



Green Infrastructure Investment Opportunities

MALAYSIA
2020 REPORT



Climate Bonds INITIATIVE

CM²
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MALAYSIA

Supported by Capital Markets Malaysia

1. Sponsor's note

Malaysia has a long and successful history in advocating the use of Islamic finance and Islamic capital market instruments. As one of the largest issuers of Sukuk (Islamic bonds) globally, the country's financial regulators and industry players have been at the forefront of innovation in Islamic finance. This is exemplified by the leadership role it has played in leveraging the collective Islamic finance expertise of its market players to create Shariah-compliant green and sustainable finance instruments.

The issuance of the Sustainable and Responsible Investment (SRI) Sukuk Framework in 2014 by the Securities Commission Malaysia (SC) marked a pivotal milestone in Malaysia's journey in building a sustainable finance and investing ecosystem – one that would be intertwined with and facilitated by the country's significant leadership in the Islamic capital market.

This report details the green investment opportunities in renewable energy, green buildings, low carbon transport and water management, available in Malaysia. In addition, it highlights how green Sukuk has been leveraged on, to fund green projects.

Since the world's first green Sukuk issuance in 2017 by Tadau Energy in Malaysia, Malaysian issuers have issued a total of 13 green Sukuk and bonds to finance a range of projects including large-scale solar farms, green buildings and a mini-hydropower plant.

Malaysia's development in this space is due in no small part to our financial sector intermediaries who have demonstrated a strong commitment to building a holistic sustainable finance ecosystem and have displayed innovation in structures and breadth of product offerings. For its part, Malaysia's financial regulators have endeavoured to create an enabling ecosystem for green finance transactions, including the introduction of tax incentives, grants and capacity building to strengthen and support its financial sector intermediaries.

Capital Markets Malaysia, as an affiliate of the SC, plays a unique role in supporting the country's sustainable finance ecosystem. With a mandate to position and profile, whilst also supporting development in this space, it is our hope that this Green Infrastructure Investment Opportunities Report conveys the noteworthy green investment opportunities available in Malaysia.

Sincerely,

Zalina Shamsudin

General Manager, Capital Markets Malaysia

About Capital Markets Malaysia

As part of its developmental mandate, the Securities Commission Malaysia (SC) set up Capital Markets Malaysia (CMM) to spearhead both the local and international positioning and profiling of the Malaysian capital market. CMM profiles the competitiveness and attractiveness of the various segments of the capital market to increase international

participation and enhance opportunities for Malaysian capital market intermediaries.

CMM engages with a wide range of international and domestic stakeholders, connecting local capital market intermediaries to foreign stakeholders and providing a global platform to position Malaysia's unique capital market offerings and expertise. As an affiliate of the SC,

CMM also continuously engages with the capital market regulator, providing market insights, business development and stakeholder engagement support to market development initiatives.



2. Introduction

This report highlights green infrastructure investment opportunities in Malaysia. It has been prepared to help meet the growing demand for green investment opportunities and to support the country's transition to a low carbon economy.

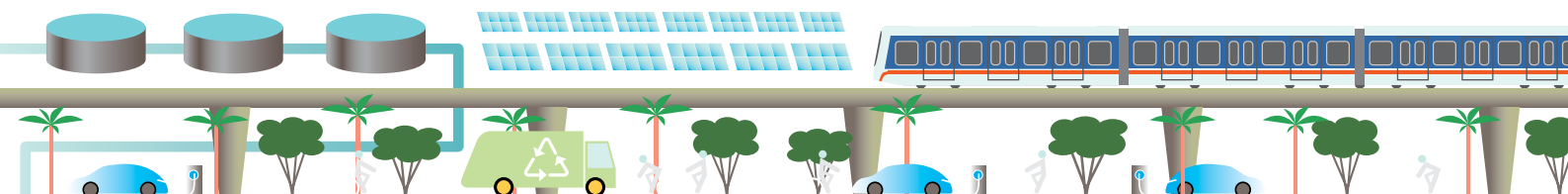
It aims to facilitate greater engagement on this topic between project owners and developers, and institutional investors. Green infrastructure and corresponding green finance instruments are explored in the report, with sector-by-sector investment options presented.

The report is intended for a wide range of stakeholders, including domestic superannuation funds and asset managers and their global counterparts, potential issuers, infrastructure owners and developers, as well as relevant government ministries.

In developing this report, the Climate Bonds Initiative consulted with key Government bodies, industry, the financial sector, peak bodies, NGOs and think tanks - in partnership with Capital Markets Malaysia. We would like to thank these partners along with the other organisations that contributed to the report:

Report highlights

- Malaysia needs a cumulative infrastructure investment of roughly USD460bn from 2016-2040.
- To meet its Paris Agreement targets, much of this investments needs to be directed at green infrastructure.
- Green finance including green bonds and sukuk will be essential to finance the transition to a low carbon economy
- Malaysia has shown global leadership on sustainable finance, implementing a range of policy support and requirements since 2011.
- SRI Sukuk and Bond Grant Scheme was one of the first global examples of incentive structures to support green bond issuance.
- Malaysia is the global leader in green sukuk issuance with 13 deals from 11 different issuers out of a global total of 23 deals and 16 issuers.
- There is already a pipeline of green investments in Malaysia across transport, energy, water and waste infrastructure.
- There is growing momentum on green infrastructure and the sample pipeline demonstrates that most of the technology required is not new to Malaysia - in particular public transport and solar energy.
- The post-COVID recovery represents an opportunity to focus recovery on green stimulus to meet Malaysia's Paris Agreement targets.



Green Infrastructure Investment Opportunities (GIIO) Report Series

Green infrastructure presents a huge investment opportunity globally, with an estimated USD100tn worth of climate compatible infrastructure required between now and 2030, in order to meet Paris Agreement emissions reduction targets. However, there remains limited identifiable, investment-ready and bankable projects, particularly in emerging markets. There is also a lack of understanding of what types of assets and projects qualify for green financing.

In response to this challenge, CBI is developing a series of reports that aim to identify and demonstrate green infrastructure investment opportunities around the world. By so doing, it aims to raise awareness of what is green and where to invest, as well as to promote green bond issuance as a tool to finance green infrastructure.

The report series commenced with the GIIO Indonesia report, launched in May 2018 and now includes Australia & New Zealand, Philippines, Vietnam and Brazil report. The pipeline of GIIO reports being developed includes further exploration of opportunities in Asia-Pacific as well as opportunities in Latin America.



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Climate Bonds Initiative

The Climate Bonds Initiative (CBI) is an international investor-focused not-for-profit organisation working to mobilise the USD100tn bond market for climate change solutions.

It promotes investment in projects and assets needed for a rapid transition to a low carbon and climate resilient economy. The mission focus is to help drive down

the cost of capital for large-scale climate and infrastructure projects and to support governments seeking increased capital markets investment to meet climate and greenhouse gas (GHG) emission reduction goals.

The CBI carries out market analysis, policy research, market development; advises governments and regulators; and administers a global green bond standard

and certification scheme. CBI screens green finance instruments against its Climate Bonds Taxonomy to determine alignment and uses sector specific criteria for certification.

The Climate Bonds Taxonomy is on the back cover. Please see p. xx for information on the Climate Bonds Standard and Certification Scheme.

Green infrastructure: an opportunity for growth

Malaysia has been one of the fastest growing economies in ASEAN with the third largest economy in Southeast Asia and the 35th largest economy in the world.¹ The COVID-19 pandemic has put some pressure on the country's prospects; however, economic growth is expected to rebound gradually in 2021-2022, as global conditions improve.² The process of recovery from the COVID crisis needs to focus on building back better, by prioritising green infrastructure and nurturing a regulatory environment that facilitates green and innovative investment.

Climate change has already had significant adverse impacts on Malaysia, including increased annual surface temperature and rainfall, sea level rise, and other extreme weather events.³ The country is also facing declining natural resources and increasing greenhouse gas (GHGs) emissions due to intense energy consumption for its rapid growth.⁴

Scaling-up of investment in green infrastructure is critical for Malaysia to meet its climate commitments - including the Paris Climate Change Agreement - and build resilience to the impacts of climate change as well as to achieve rapid economic development. As a top priority for the current Malaysia administration, infrastructure development is being heavily supported and promoted in government.

Malaysia has some of the most well-developed infrastructure among the newly industrialized countries in Asia.⁵ It also

performs well on overall infrastructure quality globally, ranking 27th out of 141 countries in the 2019-2020 Global Competitiveness Report.⁶ Despite this, climate change and population growth will continue to put pressure on this infrastructure.

Currently, much of the investment in infrastructure in Malaysia is being carried out through public funding and Public Private Partnerships (PPP) ventures.^{7,8} However, public funding is not sufficient to meet the growing demand for green infrastructure; new channels will be necessary to mobilise private capital. Existing funding commitments made by the government may also be challenged by the current COVID pandemic and ensuing economic crisis, so access to capital markets will be key to growing green pipelines.

Scaling up sustainable investment will depend on the Malaysian government's level of commitment to greening the economy. Policies encouraging public investment in green infrastructure have the power to set Malaysia on a sustainable course for the long run - sending an important signal to the market and providing an opportunity for the country to access new capital.

Globally, there is significant demand for green investments. Green debt instruments (including green bonds and green loans) that commit proceeds to climate and environmental projects provide useful tools for private investors looking to invest in green ventures. The first ever green sukuk

(Islamic bond) issued by a Malaysian entity was in July 2017, by Tadau Energy, for MYR250m (USD62.1m) with use of proceeds for renewable energy. As of 31 December 2020, green bond issuance from Malaysian entities amounted to USD1.36bn⁹ and includes a large segment of green sukuk.

In order to attract investors looking for green, there needs to be a visible pipeline of infrastructure investment opportunities that align with internationally accepted definitions of green. A large and visible Malaysian green infrastructure pipeline could also help investors to understand that there is a sufficiently large pool of financially attractive investments that are also green. The implication of this is that there are viable alternatives to non-green assets and projects, and that investors can make their preferences for green heard, which will in turn spur the creation of a larger pool of green investments.

Globally, there has been limited awareness and appreciation of 'what are green investments' beyond solar and wind energy. This lack of understanding makes it difficult for governments to develop pipelines of commercially viable, green infrastructure investment opportunities that are able to support the nation's transition to a low-carbon economy.

Improving the general investment environment as well as promoting more green finance will help to fund the infrastructure necessary to meet climate targets. This means continuing to open up to investors looking for green and ensuring there is a pipeline of bankable, investment-ready projects. These measures will ensure that Malaysia is on the path to transitioning to a low carbon economy and becoming more resilient to the impact of climate change and other global shocks.

Green infrastructure has positive environmental and economic benefits. It can create prosperity by increasing competitiveness, productivity and employment opportunities; extending the reach, reliability and efficiency of the national electricity grid, without creating air pollution; broadening the economic base; creating new markets; and providing inclusion and connectivity across Malaysia.

The post-COVID recovery: Building back better

The world is in the midst of a major crisis. In ASEAN, the global COVID-19 pandemic has triggered economic recession that is impacting the lives of millions across the region - with protective measures taken to prevent the virus's transmission shutting down large parts of the region's economy.

Once this health crisis comes under control, governments will need to find ways to stimulate growth, to get economies moving again. All future economic stimulus packages should aim to contribute to building a healthier, more resilient and more sustainable economy.

This is a huge opportunity: to use green finance, to fund COVID-19 recovery efforts that also advance climate mitigation and adaptation goals. Project inclusion for COVID-19 recovery bond programmes

could draw on green taxonomies such as those developed in the EU, ASEAN, and by the Climate Bonds Initiative, augmented to include assets that explicitly enhance resilience.

As part of improving economic resilience, the programmes should exclude activities which are at risk from future shocks. For instance, assets that could become stranded as a result of climate policy changes, or those that are not resilient to climate physical risks. Investor confidence can be built by using available taxonomies with a high degree of international recognition.

Governments simply need to focus on investments that can be characterized as 'building back better', and greener.

3. Malaysia context

Country facts

Population: **32 million** (early-2020)¹⁰

Population growth rate: **1.3%** (early-2020)¹¹

Urban population: **78.4%** (early-2020)¹²

GDP: **USD364.681bn** (2019)¹³

GDP growth rate: **4.3%** (2019)¹⁴

Interest rate (cash rate): **1.75%**
(as of Jan 2021)¹⁵

Inflation (consumer prices):
0.663% (2019)¹⁶

Net inflow FDI: **USD7.5bn**
(Q1, March, 2020)¹⁷

Government 10Y Yield: **2.662%** (daily, 9 Jan, 2021)¹⁸

Balance of trade: **USD5.1bn** (as of Dec, 2020)¹⁹

Government debt to GDP: **61%** (latest, Sept 2020)²⁰

Rating

A-, stable (S&P)³⁶

A3, stable (Moody's)³⁷

A-, stable (Fitch)³⁸

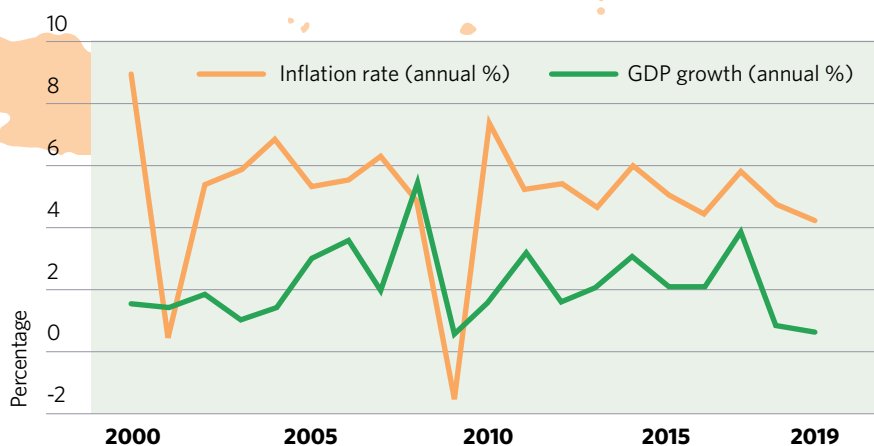
Malaysia's macroeconomic outlook

Green finance presents an opportunity in promising macroeconomic conditions.

