes.
- GICS comprises: 11 sectors; 24 industry groups; 69 industries; 158 sub-industries.

GICS is organised differently from ISIC, reflecting its purpose of categorising investment (i.e. business) types rather than use by government statistical agencies. For example, the GICS sector 10 (Energy) includes sub-industry 10102030 (Oil & gas refining & marketing), which would come under ISIC section C (Manufacturing), as well as sub-industry 10102040 (Oil & gas storage & transportation), which would come under ISIC section H (Transportation and storage). However, GICS sector 10 is separate from GICS sector 55 (Utilities) roughly covers many of the same activities ISIC section D (Electricity, gas, steam and air conditioning supply).

The North American Industry Classification System (NAICS), in use in the USA, Mexico and Canada follows a similar principle to ISIC, in that it is concerned with collection of economic statistics. However, it is somewhat different in its layout to ISIC and uses a different coding system. Its selection of activities, particularly at the higher levels, tends to mirror those of ISIC. For example, NAICS section 11 (Agriculture, forestry, fishing and hunting) seems to be broadly similar to ISIC section A (Agriculture, forestry and fishing). However, there are differences; for example, NAICS section 22 (Utilities) contains aspects of ISIC section D (Electricity, gas, steam

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[17] For example, the ISIC Group 0141: Raising of cattle and buffaloes is equivalent to the NACE Groups 1.41: Raising of dairy cattle and 1.42: Raising of other cattle and buffaloes.

and air conditioning supply) as well as ISIC section E (Water supply; sewerage, waste management and remediation activities).

Appendix H

A. Comparison of Sector Coverage of International Taxonomies

ISIC sections		Taxonomies						
Section	Name	EU	CBI	China	Colombia	South Africa	South Korea	ASEAN
A	Agriculture, forestry and fishing	X	X	X	X	X	X	X
B	Mining and quarrying							
C	Manufacturing	X	X	X	X	X	X	X
D	Electricity, gas, steam, and air conditioning supply	X	X	X	X	X	X	X
E	Water supply; sewerage, waste management and remediation activities	X	X	X	X	X	X	X
F	Construction	X	X	X	X	X	X	X
G	Wholesale and retail trade; repair of motor vehicles and motorcycles			X				
H	Transportation and storage	X	X	X	X	X	X	X
I	Accommodation and food service activities							
J	Information and communication	X		X	X	X		X
K	Financial and insurance activities							X
L	Real estate activities	X				X		X
M	Professional, scientific, and technical activities	X	X	X			X	X
N	Administrative and support service activities	X		X				
O	Public administration and defence; compulsory social security							
P	Education	X						
Q	Human health and social work activities	X						
R	Arts, entertainment, and recreation	X						
S	Other service activities					X		
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use							
U	Activities of extraterritorial organisations and bodies							

Appendix I

A. Industrial Classification by ISIC and Activities Not Defined by ISIC (ANDBI)

The analysis and comparison of ISIC and NSICs resulted in the ability to commonly describe sectors and activities to a certain extent. To bridge the remainder of the taxonomic divide, a Taxonomy specific definition of relevant activities was required to be set. These are described as "Activities Not Defined By ISIC" (ANDBI) and have been nominated to extend ISIC Industry Classification out to reach the most commonly used and likely required Green Finance Use of Proceeds activities. Specific potential Use of Proceeds activities can occur at different classification levels within ISIC and beyond. These are denoted in light grey rows below and fall within 9 ISIC classification sections. Enabling activities are shown in dark grey.

Section	Level	ISIC Code	Description
A	**Section**	**A**	**Agriculture, forestry and fishing**
A	Division	01	Crop and animal production, hunting and related service activities
A	Group	011	Growing of non-perennial crops
A	Group	012	Growing of perennial crops
A	Group	013	Plant propagation
A	Group	014	Animal production
A	Group	015	Mixed farming
A	Group	016	Support activities to agriculture and post-harvest crop activities
A	Group	017	Hunting, trapping and related service activities
A	Division	02	Forestry and logging
A	Group	021	Silviculture and other forestry activities
A	Group	022	Logging
A	Group	023	Gathering of non-wood forest products
A	Group	024	Support services to forestry
A	Division	03	Fishing and aquaculture
A	Group	031	Fishing
A	Group	032	Aquaculture
C	**Section**	**C**	**Manufacturing**
C	Division	19	Manufacture of coke and refined petroleum products
C	Division	20	Manufacture of chemicals and chemical products
C	Division	22	Manufacture of rubber and plastics products
C	Division	23	Manufacture of other non-metallic mineral products
C	Division	24	Manufacture of basic metals
C	Division	25	Manufacture of fabricated metal products, except machinery and equipment
C	Division	27	Manufacture of electrical equipment
C	Division	28	Manufacture of machinery and equipment n.e.c.
C	Division	29	Manufacture of motor vehicles, trailers and semi-trailers
C	Division	30	Manufacture of other transport equipment
D	**Section**	**D**	**Electricity, gas, steam and air conditioning supply**

D	Division	35	Electricity, gas, steam and air conditioning supply
D	Group	351	Electric power generation, transmission and distribution
D	*ANDBI*	*351[01]*	*Gas power generation*
D	*ANDBI*	*351[02]*	*Coal power generation*
D	*ANDBI*	*351[03]*	*Other fossil power generation*
D	*ANDBI*	*351[04]*	*Solar power gen generation*
D	*ANDBI*	*351[05]*	*Wind power generation*
D	*ANDBI*	*351[06]*	*Hydro power generation (incl. pump storage)*
D	*ANDBI*	*351[07]*	*Geothermal power generation*
D	*ANDBI*	*351[08]*	*Bio power generation*
D	*ANDBI*	*351[09]*	*Marine power generation*
D	*ANDBI*	*351[10]*	*Transmission and distribution (incl. ICT and smart technology)*
D	*ANDBI*	*351[11]*	*Energy storage (not incl. pump storage)*
D	Group	352	Manufacture of gas; distribution of gaseous fuels through mains
D	*ANDBI*	*352[01]*	*Gas production (fossil based production)*
D	*ANDBI*	*352[02]*	*Gas production (renewable production, not including biogas from waste products)*
D	*ANDBI*	*352[03]*	*Gas distribution*
D	Group	353	Steam and air conditioning supply
D	*ANDBI*	*353[01]*	*Provision of steam / air conditioning (fossil based production)*
D	*ANDBI*	*353[02]*	*Provision of steam / air conditioning (renewable production)*
E	**Section**	**E**	**Water supply; sewerage, waste management and remediation activities**
E	Division	36	Water collection, treatment and supply
E	Group	360	Water collection, treatment and supply
E	*ANDBI*	*360[01]*	*Water monitoring*
E	*ANDBI*	*360[02]*	*Water treatment*
E	*ANDBI*	*360[03]*	*Water distribution*
E	*ANDBI*	*360[04]*	*Water desalination*
E	*ANDBI*	*360[05]*	*Operation and maintenance of flood defences*
E	*ANDBI*	*360[06]*	*Nature-based water solutions*
E	*ANDBI*	*360[07]*	*Water saving products and technologies*
E	Division	37	Sewerage
E	Group	370	Sewerage
E	Division	38	Waste collection, treatment and disposal activities; materials recovery
E	Group	381	Waste collection
E	Group	382	Waste treatment and disposal
E	*ANDBI*	*382[01]*	*Waste preparation*
E	*ANDBI*	*382[02]*	*Waste storage and treatment*
E	*ANDBI*	*382[03]*	*Re-use*
E	*ANDBI*	*382[04]*	*Recycling*
E	*ANDBI*	*382[05]*	*Biological treatment*
E	*ANDBI*	*382[06]*	*Waste to energy*
E	*ANDBI*	*382[07]*	*Biogas recovery*
E	*ANDBI*	*382[08]*	*Biogas flaring*
E	Group	383	Materials recovery
E	Division	39	Remediation activities and other waste management services