Over the past decade, Malaysia's economy has grown rapidly while remaining resilient, but the pace of expansion has moderated. In 2019, real GDP growth reached 4.5% (y-o-y), 0.2% lower than 2018 growth. Private consumption has remained the largest contributor to output growth, which is supported by stable labour market conditions, benign inflation and continued growth in real income.²¹ The COVID-19 pandemic has meant that GDP is estimated to have contracted by 4.5% in 2020.²² Despite this, in its Economic Outlook 2021, the Ministry of Finance states that it expects a 6.5% -7.5% rebound in 2021.²³

Malaysia has a sound and resilient financial system with IMF financial soundness indicators²⁴ showing that the banking system is robust and orderly underpinned by ample liquidity and strong capital buffers. The capital market is also effective, driven by well-developed infrastructure and instruments.²⁵

Annual GDP growth and Inflation rate in Malaysia 2000-2019



(Source: World Development Indicators, WB)

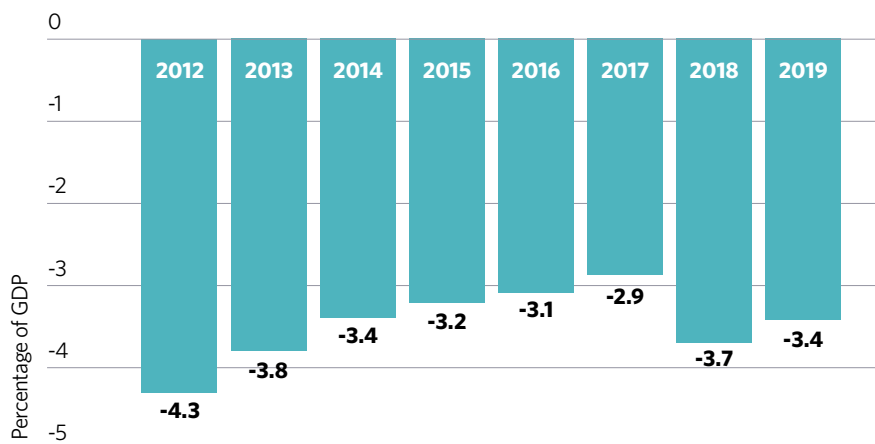
The ongoing fallout of the COVID-19 pandemic, together with the sudden enforcement of the Movement Control Order (MCO), has put various sectors of the economy under extreme stress. The Malaysian tourism industry has been hardest hit, facing an estimated loss of MYR3.37bn (USD811m) in the first two months of 2020 alone.²⁶ Indirect impacts of the virus can

also be seen in manufacturing, construction, mining, and agriculture²⁷ while the negative effects on credit markets and supply chains will dissipate only gradually²⁸. Consequently, Malaysia's economy is estimated to have contracted 4.5%.²⁹

The COVID response, alongside policies to control and reduce the health impacts, includes several measures to overcome the

economic downturn. In February 2020, an emergency stimulus package was announced worth USD4.8bn, of which, about USD453m is allocated to the tourism industry, aiming to counter the immediate impact of the outbreak on vulnerable sectors and households.³⁰ In March 2020, the PRIHATIN Rakyat Economic Stimulus Package valued at MYR250bn (USD57bn), was announced, focusing on supporting businesses, especially SMEs, assisting low and middle-income households, and providing fiscal injections to strengthen the national economy.³¹ In June 2020, the government unveiled a new short-term economic recovery plan named "National Economic Recovery Plan (Penjana)" worth MYR35bn (USD8.2bn).^{32,33} As part of the recovery plan, the Government of Malaysia launched 'Sukuk Prihatin' to raise finance for the Kumpulan Wang COVID-19 to finance measures announced in the economic stimulus packages and recovery plan to address the COVID-19 crisis³⁴. The 'Sukuk Prihatin' has been likened to a war-bond, in that it carried patriotic elements.

Fiscal Deficit in Malaysia 2012-2019 (percentage of GDP)



(Source: WB^{36,37})

Immediate policy responses have softened the impact of the COVID-19 pandemic on the Malaysian economy and paved the path towards economic recovery.³⁵ To date, the stimulus has primarily focused on short term emergency funding for the most affected

industries. There is yet to be a discussion on the possibility of longer-term green stimulus to support renewable energy, public transport or other types of green infrastructure covered in this report.

Infrastructure spending

Infrastructure pipelines are growing, with more opportunities emerging for outside investment.

Malaysia has some of the most well-developed infrastructure among the newly industrialized countries in Asia.³⁹ The majority of Malaysians have access to essential facilities and services such as public transport, communications, electricity and clean water, resulting from heavy investment in infrastructure by the government over the past ten years.⁴⁰

Some headline developments include two new major national ports (Port Klang and the Port of Tanjung Pelepas), which are categorized in the world's top 20 container ports;⁴¹ the growth of the national road network by 68% between 2010 and 2015;⁴² and the expansion of seven international airports across the country. Each of these developments has helped to position Malaysia as the preferred transfer and logistics gateway to Asia (after Singapore) for passengers and cargo.

Despite this, locational disparities and political differences across regions pose several problems for infrastructure development⁴³ particularly in reaching consensus on infrastructure policy, leaving the uneven infrastructure development across the country.⁴⁴ For example, the transportation network in East Malaysia is less advanced compared to that in Peninsular Malaysia.^{45,46}

Demand for energy and electricity, according to the International Energy Agency's projections are expected to grow by 2.2% and 4% per year respectively from 2013 to 2040.^{47,48} Moreover, the urban population is growing at an annual rate of 2.1%⁴⁹ adding pressure to the current infrastructure capacity. This will also challenge Malaysia's ability to generate enough energy from cleaner sources, which it has committed to increasing to 31% in its generation mix by 2025 and 40% by 2035.⁵⁰

With its mission of moving from an upper-middle-income economy to an advanced economy, the **Eleventh Malaysia Plan 2016-2020** has set up ambitious goals for each sector as follows:

Transport: Public transport modal coverage should be 40% in urban areas by 2030.

Logistics: The transport and storage subsector should grow at 8.5% annually by 2020 and be in the top 10 of the World Bank Logistic Performance Index.

Water: 99% of the population should have access to clean and treated water by 2020.

Energy: 7,626 MW of new generation capacity should be installed in Peninsular Malaysia by 2020.

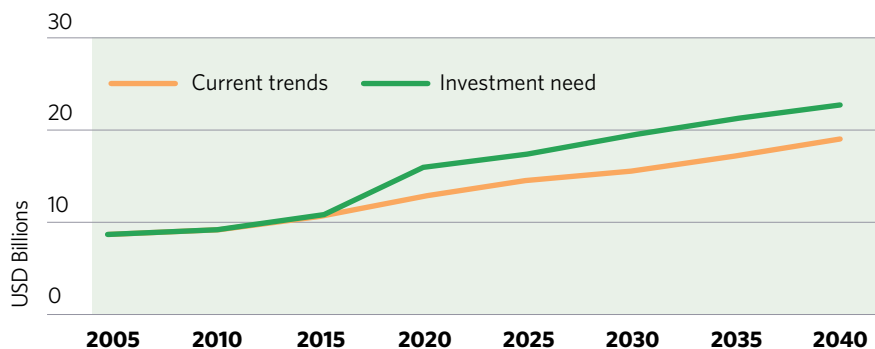
This implies that more infrastructure projects in various forms will be developed and huge investment will be needed.

In 2019, approximately USD13bn was invested in infrastructure, accounting

for 3.66% of Malaysia's GDP, while the required investment would have been about USD15bn.⁵¹ If the current investment growth rate continues, business-as-usual investment should meet up to 82% of the infrastructure development requirements up to 2040. Among the different sectors, energy and road transport will be the two highest capital-incentive areas during the period of 2007-2040.

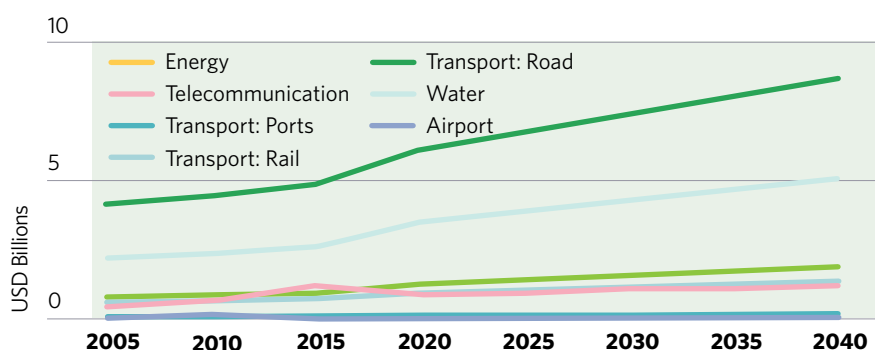
There is a need for greater private and foreign investment. Various forms of funding and initiatives have been applied to attract investment into infrastructure projects.⁵² Traditionally, public budgets have been used to finance most infrastructure projects.⁵³ However, government spending is constrained by a 55% public debt to GDP ratio, and therefore other sources of funding have been promoted, such as foreign investment or private investment PPPs.⁵⁴ Malaysia has used PPPs to finance many of its infrastructure projects since 1983 and will continue to adopt new PPP funding models. The major challenge of new PPP projects is the ability of users to pay for them. The presence of Chinese investment in Malaysia's infrastructure, through soft loans by Chinese government agencies or contractor-financing, is also a notable feature.⁵⁵

Infrastructure investment at current trend and need in Malaysia



Source: The Global Infrastructure Outlook, 2020

Infrastructure investment at current trend for each sector in Malaysia



Source: The Global Infrastructure Outlook, 2020

Malaysia's climate policy

Climate change has already had significant adverse impacts on Malaysia, including increased temperatures and rainfall, sea level rise, and other extreme weather events.⁵⁸

Malaysia's key strategy to mitigate greenhouse gas emissions is in the energy, waste and forestry sector. Mitigation in the other sectors such as industrial processes and product used (IPPU) and Agriculture have yet to be quantified.

The Malaysia Plans have been central to climate response starting with the Eighth Malaysia Plan (2001 – 2005)⁵⁹ which introduced the Five Fuel Diversification Policy where renewable energy was first promoted as a source of energy, although hydropower was already used.⁶⁰ In the Ninth Malaysia Plan (2006 – 2010)⁶¹ energy efficiency was also included. The Tenth Malaysia Plan (2011-2015)⁶² set further goals for renewable energy development in Malaysia, introducing the New Energy

Policy - on energy pricing, strategic supply developments, end use energy efficiency, energy governance and regulation as well as management of change and affordability.⁶³

The eleventh Malaysia Plan 2016-2020⁶⁴ further indicated green growth as one of the strategic thrusts enabling Malaysia to stay ahead of environmental challenges and build a sustainably developed economy.

The twelfth Malaysia Plan will run from 2021-2025 and while there has been a delay in its release, Environmental Sustainability will be a key pillar with a focus on climate mitigation and adaptation as well as green technology, sustainable production and consumption.⁶⁵

In addition to the Malaysia Plans, other key policy developments have included:

The National Renewable Energy Policy and Action Plan (2010) set out the vision of enhancing renewable energy resources to contribute towards national energy supply security and sustainable socio-economic development.

The Renewable Energy Act came into effect in 2011, and a feed-in-tariff (FiT) mechanism was introduced, benefiting renewable energy developers and expediting growth in the renewable energy sector.⁶⁶

National Policy on the Environment (NPE)⁶⁷ was launched in 2002 in recognition of the importance of integrating environmental issues into the overall framework of development. The policy seeks to promote economic, social and cultural development in harmony with environmental protection and enhancement.

In 2009, the National Policy on Climate Change⁶⁸ was introduced in an effort to develop specific national policies for strategies on climate change in Malaysia and respond to the United Nations Framework Convention on Climate Change (UNFCCC). In this policy, the Malaysian Government emphasizes sustainable development and the conservation of the environment and natural resources, ensuring that climate-resilient development fulfils national aspirations for sustainability.

The National Green Technology Policy⁶⁹

was also introduced in 2009 to accelerate the national economy and promote sustainable development. The policy has five main strategic thrusts to encourage green technology application and expansion to most sectors, in which four primary pillars are renewable energy, environment, economy and social perspective.⁷⁰

The Green Investment Tax Allowances (GITA) and Green Income Tax Exemption (GITE)

are two incentive schemes that were introduced in 2014 to strengthen the development of green technology. Companies that acquire green technology assets, undertake green technology projects and green technology service providers are eligible to apply for the incentives. Several GHG mitigation related projects and services have been approved under both GITA and GITE, most of which are renewable energy and energy efficiency projects.

The evolution of these national policies shows the commitment from the government towards a successful transition to a more sustainable and low carbon economy.

“Malaysian intermediaries, over the years, have been developing Shariah-compliant financial solutions that provide investors the choice of climate-friendly investments that allow them to participate in initiatives to green the economy and combat climate change. The Securities Commission Malaysia is committed to facilitate and enable the collective efforts of market participants who are investing in a low carbon future and will continuously strive to enhance our policy framework for sustainable finance.”

Syed Zaid Albar, Chairman, Securities Commission Malaysia

Malaysia's climate goals

As part of its NDCs under the Paris Agreement, Malaysia has defined the following mitigation targets/ GHG reduction targets:

- **35% reduction by 2030**, compared to the business-as-usual scenario of 2001-2030
- **45% reduction by 2030**, with the receipt of climate finance, technology transfer and capacity building from developed countries.

Sustainable Finance policies

2011-2020

Capital Market Masterplan 2 (CMP2) Securities Commission Malaysia

To create an advantageous environment to amplify the role of the private sector and the financing of entrepreneurial economic activities that are crucial to the future of the Malaysian economy.

CMP2 outlines key strategies to foster a more innovative intermediation environment through the growth and governance of Malaysia's capital markets. It positions the capital markets to play a critical role in financing sustainable development needs.

2014

Sustainable and Responsible Investment (SRI) Sukuk Framework Securities Commission Malaysia

SRI Sukuk Framework features guidelines and standards on issuances of green, social and sustainable sukuk to facilitate an ecosystem that promotes sustainable and responsible investing for SRI investors and issuers.

As of November 2020, 17 SRI Sukuk have been issued in Malaysia amounting to MYR5.38bn

2016

Sustainability Reporting Bursa Malaysia

All companies listed on Bursa Malaysia under the main market and ACE market are required to issue a Sustainability Statement in respect of the company's management of economic, environmental and social risks and opportunities in their annual report.

A Sustainability Reporting Guide has also been published by Bursa Malaysia to assist the companies in preparation of their report.

2017

Value-Based Intermediation (VBI) Bank Negara Malaysia

VBI serves as an intermediation function for Islamic banking institutions with the purpose of delivering positive and sustainable impact to the economy, community and environment through the intended outcomes of Shariah practices, conduct and offerings, while being consistent with the shareholders' returns and long-term interests.

Islamic banks are required to premise their intent, strategy and performance on the underlying thrust of VBI which include best conduct, good self-governance, entrepreneurial mindset and community empowerment.

2017

Islamic Fund and Wealth Management Blueprint (IFWMB) Securities Commission Malaysia

The IFWMB is a 5-year blueprint to plan the medium and long-term strategic direction for Malaysia's Islamic fund and wealth management industry.

With a vision of establishing Malaysia as a leading international centre for Islamic fund and wealth management, the key thrusts are (1) to strengthen Malaysia's positioning as a global hub for Islamic funds, (2) establish Malaysia as a regional centre for shariah-compliant sustainable and responsible investment and (3) develop Malaysia as an international provider of Islamic wealth management services

2019-2025

Sustainable and Responsible Investment (SRI Roadmap) Securities Commission Malaysia

To create a facilitative SRI ecosystem and map the role of the capital markets in driving Malaysia's sustainable development

5 Key focus areas include:

- Widening the range of SRI instruments
- Increasing SRI investor base
- Building a strong SRI issuer base
- Instilling strong internal governance culture
- Designing information architecture in the SRI ecosystem

4. Malaysia green finance trends and opportunities

Global demand for green investments

is growing with strong momentum and significant growth potential. Green labelled products have become globally recognised as an effective means of directing investment capital towards climate change mitigation and climate change resilience and adaptation projects, including green infrastructure. The growing level of interest from investors in green projects has resulted in the development and growth of innovative financial products including green, social and sustainability bonds and loans; and green index products.

Green bonds are currently the most developed segment of thematic instruments, carrying greater recognition from the investor base. Globally, the volume of green bond and loan issuance has risen sharply from USD171bn in 2018 to USD269.5bn in 2020, buoyed by strong interest from both investors and issuers.⁷¹ Cumulative issuance of green bonds to date has now reached USD1tn, but there is still a long way to go. To finance the goals of the Paris Agreement, it is estimated that green bond issuance needs to reach USD1tn per annum by the early 2020s. For emerging markets in particular, there is a large gap between green infrastructure requirements and the size of green bond markets.

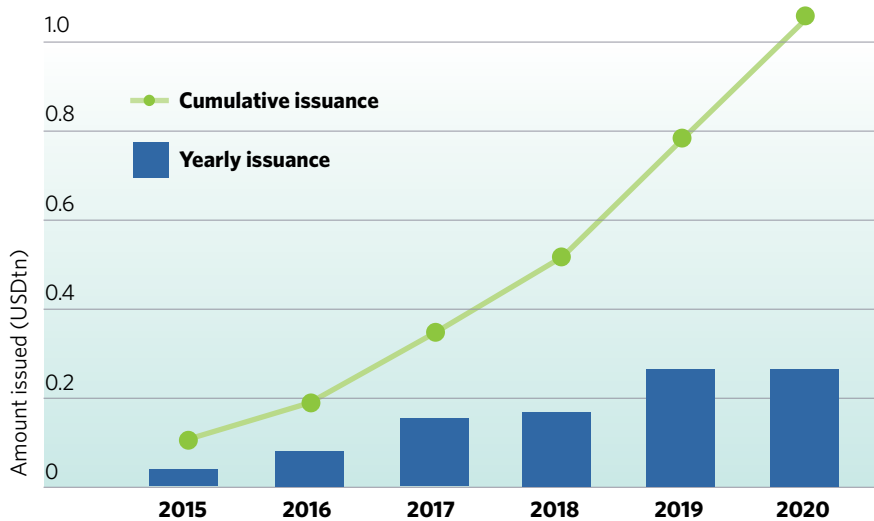
Both Malaysia and the ASEAN region mirror the upward trend where, supported by new regulation, ASEAN issuance has grown both within Malaysia and across the region.

ASEAN is increasingly appealing to investors with several foreign entities, including development banks as well as foreign commercial banks, issuing green bonds denominated in local ASEAN currencies demonstrating interest in these domestic markets. Other green bond issuers such as BNP Paribas, Société Générale, Bank of America and NAB have issued vanilla bonds in at least one of the local ASEAN currencies. Issuance in local currency allows foreign issuers to tap domestic investors for capital. Interest in ASEAN markets continues to grow.

“In recent years there has been significantly more engagement from institutional investors for integrating ESG in their investment process [in ASEAN] and the wealth management industry is now following.”

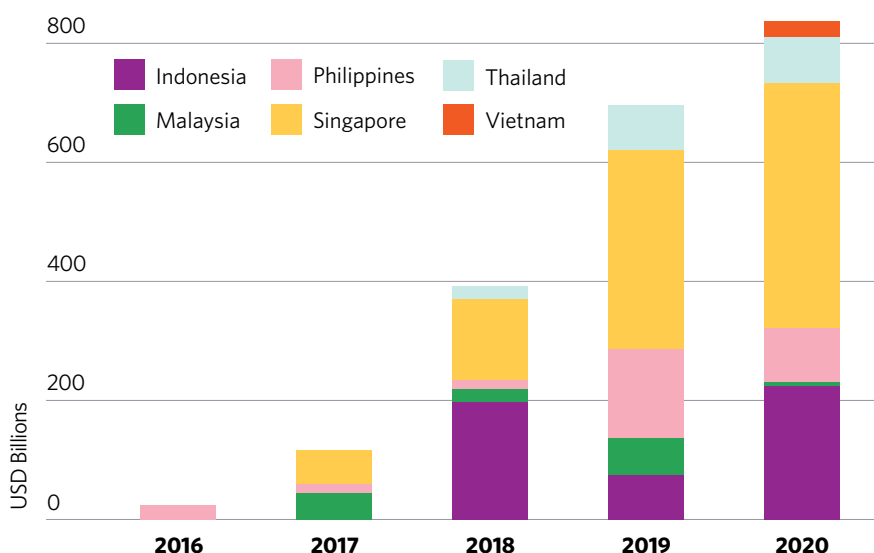
Valentin Laiseca, MSCI's Head of ASEAN Index Sales⁷²

Global green bond and sukuk issuance 2015-2020



© Climate Bonds Initiative 2021

ASEAN green bond and sukuk issuance is growing



ASEAN Green Bond Standards

One of the key drivers of regional growth is the ASEAN Green Bond Standards. The ASEAN Green Bond Standards are based on the ICMA Green Bond Principles and seek to enhance transparency, consistency and uniformity to help reduce issuance and investment costs. Key elements of the standards include:

- The issuer or issuance of the green bond must have a geographical or economic connection to the region;
- Fossil fuel power generation projects are explicitly excluded;
- Information on the process for project selection and on the use of proceeds allocation, as well as the external review

report, must be made publicly available on a designated website;

- Recommendation to obtain an external review for the green bond framework, and is particularly recommended for the management of proceeds and annual reports; and
- Recommendation for the external review providers to disclose their relevant credentials and expertise and the scope of the review conducted.

For more information on the ASEAN green bond market, please see the Climate Bonds' report: ASEAN Green Finance State of the Market 2019.

“As ASEAN grows and steadily fulfils its economic potential, opportunities exist across a wide range of industries. For example, ASEAN has over USD2tn worth of infrastructure investment opportunities – not just traditional ports, roads, and bridges, but support in ICT, education, agriculture, and healthcare.”

Alexander Feldman, *President & CEO, US-ASEAN Business Council*⁷³

“We have some very long-term horizons. If you’re a long-term investor, you can focus on specific areas, like Southeast Asia funds... [where] there is a source of growth.”

Ted Lee, *Senior Portfolio Manager of Canadian Pension Plan Investment Board*⁷⁴

“European industry still overwhelmingly sees ASEAN as an attractive region for growth and investment, as our 2017 Business Sentiment Survey showed. But that survey also showed a strong call for more progress on government initiatives to reach trade agreements, reduce barriers to trade, and realise the vision of the ASEAN Economic Community.”

Donald Kanak, *Chairman, EU-ASEAN Business Council*⁷⁵

Climate Bonds Green Bond European Investor Survey shows interest in investment in emerging markets

Outstanding emerging markets (EM) green bonds, as of end 2020, amounted to over USD204bn, or around 20% of the green bond market. Meanwhile, EMs currently account for 63% of global GHG emissions.⁷⁶ It is thus critical to determine how investors can support the expansion of EM green bonds.

Respondents of CBI’s *Green Bond European Investor Survey* were asked to describe their appetite for EM green bonds and to outline what they could be receptive to buying. Most respondents (82%) can buy EM debt. Exposure limits at country and issuer level tended to apply more to respondents that have a greater degree of integration of green bonds. However, the most common restrictions are credit rating (69%), currency (65%) and deal size (58%).

As most respondents can and would like to buy EM green bonds, EM issuers must consider how these requirements can be reconciled. Respondents expressed that they would like to increase their holdings in EM sovereigns. Countries such as Indonesia (3 bonds in USD), Seychelles (USD) and Lithuania (EUR) have issued green bonds that were met with a positive reception from investors.

Three-quarters of respondents able to buy EM green bonds treat EMs differently from developed markets, stating that they require more evidence of integrity to invest in green bonds from EMs. So, respondents were also asked to rank factors that could make investing in EM green bonds more attractive and bring scale to the



market. Credit enhancements available from multilaterals and/or public sector entities was the most frequently selected option, with more than half considering it important or very important.

When respondents were then asked which features would give them more confidence to invest in EM green bonds, they listed the following:

- 1. Transparency:** e.g. adherence to GBP, reporting Use of Proceeds (65%),
- 2. Reliability:** e.g. external reviews (SPO, audit, certification, etc) (48%),
- 3. Risk:** e.g. insurance/CDS/guarantees, size of issuance, currency (25%).

More information on this topic can be found in the *Green Bond European Investor Survey*, on the CBI website.

Malaysia's green bond and sukuk market

Market overview

Malaysia is already a leader in green finance. There have already been several landmark deals out of Malaysia, including the world's first green sukuk, issued June 2017, by Tadau Energy Sdn Bhd.

The Securities Commission Malaysia (SC) led the way by issuing its **Sustainable and Responsible Investment (SRI) Sukuk Framework** in 2014 which features guidelines and standards on issuances of green, social and sustainable sukuk, followed by the **SRI Roadmap** for the Malaysian Capital Market^{77,78}, which introduced a strategy for developing the market for SRI investments.

In 2018, Malaysia showed global leadership by establishing the **Green SRI Sukuk Grant Scheme** – one of the first global examples of incentive structures to support green bond issuance. It provides tax exemption benefits for green sukuk issuers. In January 2021, this Grant Scheme was renamed the **SRI Sukuk and Bond Grant Scheme** and made applicable to all sukuk issued under the SC's Sustainable and Responsible Investment (SRI) Sukuk Framework or bonds issued under the ASEAN Green, Social and Sustainability Bond Standards (ASEAN Standards). The Securities Commission and Bank Negara Malaysia, in the newly-formed Joint Committee on Climate Change (JC3), are discussing the development of a taxonomy for Malaysia. In a Discussion Paper,⁷⁹ Bank Negara Malaysia launched a public consultation on the impact of climate change on the financial system. By requiring financial institutions to report data on their climate exposure, this new taxonomy will support the issuance of green bonds and the purchase of green bonds issued in the Malaysian market by financial institutions.

So far Malaysia has been exploring green debt as well as equity instruments, supported by credit enhancement mechanisms and other risk-sharing approaches. This includes green bonds, green sukuk, green loans, green funds for green infrastructure and renewable energy projects, and credit guarantees for green projects. Green bonds and green sukuk remain the most dominant of these green instruments and tools.

Malaysian green bond and sukuk market analysis

A total of 14 green bond and sukuk deals have been issued by Malaysian entities⁸⁰ with six occurring in 2019 and two in 2020. There has been only one repeat issuer to date – Permodalan Nasional Berhad has come to market three times.

A green sukuk was issued by Pasukhas Group Bhd for MYR17m (USD3.9m) (out of a facility size of MYR200m) with a 20-year term, with proceeds allocated to a hydropower plant. The sukuk is guaranteed by Danajamin Nasional, the financial guarantor co-owned by Bank Negara Malaysia and the Ministry of Finance. An SPO and green rating were provided by RAM.

Another 2019 issuer was **Telekosang Hydro One Sdn Bhd** with a MYR120m (USD42m) 20-year green junior bond and a MYR470m (USD166m) 18-year green sukuk, both allocated to a 24MW “run-of-river mini-hydro” plant, the first of its kind. RAM also provided a green rating of Telekosang's Green Sukuk Framework.

Two new deals came to market in October 2019. **Edra Solar Sdn Bhd** issued an 8-tranche MYR245m (USD58m) Sustainability SRI sukuk, with maturities ranging from one to 18 years. While it will primarily refinance the Kuala Ketil solar farm, part of the proceeds will fund the cultivation of pineapples and other crops by the surrounding local community. Given its social angle, this is the country's first bond aligned with the requirements of the Securities Commission Malaysia's Sustainable and Responsible Investments (SRI) Sukuk Framework, the ASEAN Green Bond Standards, the ASEAN Social Bond Standards and the globally recognised GBP, SBP and Sustainability Bond Guidelines. It is also the first to carry three different types of rating from RAM: financial, green (Tier-1 GB) and social (Tier-3 SB).

Cypark Red Sdn Bhd issued MYR550m (USD131m) under an SRI Sukuk Murabahah programme, also in October. The deal, which has 19 tranches with terms varying between three and 21 years, will finance three solar PV plants (with 30- MWAC capacity) in Malaysia.