F	Section	F	Construction
F	Division	41	Construction of buildings
F	Group	410	Construction of buildings
F	ANDBI	410[01]	Construction / refurbishment / upgrade of commercial buildings
F	ANDBI	410[02]	Construction / refurbishment / upgrade of residential buildings
F	ANDBI	410[03]	Construction / refurbishment / upgrade of other buildings
F	ANDBI	410[04]	Development of construction products and systems for improved building energy efficiency
F	Division	42	Civil engineering
F	Group	421	Construction of roads and railways
F	ANDBI	421[01]	Construction of roads / railways
F	ANDBI	421[02]	Disaster preparedness, climate change adaptation and resilience investments for roads and railways
F	Group	422	Construction of utility projects
F	ANDBI	422[01]	Construction of utility projects
F	ANDBI	422[02]	Disaster preparedness, climate change adaptation and resilience investments for utility projects
F	Group	429	Construction of other civil engineering projects
F	ANDBI	429[01]	Construction of other civil engineering projects
F	ANDBI	429[02]	Disaster preparedness, climate change adaptation and resilience investments for other civil engineering projects
F	Group	431	Demolition and site preparation
F	Group	432	Electrical, plumbing and other construction installation activities
F	Group	433	Building completion and finishing
F	Group	439	Other specialized construction activities
H	Section	H	Transportation and storage
H	Division	49	Land transport and transport via pipelines
H	Group	491	Transport via railways
H	ANDBI	491[01]	Electrified rail and associated infrastructure
H	ANDBI	491 [02]	Low-emission rolling stock
H	ANDBI	491 [03]	Improved railway efficiency measures
H	Group	492	Other land transport
H	ANDBI	492[01]	Electric vehicles (EVs)
H	ANDBI	492[02]	Hybrid electric vehicles (HEVs)
H	ANDBI	492[03]	Components associated with low emission vehicles
H	Group	493	Transport via pipeline
H	ANDBI	493[01]	Gas transport (gas from fossil based production)
H	ANDBI	493[02]	Gas transport (gas from renewable production)
H	ANDBI	493[03]	Gas transport (mixed renewable and fossil)
H	Division	50	Water transport
H	Group	501	Sea and coastal water transport
H	ANDBI	501[01]	Low emission fossil powered vessels
H	ANDBI	501[02]	Electric vessels
H	ANDBI	501[03]	Other low-emissions vessels
H	Group	502	Inland water transport
H	ANDBI	502[01]	Low emission fossil powered vessels
H	ANDBI	502[02]	Electric vessels

H	*ANDBI*	*502[03]*	*Other low-emissions vessels*
H	Division	51	Air transport
H	Group	511	Passenger air transport
H	*ANDBI*	*511[01]*	*Low emissions passenger aircraft*
H	Group	512	Freight air transport
H	*ANDBI*	*512[01]*	*Low emissions freight aircraft*
H	Group	521	Warehousing and storage
H	Group	522	Support activities for transportation
H	*ANDBI*	*522[01]*	*Supporting infrastructure for low emissions or electric transport*
J	**Section**	**J**	**Information and communication**
J	Division	61	Telecommunications
J	Group	611	Wired telecommunications activities
J	Group	612	Wireless telecommunications activities
J	Group	613	Satellite telecommunications activities
J	Division	63	Information service activities
J	Group	631	Data processing, hosting and related activities; web portals
L	**Section**	**L**	**Real estate activities**
L	Division	68	Real estate activities
M	Section	M	Professional, scientific and technical activities
M	Division	69	Legal and accounting activities
M	Division	70	Activities of head offices; management consultancy activities
M	Division	71	Architectural and engineering activities; technical testing and analysis
M	Division	72	Scientific research and development
M	Division	73	Advertising and market research
M	Division	74	Other professional, scientific and technical activities
NA	*ANDBI*	*X[01]*	*Carbon Capture, Utilisation and Storage (CCUS)*

B. Decision Matrix

This method establishes a weight for each parameter and sums them to develop a ranking for the sectors. Each parameter is assigned a weight between 1-3 depending on the data and categorised as low, medium, and high.

The GHG emissions of the priority sectors were divided into three groups based on the emission value in Mt CO_2e (i.e., 0-300, 300 - 600, and >600). Higher scores were assigned to higher emissions in order to prioritise the most emissions-intensive sectors.