Finally, **PNB Merdeka Ventures** became Malaysia's first repeat issuer with a total of 3 deals issued in 2017 and 2019 amounting to USD382m. They are part of its programme to finance the Merdeka PNB118 Tower.

Among outstanding bonds, energy (49%) and buildings (48%) represent almost all the allocations. The remaining 3% are spread across Water, Waste, Land use and Adaptation funded predominantly by the Pasukhas deal. The largest issuer in the buildings sector is Permodalan Nasional Berhad (PNB Merdeka Ventures), while the largest related to energy is Quantum Solar Park (Semenanjung Sdn Bhd).

All green bond and sukuk deals have been issued in domestic currency, ranging in USD-equivalent size from about USD50m to USD500m, and tending towards longer terms. This demonstrates that the Malaysian bond market is sufficiently mature to support the development of a local green bond market. It is also a potential hub for green Islamic transactions, with 75% of outstanding green bonds offered in sukuk format.

“Malaysia has earned the recognition as the pioneer in driving the Green SRI Sukuk agenda since 2014. The Green SRI Sukuk stands out because of its strength in investor engagement which requires the issuers to conduct robust and responsible reporting. We felt it was inevitable for Telekosang Hydro to make use of this platform, not only as promoters of sustainable developments for future generations, but also to attract international investors that embrace sustainability. As Malaysians, we are proud that Telekosang Hydro has been given the highest recognition as the World's First Green SRI Sukuk for Mini Hydro.”

Beroz Nikmal bin Mirdin, CEO of Telekosang Hydro One Sdn Bhd

Malaysian green bond and sukuk issuance

Issuer name	Bond/Sukuk	Amount issued*	Issue date	Issuer type	Use of proceeds
Solar Management (Seremban) Sdn Bhd	Sukuk	MYR260m (USD64.4m)	Sept-20	Non-financial corporate	Energy
Leader Energy Sdn Bhd	Sukuk	MYR260m (USD61m)	Jul-20	Non-financial corporate	Energy
PNB Merdeka Ventures Sdn Bhd	Sukuk	MYR435m (USD105m)	Dec-19	Government-backed entity	Buildings
Cypark Ref Sdn Bhd	Sukuk	MYR550m (USD131m)	Oct-19	Non-financial corporate	Energy
Edra Solar Sdn Bhd	Sukuk	MYR245m (USD58m)	Oct-19	Non-financial corporate	Energy, Land use
Telekosang Hydro One Sdn Bhd	Bond and Sukuk	MYR590m (USD208m)	Aug-19	Non-financial corporate	Energy
PNB Merdeka Ventures Sdn Bhd	Sukuk	MYR445m (USD108m)	Jun-19	Government-backed entity	Buildings
Pasukhas Green Assets Sdn Bhd	Sukuk	Issue size: MYR17m (USD3.9m) Facility size: MYR200m	Feb-19	Non-financial corporate	Energy, Buildings, Water, Waste, Land use, Unallocated A&R
UiTM Solar Power Sdn Bhd	Sukuk	MYR222m (USD57m)	Apr-18	Government-backed entity	Energy
Sinar Kamiri (Mudajaya Group Berhad)	Sukuk	MYR245m (USD63m)	Jan-18	Financial corporate	Energy
SEGI Astana Sdn Bhd	Bond	MYR415m (USD104m)	Jan-18	Non-financial corporate	Buildings
PNB Merdeka Ventures Sdn Bhd	Sukuk	MYR690m (USD170m)	Dec-17	Government-backed entity	Buildings
Quantum Solar Park (Semenanjung) Sdn Bhd	Sukuk	MYR1,000m (USD236m)	Oct-17	Non-financial corporate	Energy
Tadau Energy Sdn Bhd	Sukuk	MYR250m (USD58m)	Jul-17	Non-financial corporate	Energy

(Source: CBI database), *Note currency conversion rates are taken on date of issue

Malaysian social and sustainability bonds

Issuer	Amount*	Issuer date	Type, UoP
Khazanah Nasional Berhad	MYR 100m (USD 28m)	(April 2015)	Social, education
HSBC Amanah Malaysia	MYR500m (USD121m)	(October 2018)	Sustainability
CIMB Bank Berhad	USD680m	(October 2019)	Sustainability
Edra Solar Sdn Bhd	MYR30m (USD7m)	(October 2019)	Sustainability
Government of Malaysia, Sukuk Prihatin	Up to MYR500m (USD124.3m)	September 2020	Social, COVID response
Cagamas (National Mortgage Corporation of Malaysia)	MYR100m (USD24.8m)	October 2020	Social, Affordable housing ⁸¹

(Source: CBI database)

Green Technology Financing Scheme (GTFS) and Financial Institutions' participation

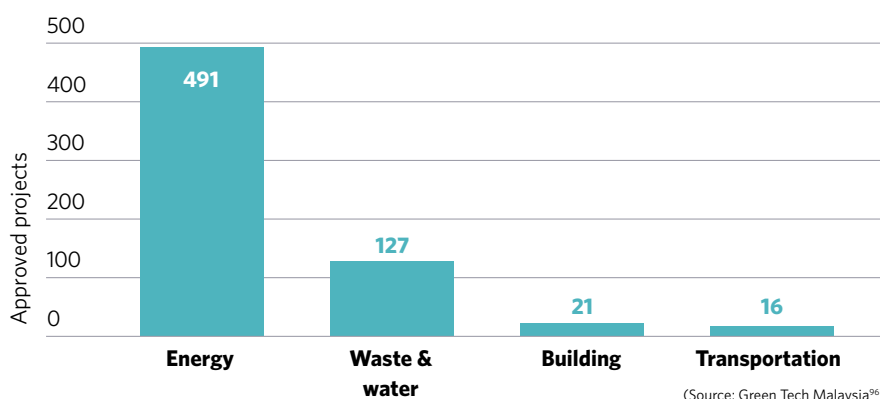
The Green Technology Financing Scheme (GTFS) was initially launched in 2010 by the Government with a total target financing approval of MYR3.5bn to support the development of green technology in Malaysia.⁸² In March 2019, the Ministry of Finance approved an extension of GTFS, known as GTFS 2.0 with an allocation of MYR2bn until 2020.⁸³ The scheme aimed to promote green investments in eligible sectors such as energy, water, building and township, transport, waste and manufacturing by providing easier access to financing and at lower financing costs.⁸⁴ GTFS provides green investors with a 2% rebate on interest/profit rate charged by financial institutions and a 60% Government Guarantee on financing provided by financial institutions.⁸⁵ Credit Guarantee Corporation Malaysia Berhad (CGC) also provides a guarantee of 60% on the approved financing amount. Upon guarantee approval, CGC will issue a Letter of Guarantee (LG). A guarantee fee of 0.5% per annum on the total guarantee amount will be charged to the borrower.⁸⁶

Since its introduction, GTFS has benefited a number of green projects. In 2010, only 13 projects were granted soft loans amounting to MYR164.3m⁸⁷ By 2017, these figures had risen to 319 projects and MYR3.638bn to be allocated with significant social and environmental impacts.⁸⁸ About 5,000 green jobs were created and 3,784 million tons of CO₂ has been saved each year.⁸⁹ The GTFS 2.0 has granted soft loans to additional 336 green technology producers and users with MYR1m to be drawn down.⁹⁰ The latest version, GTFS 3.0 has a fund size of MYR2bn (USD500m) for 2 years until 2022 with a guarantee by Danjamin Nasional to encourage issuances of SRI sukuk. It is expected to generate MYR4bn in revenue from green investments and create 2,500 job opportunities for the country.^{91,92}

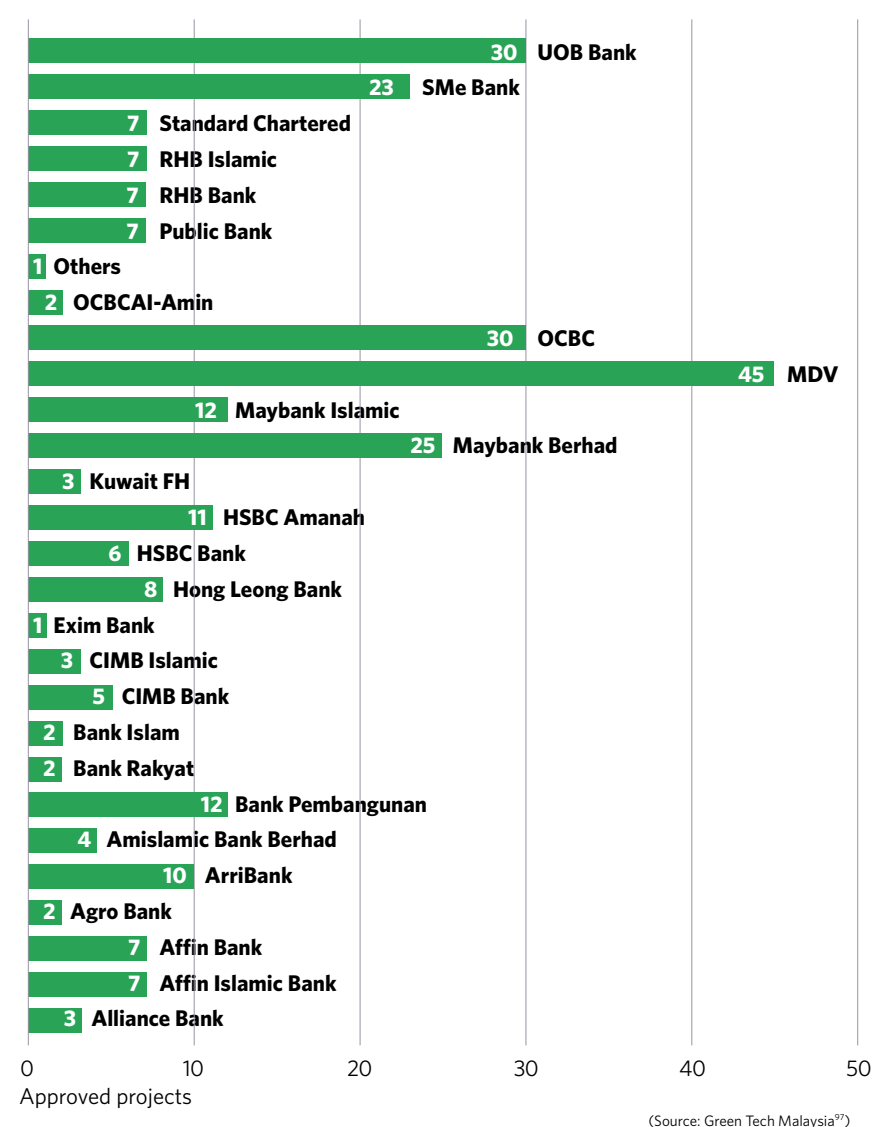
The GTFS has resulted in the participation of 28 banks and financial institutions with approximately USD875m in loans as of July 2018.⁹³ Of all projects financed, about 53% came from conventional finance, with the rest funded by Islamic sources.⁹⁴

The GTFS is a unique example of how governments can support the growth of green projects using tools like guarantees and incentives. We note here, however, that

GTFS performance by sector, 2010-2020



GTFS Projects financed



the full methodology for project selection is not available and while it appears broadly aligned with the Climate Bonds Taxonomy and Climate Bonds Standard, there may be some areas where they are not in alignment. Within energy, for example, biofuels remain contentious. Under the Climate Bonds Bioenergy sector criteria, they may

be eligible but require that the feedstock is sourced sustainably and that it has an 80% emission reduction compared to a fossil fuel baseline⁹⁵. Biofuels are included under the GTFS but a full assessment of the alignment between GTFS criteria and the Climate Bonds sector criteria has not yet been undertaken.

Financing credible transitions in Malaysia

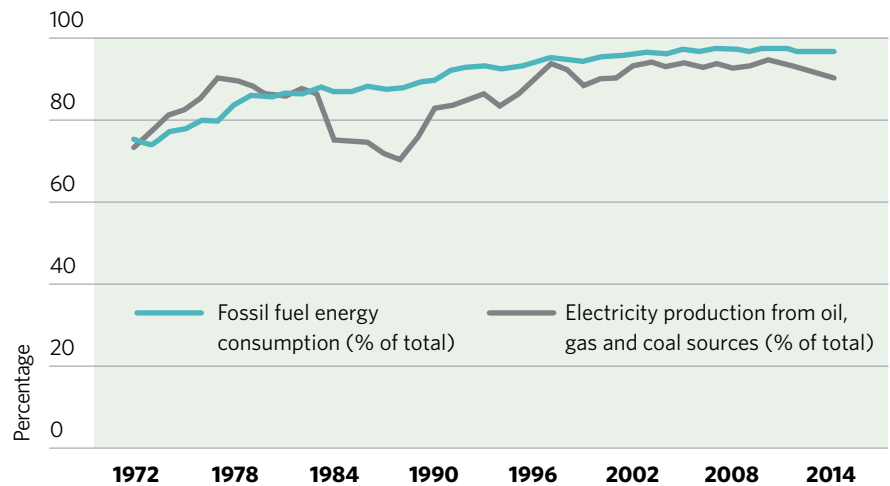
The Climate Bonds Initiative has been active in promoting the creation of credible transition strategies in GHG-emissions intensive industries around the world. The concept of transition reflects the fact that, in the short- to medium-term, large companies in many sectors will inevitably straddle both brown and green assets, progressively reducing exposure to brown assets and practices as they increase capex towards, and adoption of, greener modes of operation. It also embodies a recognition that, both globally and locally, the expectation of institutional investors is that progress towards low or zero-carbon business models, is increasingly indicative of sound corporate performance, hedging of climate risks and long-term value accretion.

Global green investment opportunities are growing and yet large GHG emitters are still largely absent from the market. GHG-intensive segments of the real economy - such as cement and concrete, mining and metals, oil and gas transport and manufacturing - offer significant emissions reductions potential -but are not yet following a transition pathway towards zero carbon by 2050. When such industry sectors start to align with a 1.5-degree emissions trajectory, new green financing opportunities could be created for assets and projects with ambitious climate targets and an increased focus on low carbon production modes.

A credible transition strategy requires organisations to commit to strategic change, undertaking tangible and verifiably climate relevant measures that relate to companies' core business activities. They will need more than broad statements of strategy or intent to disclosure climate risk as envisioned by compliance with the Task Force on Climate-related Financial Disclosures (TCFD). They will need a visible reflection of green investment on balance sheets, in capex plans and borrowing programs.

Transition bonds are a highly visible means to support this transition from brown to green. Even a small initial share of green capital expenditure could be a credible indicator of more to come, if it is combined with a re-orientation and acknowledgment to investors that achieving low carbon targets and then zero-carbon operating models are inevitable business destinations between now and 2050, backed up by green spending and capex plans. Transitioning to a green, climate resilient economy is paramount to ensure that the region can reduce its GHG emissions, better hedge against climate change risks and thrive in the long-run.

Fossil fuel consumption in Malaysia



Malaysia's economic growth is connected with the availability and supply of fossil fuel resources.⁹⁸ Fossil fuel energy consumption (% of total) in Malaysia increased from about 75% in 1972 to a peak of 96.63% in 2014. This is because industrial and transportation sectors in Malaysia have remained heavily dependent on oil and natural gas.⁹⁹ In addition, as a result of rapid industrialization and urbanization, the demand for energy is on the rise, which contributes to increasing consumption and exploitation of fossil fuels since a

large share of energy supply comes from these sources.¹⁰⁰ Specifically, in Malaysia, more than 80% of electricity production is generated from oil, gas and coal.

The dependence on fossil fuel is believed to put Malaysia under the threat of energy insecurity and environmental degradation due to the short life expectancy of Malaysia's fossil fuel reserves and high CO₂ emissions. Thus, the Malaysian government has taken steps to decrease the reliance on fossil fuels and green the economy.

Malaysia's policy framework has evolved from a sole focus on fossil fuel supply in the 1970s to a diversification of supply sources, including renewable energy, since 2001.¹⁰¹ Central to Malaysia's transition strategy are policies to foster green technology development in the country. In 2009, the country announced its newly developed policy framework called the New Economic Model (NEM) with three-pronged goals, including inclusiveness, high income and sustainability.¹⁰² Green Technology is earmarked as an important driver for the twin goals of high income and sustainability. Later, the National Transport Policy 2019-2030 also accelerates the implementation of low carbon mobility incentives by prioritizing public transport development and adopting green technology and cleaner fuels such as biodiesel and electricity vehicles (EVs).¹⁰³

“Maybank Investment Bank plays an important intermediary role in bridging the financing gap between issuers and investors, in line with our aspiration to build a more sustainable and inclusive ASEAN.

Recently, we are seeing significant interest and greater level of awareness from investors and relevant stakeholders on matters relating to ESG.”

Fad'I Mohamed, CEO of Maybank Investment Bank Bhd

Examples of Malaysia's policy instruments on green economy

Year	Policy instrument	Functions of policy instruments
2009	National Green Technology Policy ¹⁰⁴	The policy emphasizes the central role of green technology in Malaysia's green development, overseeing greening in four sectors, including energy, buildings, water and waste management and transportation.
2009	Green Building Index ¹⁰⁵	The index helps to enable green grading and certification of Malaysian buildings.
2010	National Renewable Energy Policy and Action Plan ¹⁰⁶	The policy aims to enhance the utilisation of indigenous renewable energy resources to contribute towards national electricity supply security and sustainable socio-economic development
2010	Green Technology Financing Scheme ¹⁰⁷	The scheme was launched to create a policy environment that would attract innovators and users of green technology
2011	Renewable Energy Act ¹⁰⁸	The Feed-in Tariff is being implemented for biogas, biomass, mini hydro, solar PV and geothermal
2011	Low Carbon Cities Framework (LCCF) ¹⁰⁹	The framework looks at addressing carbon emissions in 4 main areas: urban environment, urban infrastructure, urban transportation and buildings
2013 2019	Minimum Energy Performance Standards (MEPS) ¹¹⁰	The standards specify the minimum level of energy performance that appliances, lighting and electrical equipment (products) must meet or exceed before they can be offered for sale or used for commercial purposes
	National Transport Policy 2019-2030 ¹¹¹	The policy has set forth targets and strategies for enhancing the country's economic competitiveness, while reducing negative impact of the transport sector on the environment

(Source: Adopted from Hezri and Ghazali (2011) and authors' compilation)

The role of Development Finance Institutions (DFIs)

DFIs have a mandate to support developing countries and can achieve this through blended finance and credit enhancement mechanisms, reducing risk exposure and enhancing market incentives for investors to mobilize private capital. This is particularly relevant for large-scale projects such as infrastructure development, where the blended finance approach can generate more bankable project pipelines by providing technical support and facilitating access to funding.

DFIs can act as market facilitators, which is beneficial to increasing liquidity and issuance in local economies. For example, the IFC issued a green bond in June 2018 in Philippine peso (a Mabuhay bond) and one in Indonesian rupiah (a Komodo bond) in October 2018. Through deals like these, DFIs can support “market creation” by participating in first-time issuances and helping new issuers get their names out to investors. Effectively, this establishes pricing points, the idea being that issuers return to market publicly. So, the deals also act as demonstration issuance to spur market growth and can showcase how climate solutions can be funded with green bonds.

DFIs in ASEAN, such as the International Finance Corporation (IFC), Asian Development Bank (ADB), Asian Infrastructure Investment Bank (AIIB) and the World Bank, can also subscribe to private placements or be anchor investors in debt issuance and IPOs to help the company

seeking funding to build investor confidence and catalyse investments from a wider pool of private actors. So, they provide direct green financing, as anchor investors in debt issuance or in IPOs, DFIs can leverage their support to attract other investors.

They can help a company seeking funding to build investor confidence and catalyse investments from a wider pool of private actors (both international and domestic). For example, in early 2019, the ADB and other development financiers launched the “ASEAN Catalytic Green Finance Facility”, an initiative to mobilize USD1bn for green infrastructure in Southeast Asia.¹¹²

The facility will provide loans and technical assistance for sovereign green infrastructure projects such as sustainable transport, clean energy, and resilient water systems, which aims to catalyse private capital by mitigating risks through innovative finance structures.¹¹³

The Asian Development Bank is active in Malaysia with recent support mostly in the form of technical assistance to several states to help develop green cities and energy sector.¹¹⁴ The ADB interventions in the Malaysian energy sector have included the development of hydropower, transmission links and renewable energy. One example is the Sarawak – Kalimantan Power Interconnection is a USD161m joint venture which included USD45m funding from ADB.^{115,116}

ADB also played a role in developing and implementing the Green City Action Plan¹¹⁷ for integrated urban management in Malaysia by providing a technical assistance grant¹¹⁸ and help to implement the plan. This included structuring bankable projects for solar energy and street lighting, setting up a database to track indicators in environment and economic growth, and conducting training in urban development, environment planning, and knowledge sharing.¹¹⁹

ASEAN Catalytic Green Finance Facility (ACGF) is a newly introduced initiative to spur more than USD1bn in green infrastructure investments across Southeast Asia.¹²⁰ Launched in April 2019, the new facility provides loans and necessary technical assistance for green infrastructure projects which actively contribute to environmental sustainability and climate goals. These projects include, but are not limited to, renewable energy, energy efficiency, sustainable transport systems, green cities, and sustainable water supply and sanitation.¹²¹ The new facility is co-funded by ADB, ASEAN Infrastructure Fund, AFD, European Investment Bank, European Union, KfW and the Republic of Korea. As of February 2020, the ACGF's co-financing partners have committed USD1.42bn for sovereign loans and USD13.1m for technical assistance.¹²² This would be a great source of financing for future green projects in Malaysia.

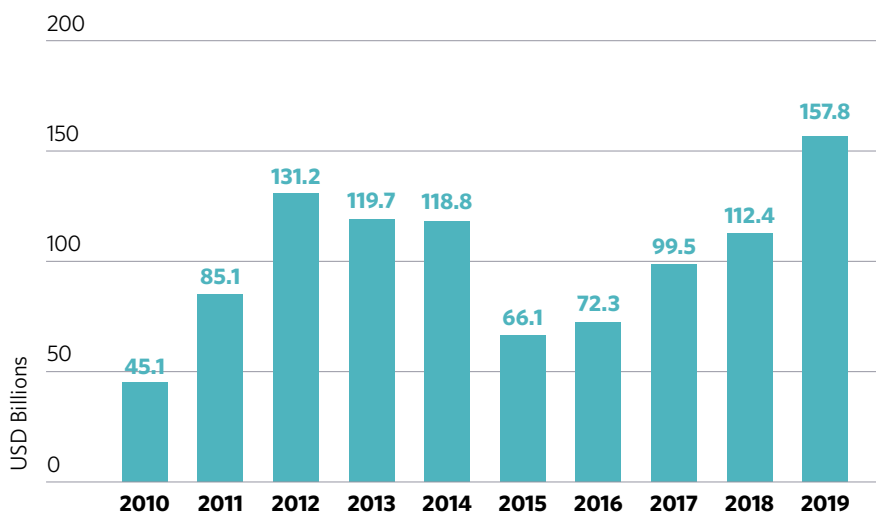
5. Deep Dive: Green sukuk opportunities

The global Sukuk market is seeing rapid growth with the market reaching USD157bn in 2019 and Malaysia leading the way accounting for 48% of the market.^{123,124}

“As a global leader in the Islamic Capital Market (ICM) and driven by the commonalities between ICM and sustainable finance, Securities Commission Malaysia (SC) focused on developing regulatory frameworks to provide a natural broadening for Malaysia to pursue the Sustainable and Responsible Investment (SRI) agenda”

Sharifatul Hanizah Said Ali,
Executive Director of Islamic Capital Market Development of the Securities Commission Malaysia

Global sukuk issuances 2010-2019)



Source: MIFC estimates

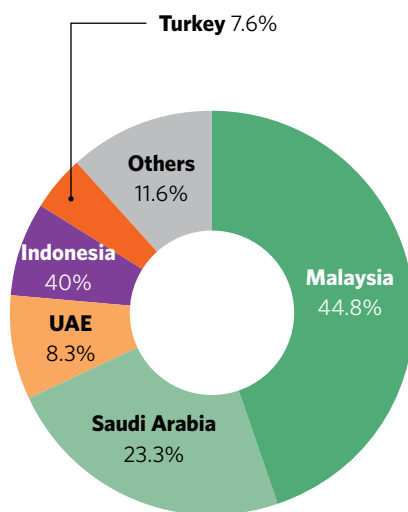
A sukuk is an interest-free bond that generates returns to investors without infringing upon the principles of Islamic law (Shariah). They are backed by a specific pool of assets and the purchaser receives a certificate giving partial ownership in the underlying nominated assets or earnings from those assets. There is a growing demand in the Middle and Far East for Shari’ah-compliant or Islamic bonds, but a shortage of product. An estimated 25-40% of institutional investors’ assets under management are dedicated to fixed-income debt, including asset-backed securities.

Green Sukuk are Shari’ah compliant investments in renewable energy and other environmental assets that meet the Green Bond Principles, Climate Bonds Taxonomy or other global or regional definitions of green.

The emergence of green Islamic finance as a special segment of the green bond market is a promising development for attracting new interest from investors investing according to Shariah principles. The green feature fits well with the underlying principles of sukuk given that both green bonds and sukuk instruments raise funds for a specific purpose, and both have environmental, ethical and social principles aims at their core. Shariah principles include “environmental stewardship”, such as the protection of air, water and land, as well as other ecosystems.

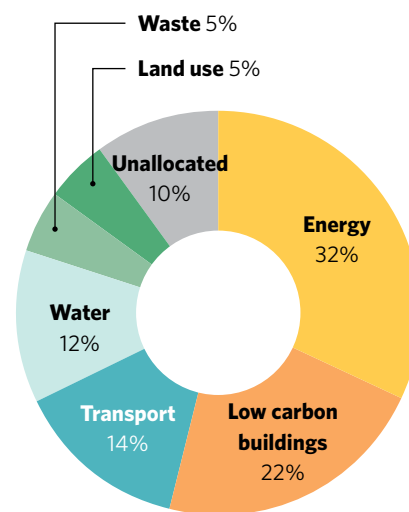
An advantage of green sukuk is that it has the potential to attract both green investors and those with Shariah-compliant mandates. The market has the potential to channel the USD2tn Islamic finance market towards the funding of green and sustainable projects.¹²⁵

Global sukuk outstanding by domicile as at end-Sept 2020



Source: MIFC estimates

Global green sukuk: Use of Proceeds



Source: MIFC estimates

The world’s first green sukuk was issued in July 2017 by Tadau Energy for MYR250m (USD62m) to finance solar projects in Malaysia.¹²⁶ Since then, global issuance has reached USD8.8bn from 16 different issuers. While Malaysian issuers account for only 15% of deals by value, it is by far the most diverse market with 13 deals from 11 different issuers (out of a global total of 23 deals and 16 issuers). Other countries have larger deal sizes but much less diverse and active markets – e.g. Indonesia has one issuer (Republic of Indonesia) while UAE has two.

To date, the green sukuk market has primarily focused on financing projects relating to renewable energy, low carbon buildings and low carbon transport. This is broadly in line with the global green bond market although there are some small differences – transport, for example accounts for 20% of global green bond market spending while they account for 14% of the green sukuk market.

Green Sukuk in Malaysia

Malaysia is already one of the region's most proactive countries in promoting the growth of the green finance market including green sukuk. This includes:

- Guidelines for green sukuk - the Sustainable and Responsible Investment Sukuk Framework introduced by the Securities Commission Malaysia.
- Tax deduction of issuance costs for issuers and tax exemptions for investors for socially responsible sukuk and green sukuk. These were initially put in place in 2017 to last until 2020 and has since been extended to 2023
- SRI Sukuk and Bond Grant Scheme exists to cover the cost of external reviews up to a maximum of MYR300,000 (USD74,500) per issuance.
- Financing incentives under the Green Technology Financing Scheme (GTFS) with total funds allocation of MYR5bn (USD1.2bn) until 2022¹²⁷

Examples of issuers include:

Tadau Energy issued the world's first green sukuk in July 2017. The 16-year MYR250m (USD62m) deal was issued to finance solar power assets.