Similarly, each sector's share of GVA was categorised into categories of 0-3%, 3-6%, and >6%. Higher scores were assigned to higher GVA shares in order to identify the sectors that make the most substantial GVA contributions.

Sector	GHG Emissions 2018	GVA 2018 (current)	Total	Score
Agriculture, forestry and fishing	3	3	6	1
Manufacturing	2	3	5	2
Electricity, gas, steam and air conditioning supply	3	1	4	3
Water supply; sewerage, waste management and remediation activities	1	1	2	6
Construction & Real estate activities	1	3	4	3
Transportation and storage	2	2	4	3

Indicator	Low	Medium	High
GHG Emissions (Mt CO_2e) 2018	0 - 300	300 - 600	> 600
GVA % 2018 (current)	0% - 3%	3% - 6%	> 6%

Criteria	Score
Low	1
Medium	2
High	3

C. Weighted Decision Matrix

This method assigns a weight to each parameter between 0 and 1, with the sum of both weights totalling 1, then multiplies each weight value by each data point of the matrix (Mustafa, et al., 2015). The weights for emissions and GVA were 0.5, and 0.5, respectively. The objective of choosing equal weights was to have an equal balance of the economic and environmental parameters during analysis. Each of these weights were multiplied by the values of emissions and GVA for per sector to produce a final ranking of weighted values.

Indicator		Sectors					
Name	Weight	Agriculture, forestry and fishing	Manufacturing	Electricity, gas, steam and air conditioning supply	Water supply; sewerage, waste management and remediation activities	Construction & Real estate activities	Transportation and storage
GHG Emissions (Mt CO$_2$ eq) 2018	0.5	1,552.0	500.9	711.7	210.6	63.8	385.9
GVA % 2018 (current)	0.5	7.5%	21.6%	2.0%	0.5%	6.49%	3.6%
Total	1	**776,06**	**250,56**	**355,90**	**105,31**	**31,96**	**193,00**
Score		**1**	**3**	**2**	**5**	**6**	**4**

D. ELECTRE

The ELECTRE method allows for the evaluation of all the parameters and compare with different alternatives (e.g., data comparison of each sector with every other sector) and rank them in a preferred order (Birgün & Cihan, 2010). Similar to the weighted decision matrix, this methodology assigned the same weights for two parameters. The initial data points for each parameter per sector are normalised to translate them into unitless values between 0 and 1. Subsequently, the weights were applied, and the concordance and discordance matrices were developed. Concordance matrix describes the predominance of an alternative to a compared one and the discordance matrix describes the opposite. Finally, matrices are evaluated using a credibility matrix to obtain a binary result of TRUE or FALSE. The more values with TRUE, the higher the count, thus higher the rank.

Raw data for analysis		
	GHG Emissions	GVA %
	Mt CO2 eq	%
Agriculture, forestry and fishing	1552.1	7.57%
Manufacturing	500.9	21.66%
Electricity, gas, steam and air conditioning supply	711.8	2.09%
Water supply; sewerage, waste management and remediation activities	210.6	0.53%
Construction & Real estate activities	63.9	6.49%
Transportation and storage	386.0	3.67%

Normalisation of parameters		
	GHG Emissions	GVA %
	Mt CO2 eq	%
Max Value	1552.1	21.66%
Critical Value	0.0	0.00%
Normalised values		
Agriculture, forestry and fishing	1.0	0.3
Manufacturing	0.3	1.0
Electricity, gas, steam and air conditioning supply	0.5	0.1
Water supply; sewerage, waste management and remediation activities	0.1	0.0
Construction & Real estate activities	0.0	0.3
Transportation and storage	0.2	0.2

Normalised Weight Values

	GHG Emissions	GVA %
Agriculture, forestry and fishing	0.500	0.175
Manufacturing	0.161	0.500
Electricity, gas, steam and air conditioning supply	0.229	0.048
Water supply; sewerage, waste management and remediation activities	0.068	0.012
Construction & Real estate activities	0.021	0.150
Transportation and storage	0.124	0.085
Weight	0.50	0.50