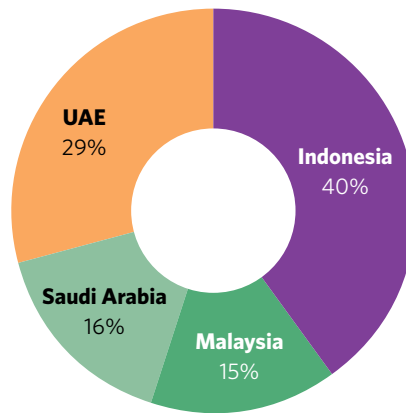
Permodalan Nasional Berhad, a Malaysian state-backed investment entity, issued the first green sukuk with proceeds solely to property financing in 2017. The proceeds financed the Merdeka PNB118 Tower, which aims to secure LEED certification.¹²⁸

UiTM Solar Power Sdn Bhd issued a MYR222m (USD55.9m) green SRI sukuk in April 2018 to finance the construction of a 50MW solar power plant in Gambang, Pahang, Malaysia.¹²⁹ It is the first university worldwide to issue a green sukuk. CICERO provided the second party opinion on the issuer's green SRI sukuk framework. Proceeds are used to finance construction, to refinance construction debt, or to finance the payment of a government-granted green subsidy. They may involve securitizing future income cash flows from ring-fenced projects or assets with specific criteria attached.

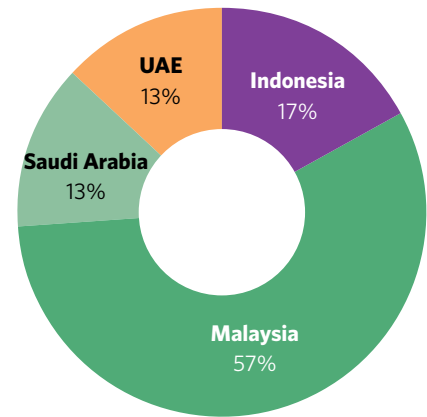
Across the ASEAN region, green sukuk remains a focus of green issuance regionally and represented 30% of the ASEAN green finance market as of September 2020.

The Republic of Indonesia issued the first green sovereign sukuk in 2018 (USD1.25bn) which is the largest green sukuk to date¹³⁰, as well as the first green sovereign bond from Asia. It returned to the market in 2019 and 2020 issuing a total of USD2.75bn in

Global green sukuk market cumulative issuance



Number of green sukuk issuers per country



Malaysian Sustainable Finance Initiative

In early 2019, the government-commissioned Malaysian Green Financing Taskforce (MGFT) put forth 21 recommendations to advance the financing of renewable energy projects in Malaysia. A key recommendation from this Taskforce was to build a centralised green financing centre of excellence to support and strengthen the capabilities of financial sector participants. This recommendation led to the formation of the Malaysian Sustainable Finance Initiative.

On 23 July 2020 Capital Markets Malaysia launched the Malaysian Sustainable Finance Initiative (MSFI) to facilitate capacity building, knowledge and thought leadership on sustainable financing catered to the needs of Malaysia's financial sector. Malaysia's Finance Minister, is Patron of the MSFI.

The MSFI supports capacity development for financial sector intermediaries through workshops and training courses to foster a greater understanding of financing solutions through the lens of environmental, social and governance factors, which take into account financial considerations as well as impact on the environment and society.

The Initiative will also provide a digital platform for the sharing of knowledge and expertise on new financing trends, products and services that prioritise sustainability, and societal wellbeing whilst ensuring good governance practices.

The MSFI is funded by the Capital Market Development Fund and the UK Government's Prosperity Fund ASEAN Low Carbon Energy Programme. The Initiative is led by a Steering Committee chaired by the SC and includes members representing stakeholder groups within Malaysia's financial sector.

"The reality of the effects of climate change has made it imperative for us globally to shift towards more sustainable and responsible practices. The Malaysian Sustainable Finance Initiative aims to support efforts of Malaysia's financial sector to further develop multiple financing avenues to fund businesses and projects that are aligned to the sustainability agenda such as the UN SDGs."

Zainal Izlan Zainal Abidin, Chairman, Capital Markets Malaysia

green sukuk.¹³¹ Eligible project categories are: renewable energy, energy efficiency, adaptation, transport, green buildings, sustainable agriculture, sustainable management of natural resources and green tourism.¹³² The wide range of eligibility categories is not unusual for a sovereign

bond as ministries and agencies usually apply for funding of specific projects after the bond has been issued. The issuer's reporting on proceed allocation will be essential to determine the share of funds allocated to each eligible category.

Trends in global green sukuk issuance

Green sukuk are starting to find their place in the financial market. Since the first green sukuk was issued in 2017, Southeast Asia hosted all green sukuk until May 2019, when MAF Sukuk LTD issued the first green sukuk of UAE.¹³³ The table below provides details of green sukuk issuances outside of ASEAN.

Examples of how green sukuk are being used to fund green infrastructure outside of the ASEAN region

Majid Al Futtaim (MAF) of UAE launched the Middle East's first corporate green sukuk¹³⁴ in May 2019 valued at USD600m, which was listed on the Nasdaq stock exchange in Dubai.¹³⁵ The proceeds were deposited in MAF's general accounts and used to finance and refinance Majid Al Futtaim's existing and future green projects, including green buildings, renewable energy, sustainable water management, and energy efficiency.¹³⁶ Eligible green projects must meet the criteria and objectives set out for each project category in its Green Finance Framework, issued in April 2019.¹³⁷

The Green Finance Framework was based on ICMA's Green Bond Principles (GBP) with an external review to confirm its alignment with GBP.¹³⁸ Majid Al Futtaim has committed to publishing an annual report on the proceeds allocation and environmental impact of its Green Eligible Project Portfolio.

On November 7, 2019, the **Islamic Development Bank** (IsDB) issued its first EUR1bn green sukuk under its USD25bn sukuk program.^{139,140} Proceeds from the debut green issuance were to be deposited in the general funding accounts and used to finance and re-finance a range of climate change and green projects in its 57 member countries.¹⁴¹ Eligible projects are those for renewable energy, clean transportation, energy efficiency, pollution prevention and control, environmentally sustainable management of natural living resources and land use and sustainable water and wastewater management.¹⁴²

Green sukuk issuances outside of ASEAN

Issuer name	Amount Issued	Currency	Size in USD	Issuance date	Country
Saudi Electricity	USD1.3bn (2 equal tranches)	USD	650m (each)	17/09/2020	Saudi Arabia
Islamic Development Bank	1,000m	EUR	1,102m	27/11/2019	Saudi Arabia
Majid Al Futtaim Properties LLC	600m	USD	600m	30/10/2019	UAE
Taweelah IWP	785m	USD	785m	1/09/2019	UAE
Majid Al Futtaim Properties LLC	600m	USD	600m	14/5/2019	UAE

Source: Climate Bonds Initiative database

While the specific projects financed by the bond have not yet been disclosed, one example of a green project being financed by IsDB is DEWA (Dubai Electricity and Water Authority) 800MW Photovoltaic Solar Power Plant - Phase III in UAE.¹⁴³ The power plant has a total cost of USD924m, co-financed by Islamic Development Bank, Abu Dhabi Islamic Bank, Natixis, National Bank of Abu Dhabi, Union National Bank and First Gulf Bank of which, IsDB's participation is USD110m¹⁴⁴ The plant was started on 11th June 2017 and was expected to commence commercial operations in 2020. Once completed, the project can support the economic growth of Dubai through the addition of 800MW of clean and sustainable electricity generation capacity to the grid.

Policies, guidelines and incentives to grow green sukuk

Policy guidance and incentives can be essential in kickstarting new green finance markets to scale up. Green finance guidelines have pivotal to kickstarting markets all over the world - within ASEAN, China and beyond.

Global Guidance and frameworks specifically relating to sukuk include:

In 2018 in the **UAE**, a framework for green bonds and sukuk was adopted within UAE Federal Decree Law No. 9/2018 On Public Debt (Public Debt Law). The law specifically states that public debt can be allocated for infrastructure projects. Many are of the view that this legislation is the first step to a sovereign green issuance to support a renewable energy infrastructure project and this is supported by Dubai and Abu Dhabi each having developed coalitions to further green finance in their jurisdiction.¹⁴⁵

In January 2020, **Abu Dhabi** announced the formation of a "Green Bond Accelerator" programme with the objective of "establishing Abu Dhabi as a regional hub for the issuance of green bonds and green sukuk for sustainable projects in the Emirate as well as across the Middle East and Africa".

Also in January 2020, The UAE published its "Guiding Principles on Sustainable Finance in the UAE" which aims to facilitate the UAE's transition to a more sustainable economy, diversify the economy, help mitigate risks of reduced global demand for oil, adapt to the physical risks of climate change and explore the new investment opportunities it presents.

Global efforts toward harmonisation

While the proliferation of regional and national green finance guidelines has been a positive step in kickstarting the local market, the lack of global market standardization can be confusing for investors and can be a barrier to the overall market – particularly in facilitating cross-border capital flows.¹⁵³

Currently, in most jurisdictions, the green bond and green sukuk markets employ a voluntary framework that establishes best practices for investors. There are a number of green bond frameworks that can apply to green sukuk, as well as there being green sukuk specific frameworks and standards. The table right presents some widely acceptable green sukuk frameworks.

“ASEAN-wide regulatory support to harmonize the definitions of “green”, beyond just capturing green sectors or activities at a broad level (for instance, emission intensity thresholds for geothermal and biomass sources) is needed to avoid greenwashing among financial institutions and corporations”.

Rafe Haneef, Group Chief Sustainability Officer, CIMB Group

Widely acceptable green sukuk frameworks

Frameworks/Guidelines	Convenor/developer	Publication year
Guiding Principles on Sustainable Finance in the UAE	Collaboration of financial services authorities including: Ministry of Climate Change and Environment, Central Bank of the UAE, Insurance Authority of the UAE, Abu Dhabi Global Market; the Securities and Commodities Authority; the Dubai Financial Services Authority; the Dubai Islamic Economy Development Centre; the Abu Dhabi Securities Exchange, the Dubai Financial Market and Nasdaq Dubai	2020
Sustainable Finance Framework ¹⁴⁶	Islamic Development Bank	2019
Climate Bonds Standard version 3.0 ¹⁴⁷	Climate Bonds Initiative (CBI)	2019
Indonesia’s Green Bond and Green Sukuk Framework ¹⁴⁸	Ministry of Finance Indonesia	2018
Climate Bonds Standard version 2.1 ¹⁴⁹	Climate Bonds Initiative (CBI)	2017
ASEAN Green Bond Standards ¹⁵⁰	ASEAN Capital Market Forum (ACMF)	2017
Green Bond Principles ¹⁵¹	International Capital Market Association (ICMA)	2014
Sustainable and Responsible Investment Sukuk Framework (SRI) ¹⁵²	Securities Commission Malaysia	2014

(Source: Authors’ compilation)

The Green Sukuk and Working Party (GSWP)

The Green Sukuk and Working Party (GSWP) has been established by the Clean Energy Business Council (MENA), the Climate Bonds Initiative and the Gulf Bond and Sukuk Association (GBSA), to promote and develop Shari’ah-compliant financial products to invest in climate change solutions.

The Climate Bonds Initiative is part of a Green Sukuk Working Group, a Gulf-based coalition developing finance models for renewable energy that meet the needs of Islamic investors. The Working Group has been set up with the Clean Energy Business Council of MENA and the Gulf Bonds and Sukuk Council.

GSWP is a collaboration of experts in project development, environmental standards, capital markets, actuarial compliance and Islamic finance.

The GSWP will:

- 1. Design Green Sukuk architecture**, so that product issuers can offer and investors can access products with confidence about their compliance with Shari’ah law and ethical standards.
- 2. Promote the concept of Green Sukuk** and other green Islamic finance products to governments, investors, product originators and other interested parties.
- 3. Engage with Governments and development banks** about supporting appropriate project development and the growth of a Green Sukuk market.
- 4. Inform the market** by promoting best practice, convening industry forums and developing template models.