Concordance Matrix

	Agriculture, forestry and fishing	Manufacturing	Electricity, gas, steam and air conditioning supply	Water supply; sewerage, waste management and	Construction & Real estate activities	Transportation and storage
Agriculture, forestry and fishing		0.5	1	1	1	1.0
Manufacturing	1		0.5	1	1	1.0
Electricity, gas, steam and air conditioning supply	0	0.50		1.0	0.5	0.5
Water supply; sewerage, waste management and remediation activities	0	0.00	0.00		0.5	0.0
Construction & Real estate activities	0	0.00	0.50	0.50		0.5
Transportation and storage	0	0.00	0.50	1.00	0.50	
					C Bar	0.5

Discordance Matrix						
	Agriculture, forestry and fishing	Manufacturing	Electricity, gas, steam and air conditioning supply	Water supply; sewerage, waste management and	Construction & Real estate activities	Transportation and storage
Agriculture, forestry and fishing		0.325	0.000	0.000	0.000	0.000
Manufacturing	0.339		0.068	0.000	0.000	0.000
Electricity, gas, steam and air conditioning supply	0.271	0.452		0.000	0.102	0.036
Water supply; sewerage, waste management and remediation activities	0.432	0.488	0.161		0.138	0.072
Construction & Real estate activities	0.479	0.350	0.209	0.047		0.104
Transportation and storage	0.376	0.415	0.105	0.000	0.065	
					D Bar	0.168

Credibility Matrix						
	Agriculture, forestry and fishing	Manufacturing	Electricity, gas, steam and air conditioning supply	Water supply; sewerage, waste management and	Construction & Real estate activities	Transportation and storage
Agriculture, forestry and fishing		FALSE	TRUE	TRUE	TRUE	TRUE
Manufacturing	FALSE		TRUE	TRUE	TRUE	TRUE
Electricity, gas, steam and air conditioning supply	FALSE	FALSE		TRUE	TRUE	TRUE
Water supply; sewerage, waste management and remediation activities	FALSE	FALSE	FALSE		TRUE	FALSE
Construction & Real estate activities	FALSE	FALSE	TRUE	TRUE		TRUE
Transportation and storage	FALSE	FALSE	TRUE	TRUE	TRUE	

Sector	Count	Score
Agriculture, forestry and fishing	4	1
Manufacturing	4	1
Electricity, gas, steam and air conditioning supply	3	3
Water supply; sewerage, waste management and remediation activities	1	6
Construction & Real estate activities	3	3
Transportation and storage	3	3

Appendix J

A non-exhaustive list of potential areas for possible implementation into subsequent version of the Taxonomy has been compiled below.

A. Suggested Non-Exhaustive Lists of Green and Red Activities

The lists below show activities which could potentially be classified automatically as green or red, thus simplifying the Plus Standard Process.

<u>Green Activities</u>

Energy:
- Electricity generation from renewable energy (e.g., solar PV, concentrated solar, wind and ocean energy)
- Transmission and distribution of renewable energy.
- Energy storage systems including green hydrogen.
- Cogeneration, production of heat/cool from renewable energy.

Transport:
- Zero tail pipe emissions micro-mobility.
- Zero tail pipe emissions transport (road, rail, water – passenger and freight)
- Infrastructure for zero emission transport.

Manufacturing:
- Manufacturing of low carbon technologies (e.g., renewable energy equipment, electric vehicles, green hydrogen etc.).
- Installation of specific low/zero carbon technologies such as waste heat boilers and LED lighting

Construction and Buildings:
- Installation of specific low/zero carbon technologies such as waste heat boilers, insulation, double-glazed windows and LED lighting
- Acquisition of a new building that is best in class performance within the country

Water, Waste and other remediation:
- Carbon capture, utilisation and storage.
- Efficient wastewater treatment plants.
- Efficient organic waste treatment plants (e.g., composting and anaerobic digestion) and material recovery systems.
- Separate collection of municipal solid waste.
- Landfill gas capture in closed landfills.

<u>**Red Activities**</u>

Energy:
- Coal or oil power without carbon capture, utilisation and storage (CCUS)
- Waste heat recovery from coal or oil fuelled power generation
- Coal mining or oil extraction, refining, processing or production and associated supply chain infrastructure

Transport:
- New roads, road bridges, road upgrades, parking facilities, fossil fuel filling stations, etc.
- Oil tankers or other ships solely transporting coal or oil

Waste:
- Collection of waste that is going to landfill
- Landfill without gas capture

These suggested lists of green and red activities are subject to review at subsequent Taxonomy iterations. Some of the activities which would currently fall under amber may be moved to either green or red and some of the activities in red could transition towards amber and green (e.g., electricity generation from nuclear energy when DNSH issues are addressed for nuclear waste management).

B. Decarbonisation pathways

While climate change mitigation is the focus for this first version of the ASEAN Taxonomy, all the environmental objectives are equally important. Currently, relatively limited guidance is available on classifying activities with specific focus on each of the other three environmental objectives. Hence a staged approach for covering the full scope of environmental objectives is recommended.

The areas which are not covered in the current version but will have to be developed by the AMS and ATB in the next phase of work are:
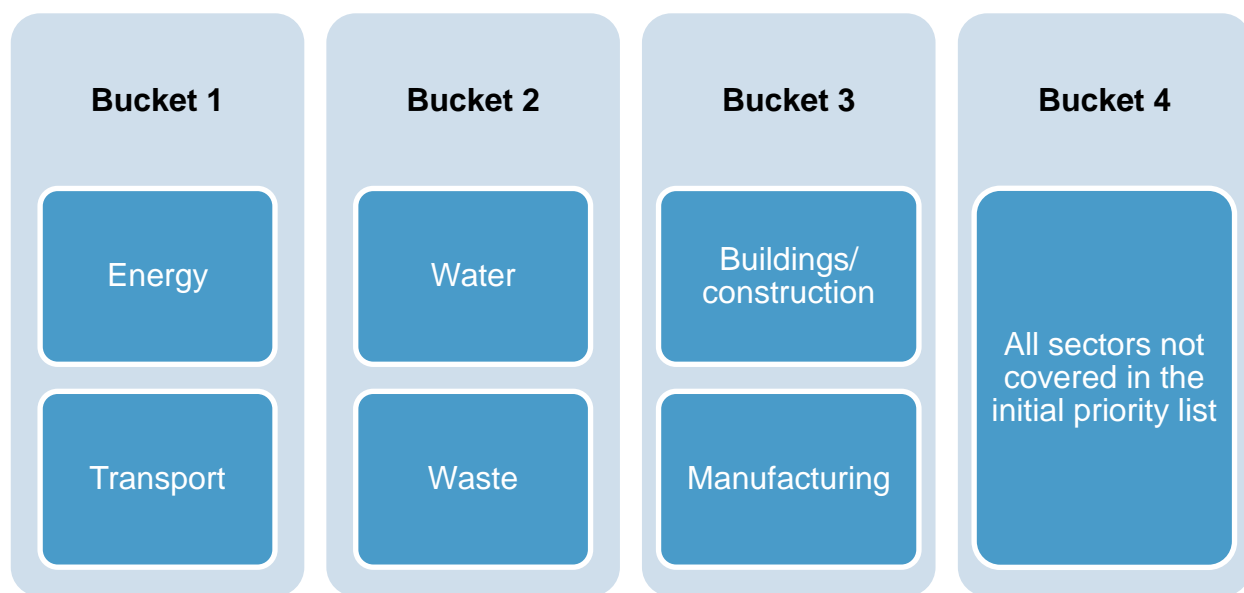
- Integration of other environmental objectives into the overall classification framework.
- Develop guiding questions on environmental objectives and essential criteria to enrich the assessment of economic activities based on single decision tree under the Foundation Framework.
- Develop the thresholds for the focus sectors under the Plus Standard.

C. Proposed Decision Tree Buckets

In future iterations of the Taxonomy, it is suggested that 'buckets' of sectors be established to allow a more targeted assessment of activity classification. It is proposed that the focus sectors identified in Chapter 4 have been grouped into buckets based on similar attributes such as the

sector's typical approach to measuring environmental performance (more info is provided in Chapter 5.3.1 below).