Potential for growth of the global sukuk market

There remain some barriers to the growth of a large green sukuk market. These include:

- a lack of knowledge at both the issuer and investor levels about the process and benefits of green sukuk issuance.
- perceptions about complexity and pricing
- lack of green definitions
- lack of consensus among government agencies on policy coordination,
- lack of bankable green projects

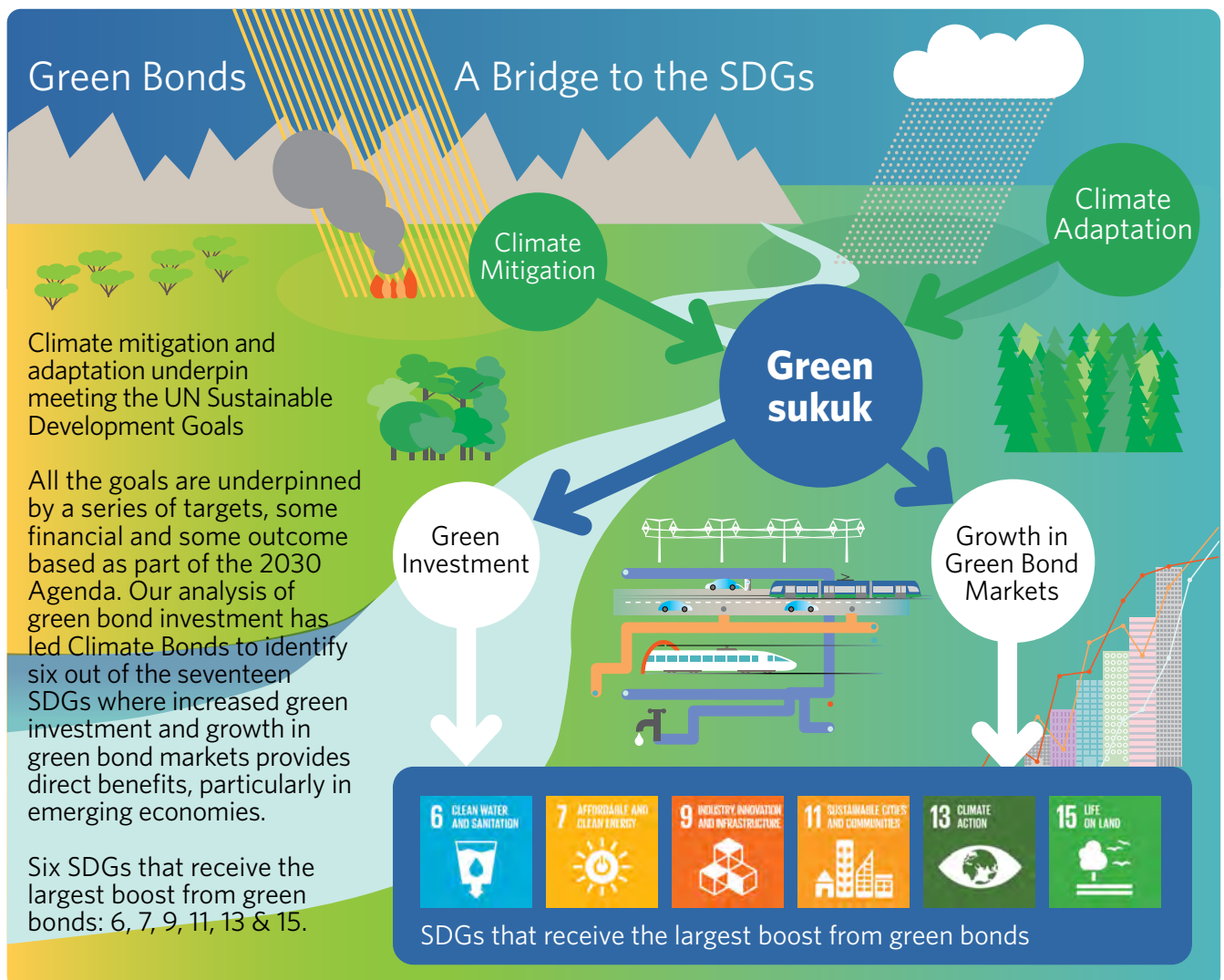
As the market grows, these barriers are also reducing. For example, as the number of green sukuk has increased, so too has investor awareness and comfort around these new products. Further, as such deals become more commonplace, the issuance process reduces in complexity as there are a number of green frameworks for issuers to use as a starting point. As the expertise in the country increases, the cost of external review may reduce as issuers can use local expertise rather than bringing in international expertise.

In Malaysia, the World Bank has helped address these issues and grow green sukuk by: identifying the complementarity between Malaysia's SRI sukuk guidelines and Green Bond Principles to enable potential issuers to issue green sukuk in the absence of national green bond guidelines; providing guidance on eligible green projects; advising on the role of external reviews and facilitating the participation of local institutions to provide external reviews at low cost; identifying potential issuers for demonstration issuances and helping the first issuers navigate government policies and follow international best practices.

As a demonstration of the potential for investor participation, a Green Sukuk Programme has been announced by Clarmondial, Amanie Advisors and Cenergi SEA, an investment fund that is a subsidiary of Khazanah Nasional Berhad, an investment fund owned by the government of Malaysia, with a focus on South East Asia, starting with smaller, renewable energy and energy efficiency projects in Malaysia.

The green sukuk market has the potential for scaling up significantly, particularly in Indonesia and Malaysia. The green sukuk market has also demonstrated that it can be a valuable tool in facilitating cross border flows from the Middle East where there is a large investor base toward the ASEAN region where there is a large need for green finance.

It is clear that markets that have seen growth in green sukuk issuance have also received support from governments and regulators. Malaysia is a prime example of this where the early success of the green sukuk market is likely due to Bank Negara Malaysia and the Securities Commission Malaysia working closely with the World Bank to foster top-down engagement. Further, Indonesia's engagement with the UNDP led to their green bond framework and sovereign green sukuk program. It is a logical conclusion that accelerated development and growth in Islamic financial best practice is driven by top-down engagement.¹⁵⁴



6. Green infrastructure investment opportunities

The Malaysian government aims to develop billions of dollars of new public-works projects. There are already green infrastructure projects and assets of many different sizes and technologies spread across the nation. These range from a USD10bn national railway project through to a USD72m waste infrastructure project. A list of 54 projects has been compiled into a sample pipeline (see Appendix 2).

This report uses the globally recognised Climate Bonds Taxonomy and Sector Criteria to determine which projects and assets are green. However, there are many other standards and schemes that can be used to measure the 'greenness' of projects in Malaysia, including global standards and those from Southeast Asia and Malaysia. Most of these apply to either the development and retrofitting of buildings or a broad set of infrastructure projects and assets.

Investors currently have too few tools to ensure that their investments are making a significant impact. Having common definitions of 'green' across global markets, allows investors, potential issuers and policy makers to identify green assets and attract investment more easily.

Ideally, the Malaysian government could adopt a best practice standard to identify green projects during infrastructure planning and collating these in a single list. Then it can prioritise projects that are in line with international definitions for 'green' and provide clear 'green' labelling, when preparing future infrastructure pipelines.

Providing this level of visibility for green infrastructure investment opportunities could facilitate increased access to private sector capital for Malaysia's economic development, the acceleration of Malaysia's transition to a low carbon economy and help meet global institutional investor demand for green assets.

Methodology

The following section explores green infrastructure investment opportunities across Malaysia in four key sectors: renewable energy, low carbon transport, sustainable water management and sustainable waste management. Although not included here, Malaysia has some green projects across other sectors like green buildings, agriculture/ forestry, and tourism.

There are various ways for an investor to gain exposure to a specific project, asset or portfolio. The possible investment pathways will vary depending on the asset ownership structure, the stage in the asset's financing lifecycle, and the investor's mandate. This can vary between projects with public and private funding.

Accordingly, metrics were used to classify the green infrastructure investment opportunities, by status:

- Completed projects: high profile, recently completed projects;
- Projects under construction: major projects that are under construction; and
- Planned projects: major projects that have not yet begun construction but have been announced and/or have undergone business case planning and/or have been allocated budget.

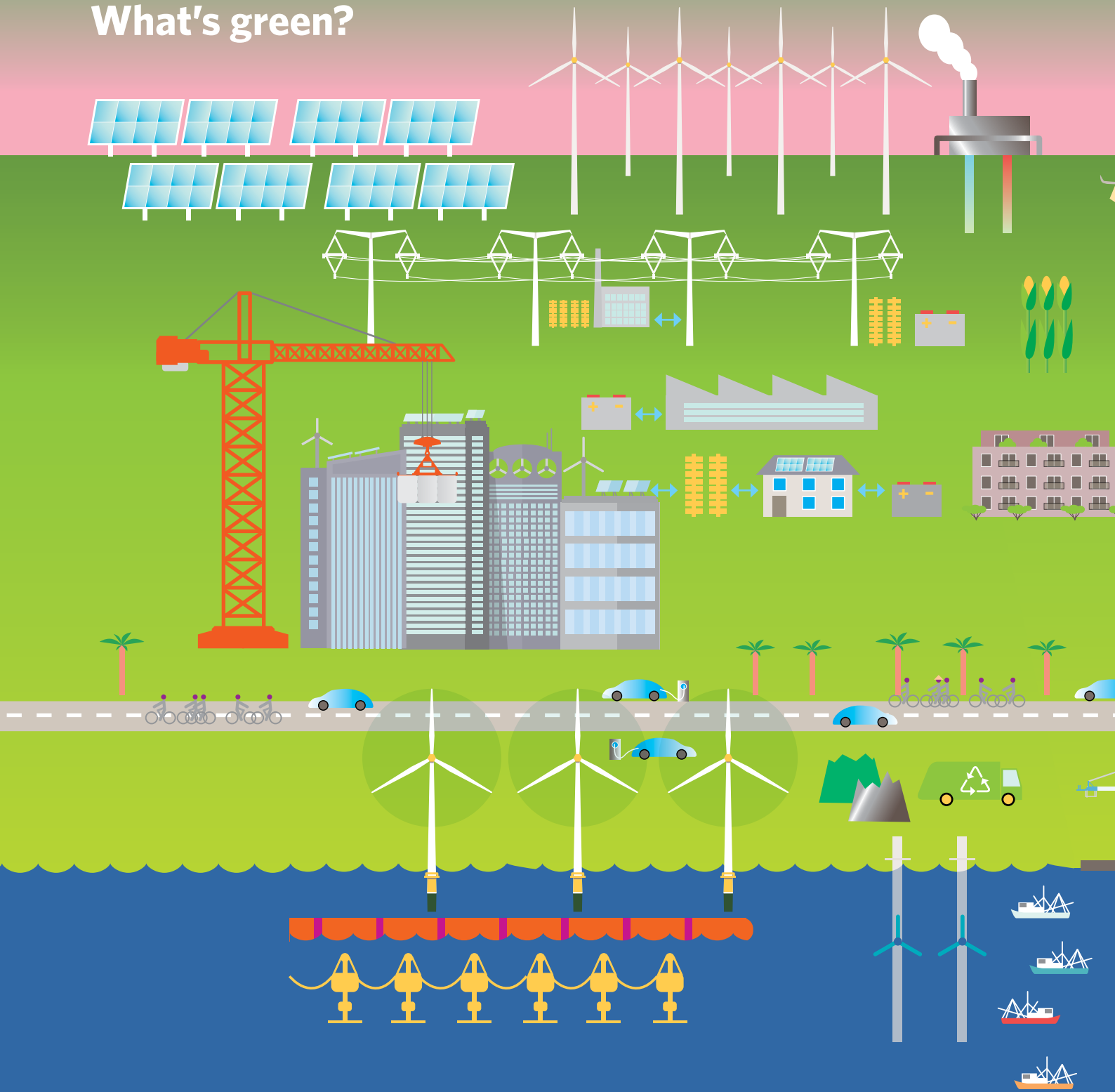
Case studies and a sample pipeline have been developed for this report to show the different types of opportunities available in the short- and medium-term future in Malaysia. The case studies include both greenfield and brownfield projects and assets that could have been or could potentially be financed/ refinanced via green bonds.

Climate Bonds Taxonomy and the Climate Bonds Standard and Certification Scheme

The Climate Bonds Taxonomy features eight climate-aligned sectors (see back cover). The purpose of the Taxonomy is to encourage common broad 'green' definitions across global markets in a way that supports the growth of a cohesive green bond market. The Climate Bonds Standard & Certification Scheme is used to provide a labelling scheme for bonds and other debt instruments.

The Sector Criteria for the Climate Bonds Standard & Certification Scheme provide eligibility conditions or thresholds which must be met for assets to be in line with a rapid trajectory towards a 2050 zero-carbon future. The criteria are developed based on climate science by technical expert groups with input from industry.

What's green?



Geothermal:



According to the Geothermal Energy Association, 39 countries could supply 100% of their electricity needs from geothermal energy, yet only 6% to 7% of the world's potential geothermal power has been tapped.¹⁵⁵

Drawdown Agenda

Solar:



The world installed a record number of new solar power projects in 2017, more than net additions of coal, gas and nuclear plants put together.¹⁵⁷

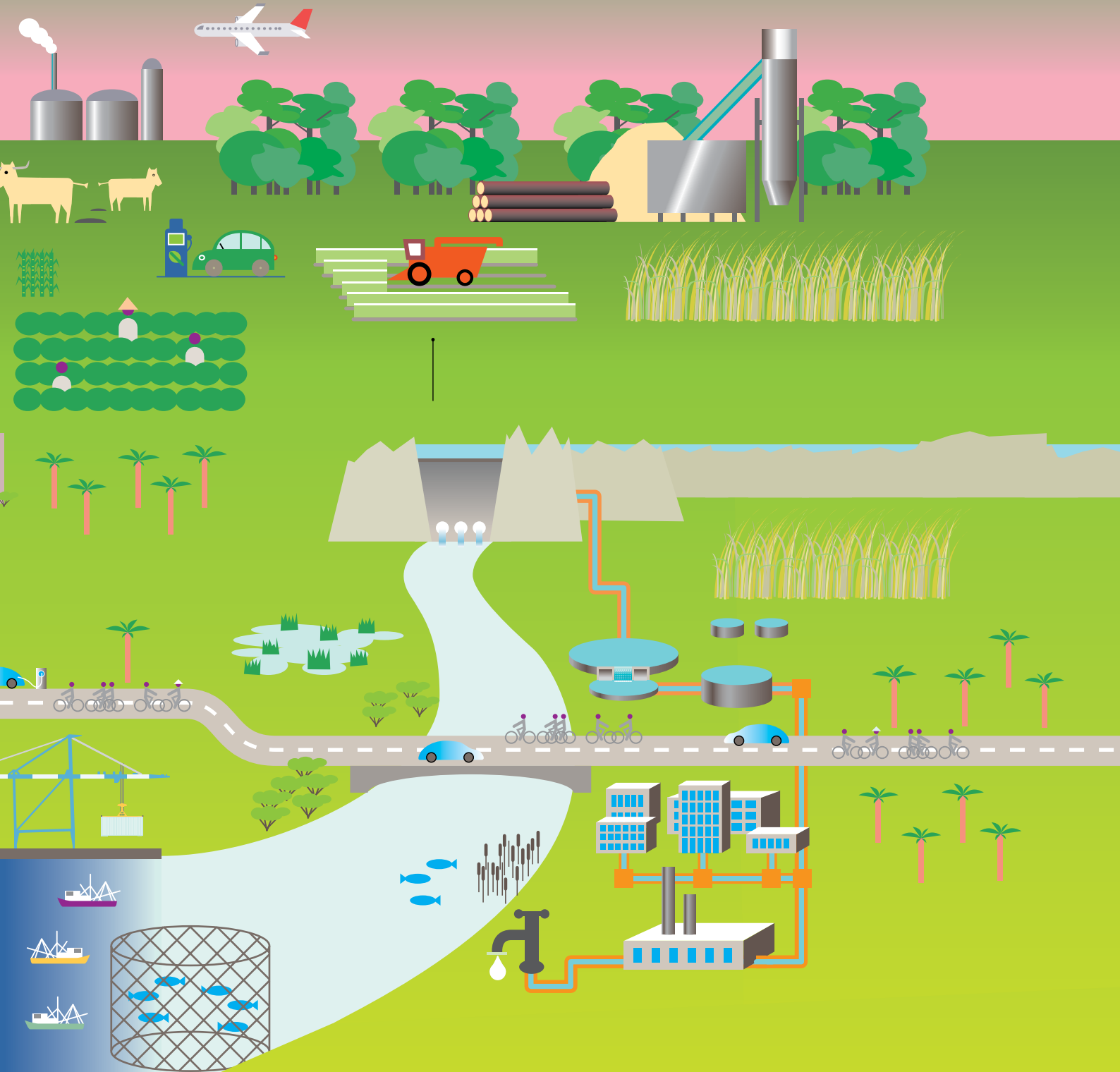
UNFCCC

Hydropower:



Hydropower is the largest source of renewable electricity in the world, producing around 17% of the world's electricity from over 1 200 GW of installed capacity, and is expected to remain the world's largest source of renewable electricity generation by 2022.¹⁵⁶

International Energy Agency



Transport (rail):



75% of the world's countries have established strategies and targets to improve the environmental performance of their transport sector within their Intended Nationally Determined Contributions (INDCs). One-fifth of the transport-related (I)NDCs include measures in the railway sector.¹⁵⁸

UNFCCC

Water:



The UN says the planet is facing a 40% shortfall in water supply by 2030, unless the world dramatically improves the management of this precious resource.¹⁵⁹

UNFCCC

Buildings:



Building-related emissions account for about one-third of global GHG emissions and could double by 2050, making building efficiency a critical part of the COP21 agenda.¹⁶⁰

GreenBiz

Renewable energy

Energy generation, transmission or storage technology that has low or zero-carbon emissions. This can include solar energy, wind energy, bioenergy, hydropower, geothermal energy, marine energy or any other renewable energy source.