For the purpose of designing high-level decision trees to classify activities, sectors were grouped into 'buckets' based on similar characteristics. This would enable the decision trees to be designed with relatively targeted questions that nevertheless are not specific to a single sector. These buckets are shown in Figure 19.

Bucket 1	Bucket 2	Bucket 3	Bucket 4
Energy	Water	Buildings/ construction	All sectors not covered in the initial priority list
Transport	Waste	Manufacturing	

Figure 19: Decision Tree Buckets[18]

For example, the energy and transport sectors both have zero-carbon technology options that are readily available and, in many cases, currently financially viable (or envisaged to be viable within the short term). For both, there are clear cut green activities, such as renewable energy and zero tail pipe emission vehicles, which can be separated from those that require further assessment before categorisation.

Manufacturing and construction are grouped together because the opposite is true – i.e. there are few individual zero-carbon technologies that can be classified as green through the foundation framework but both sectors need to decarbonise in the short term through significant efficiency investments (in buildings and manufacturing processes) while breakthrough technologies become readily available and viable (this is especially the case for manufacturing).

The agriculture and land use sector is not grouped together with other sectors due to the unique characteristics and complexity of the activities. The activities in this sector require detailed assessments of the supply chain to ensure alignment with the objectives of the Taxonomy. This is not possible to apply in a decision tree and will require analysis through the Plus Standard Framework.

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[18] Agriculture is not included here as it is too complex to analyze in a decision tree

D. Proposed Sector Specific Classification

The decision tree shown at Chapter 5.4.1, Figure 17 is a sector agnostic template for the assessment of all activities which fall within those buckets. However, under a proposed future iteration, the specific application of the criteria at each decision node will differ depending on the bucket into which the proposed activity falls.

Table 8: Proposed Decision Tree Directions (Buckets 1 - 3)

Ref	Bucket 1 (Transport / Energy)	Bucket 2 (Manufacturing and Buildings / Construction)	Bucket 3 (Water & Waste)
1A	Examples: ('Yes') Transport - electrified transport options, such as electric vehicles. energy - low carbon alternatives to fossil fuel. ('No') Captures activities that are necessary, but do not have a substitute and will therefore need to be decarbonised over time (e.g. aviation).	Examples: ('Yes') Near zero buildings or manufacturing processes with near zero emissions. ('Yes') Does not refer to manufacturing of renewable energy equipment - would be regarded as an enabling activity. ('Yes') Could refer to construction of energy efficient buildings.	Examples: ('Yes') Activities which form part of a fully achieved circular economy.
1B	Activity supports significant reduction of emissions by 2030 Example ('Yes'): improved control or T&D processes for renewable energy.	Activity facilitates / enables significant short term emissions reduction of that activity: >30% for buildings or > 20% for manufacturing; or, Facility has best-in-class emissions performance compared to peers in region. Example: ('Yes') Manufacturing of renewable energy equipment.	Examples: ('Yes') Activity which improves water or waste-water volume delivered per unit of energy expended; Activity involving collection, transport, sorting of waste with the objective of supporting recycling; ('No') Treatment of waste with the objective of composting or digesting organic material. Improved logistical or control processes which will allow more efficient waste recycling.
1C	Example: ('Yes') Electric public transport using electricity from non-renewable sources	Example: ('Yes') Construction for more efficient energy use.	Example: ('Yes') Water supply or waste water treatment which increases overall system efficiency.
2A	Example ('No') transport of fossil fuels.	Example: ('No'): Manufacturing equipment for carbon emitting industries.	Example: ('Yes') process which incentivises future use of fossil derived materials.
2B	Example: ('Yes') Planned transition to renewables.	Example: ('Yes') Planned transition from this activity	Example: ('Yes'): Planned replacement with alternatives
2C	Example: ('No') Discourages EV uptake	Example: ('No') Discourages zero-carbon building	Example: ('No') Discourages water recycling
2D	Example: ('Yes') Planned transition to renewable EVs	Example: ('Yes') Planned transition to zero carbon	Example: ('Yes') Planned transition to water recycling
3A 3B	Example: ('No') Local pollution or damage to species habitat.	Example: ('No') local pollution or damage to species habitat.	Example: ('No') methane emissions
4A 4B	Example: ('Yes') emissions reductions at source.	Example: ('Yes') emissions reductions at source.	Example: ('Yes') methane leakage mitigation

Appendix K

**A. Alternate model for threshold design: unique threshold pathway per activity**

This alternate model involves establishing a single threshold per activity, where the thresholds decline over time. For each activity, the starting point would vary depending on the characteristics of the particular activity and the collective starting point of the ASEAN economy. This means that the pace of decarbonisation for each activity, as indicated by the slope of the trajectory, will vary to provide adequate regional context to be inclusive, yet at the same time remain credible with a clear end-goal. By this approach, each activity has a unique decarbonisation pathway comprising a single threshold that declines over time.

This approach reflects that decarbonisation trajectories of all activities in a taxonomy contribute to a common end-goal. This is an aggregate goal meaning the decarbonisation pathways for individual activities may reach zero or low emissions at end-points earlier or later than 2050, depending on factors such as technological feasibility of low-carbon alternatives.

These factors are not all understood at this stage and therefore the exact pathway, and how thresholds will change in the future, is not clear. This means that the taxonomy puts forward thresholds for what is green now based on best available understanding of science and viability of technologies. While the glide path depicted provides a conceptual understanding of how thresholds will strengthen over time, these future thresholds do not need to be put forward at this stage and, instead, can be determined at points in the future based on the viability of technologies at that point in time.

We note here that while some sectors, may indeed reach zero after 2050, this will require other sectors to do the heavy lifting in the short term and to be decarbonised in advance of 2050. This thinking should also underpin the development of thresholds.

Another key feature of this option is that thresholds tighten over time in line with climate science. The exact decarbonisation trajectory, and therefore how thresholds will tighten over time to account for this, is not perfectly clear for all sectors and activities. For this reason, the pathways in Figure 20 are depicted with solid lines in the near- to medium-term (e.g. until 2030 or 2040), and the continuation of the trajectory beyond this point is depicted with dashed lines to indicate that this tentative and subject to review in the future.
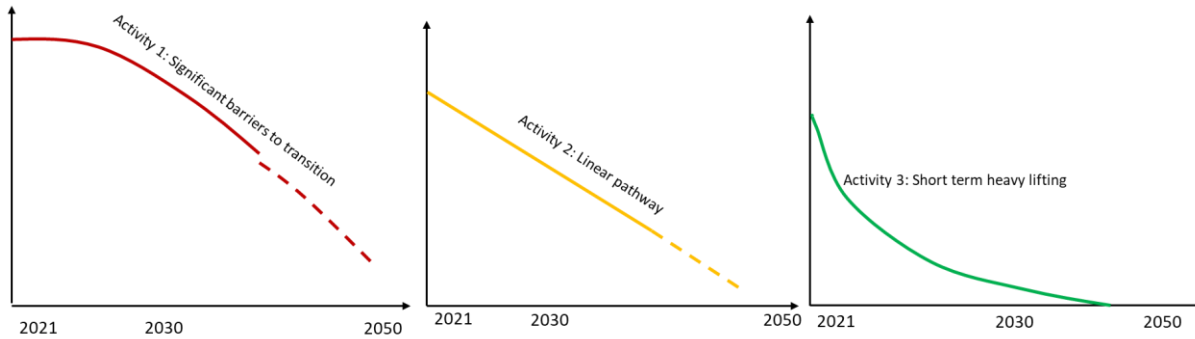
Figure 20: Illustrative example of types of decarbonization pathways

This approach provides a cohesive approach across ASEAN as it offers a single threshold per activity. It may be more easily understood by market participants and is easy to map to or compare against thresholds in other taxonomies.

However, it is recognised that there may be instances where the threshold provided is not achievable in the short term for some AMS given the starting points within an activity are too dispersed. Also, entities with higher starting levels of emissions for the activity in question will have larger gaps to close in the near-term compared to other entities performing the same activity with lower emissions.