Sector overview

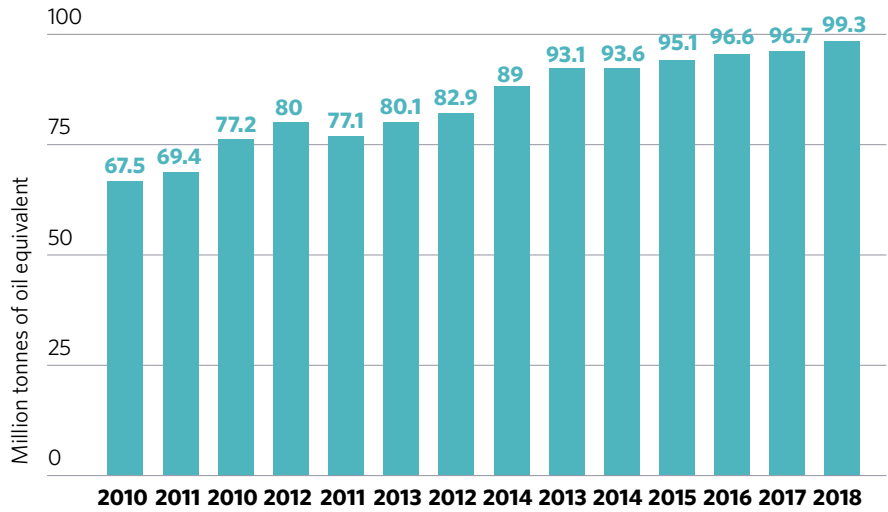
Malaysia is a fast-growing country with a rapid pace of industrialization and urbanization. The country has been heavily dependent on energy to support and spur its development. Between 2005 and 2018, primary energy consumption in Malaysia rose from 67.5 million to 99.3 million tonnes of oil equivalent. According to the World Energy Markets Observatory (WEMO) 2017 report, Malaysia's energy usage is projected to increase by an annual rate of 4.8% up to 2030.¹⁶¹

Energy sources in Malaysia are diverse, ranging from coal, gas, diesel and oil to hydropower and other renewables. Among them, the traditional source of power supply has been natural gas and oil, accounting for about 80% of total primary energy supply in 2016. There has also been a significant boom in fired coal energy supply, with its share soaring from 4.40% to 20.20% in the energy mix over the period from 1996 to 2016. These thermal power sources are predicted to remain the most significant sources during 2019-2030 with power capacity expected to grow by 5 GW during this period to meet the increasing consumption demand.¹⁶²

Despite its substantial fuel reserves, the overdependence of thermal resources for electricity generation poses a serious long-run impact on its environmental health and energy security. The government had considered developing nuclear power in order to achieve energy independence and avoid GHG emissions; however, due to public resistance, the plan was suspended.¹⁶³ This leaves renewable power as the only option to generate electricity, while still preserving the environment and energy independence. Renewable sources in Malaysia include solar, wind, biomass, mini hydro.

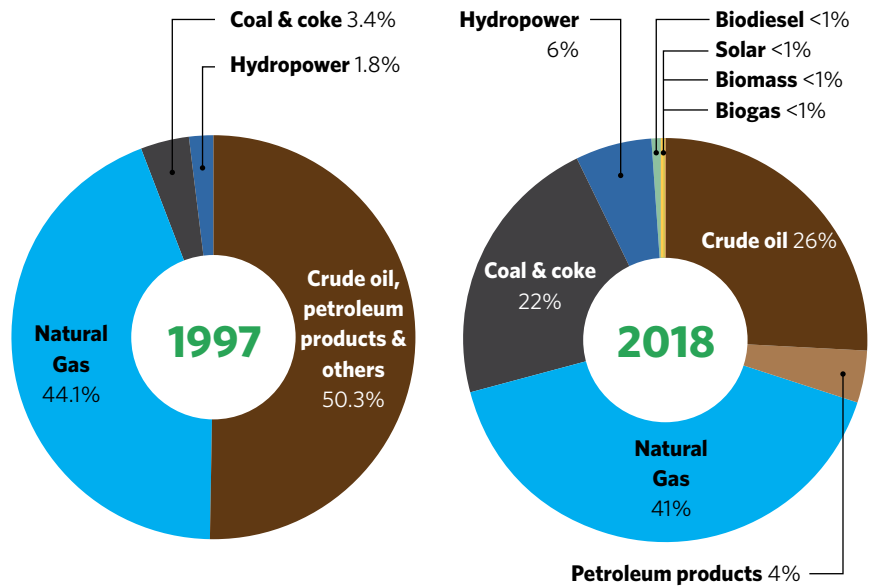
The Fifth Fuel Policy under the Eight Malaysian Plan (2001-2005), aimed to balance the utilization of oil, gas, coal, hydro and other renewable energy.¹⁶⁴ However, plans to develop RE did not achieve much success until 2012. By 2018, Malaysia sourced only 2% of its total electricity output from renewable sources (excluding large hydro schemes).¹⁶⁵

Primary energy consumption in Malaysia is on the rise



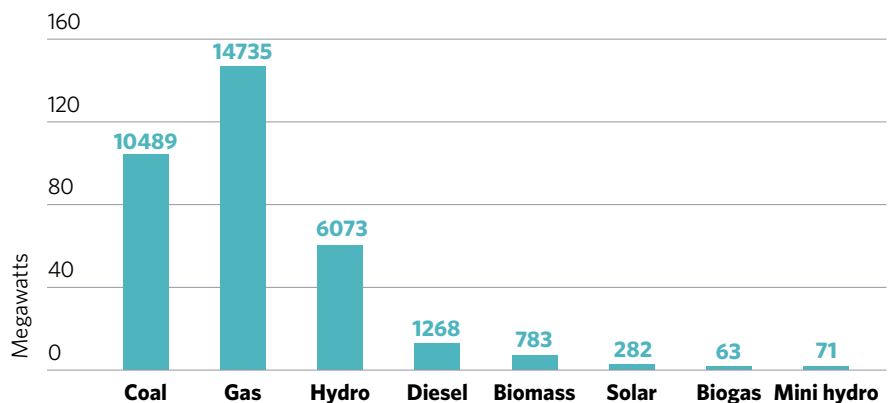
(Source: Statista.com¹⁶⁶)

Coal and hydro increase as a percentage of energy sources 1997 - 2018



(Source: Energy Commission 2019¹⁶⁶)

Gas and coal dominate electricity generation capacity in Malaysia



(Source: Statista.com, January 2018¹⁶⁷)

In December 2020, the Ministry of Energy and Natural Resources increased its target for renewable energy to 31% of total generation capacity by 2025 and 40% by 2035. This will involve the installation of 1,178 MW of renewable energy by 2025 and 2,414 MW by 2035.¹⁶⁶ Since the Malaysian 10th plan (2011-2015), the government has placed more emphasis on RE, giving special attention to solar energy.¹⁶⁷ The figure right shows the Malaysian government's plans of expanding the use of solar energy during the period 2011-2050.

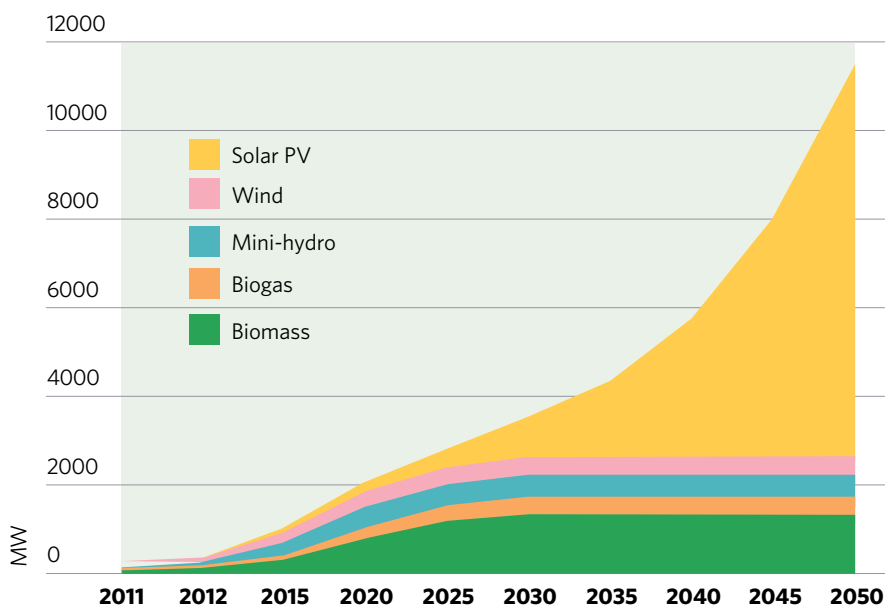
Solar energy has huge potential for development in Malaysia thanks to its location near the equator with monthly solar irradiation at 400-600 MJ/m² and potential capacity up to 6500 MW.^{168,169} Electricity generation from solar sources stood at only 282 MW as of January 2018.

In 2016, to push the development of this renewable source, the Energy Commission (EC) started competitive bidding for the development of large-scale solar.¹⁷⁰ The EC is a statutory body is responsible for regulating the energy sector, specifically the electricity and piped gas supply industries, in Peninsular Malaysia and Sabah. The first round of their LSS bidding was released with a total aggregate capacity of 250 MW and 19 projects being approved.¹⁷¹ The second tender took place in 2017, with total aggregate capacity of 460 MW¹⁷² and 41 shortlisted projects.¹⁷³ The third round of LSS started in February 2019 with a total offered capacity of 500 MW and up to 100 MW of capacity limitation for each of the five selected developers.^{174,175}

Wind energy potential is moderate but not-utilised at present. Thanks to strong wind blown from the Indian Ocean and the South China Sea with mean wind speed of 1.5-4.5 m/s¹⁷⁶, onshore wind power in Malaysia could reach up to 1.5 MW¹⁷⁷. There is currently no wind energy in Malaysia. Support and incentives from the Government are required to encourage the deployment of wind power.

Biogas is a promising option to decreasing Malaysia's reliance on fossil fuels for power generation. Potential feedstock for biogas generation includes municipal solid waste, food waste, cattle manure, sewage and palm oil mill effluent.¹⁷⁸ In 2018, Malaysians generated about 38,142 tonnes of waste per day, while the recycling rate still stood at a low rate of 28%.¹⁷⁹ Total potential energy generation from biogas is estimated at around 2.3 million MWh.¹⁸⁰ Meanwhile, the total generation capacity from biogas in 2018 was only 63 MWh. These figures indicate that there is a huge potential for biogas generation in Malaysia.

Ambitious targets for solar PV expansion to 2050



(Source: Chua et al. 2011¹⁹⁸)

Biomass is a more established source of energy in Malaysia, producing approximately 168m tonnes of biomass each year.¹⁸¹ As the largest palm oil producer and exporter in the world, Malaysia has huge biomass resources. At present, biomass is the biggest source of electricity generation in the RE mix (excluding large hydropower). In its National Biomass strategy 2020, the Government aimed to achieve 800 MW of installed capacity from biomass by 2020.¹⁸² By 2030, the biomass installed capacity is expected to increase to 1340 MW.¹⁸³

Mini-hydro is ripe for development given Malaysia's high rainfall volume and abundant streams and rivers.^{184,185} While most small and medium-sized hydropower plants are located in Peninsular Malaysia, the Sarawak state has the most potential for large hydroelectric growth thanks to its rainfall and geography.¹⁸⁶ In 2016, the installed hydropower capacity in Sarawak was 6,094MW. Bakun plant developed by Sarawak Hidro and with a registered capacity of 2,400MW is the largest hydropower plant in Malaysia, followed by Baleh (1,285MW) and Murum (944MW) plant.¹⁸⁷

In 2009, the Malaysian Government established the Sarawak Corridor of Renewable Energy (SCORE) program with an aim to take advantage of natural resources and provide reliable, low-cost electricity. SCORE looks to finance 51 potential hydropower projects selected by the Government with a potential hydroelectric capacity of 20GW. A further 1700 MW of hydropower projects are also at a planning or feasible studying in Peninsular Malaysia.¹⁸⁸

In Malaysia, small hydropower plants are high on the agenda. 149 sites were identified to be suitable for mini hydropower development with an estimated capacity of 28.9 MW per year.¹⁸⁹ In its Small Renewable Energy Programme (SREP), the Malaysian Government expressed a goal to increase electricity generation from small hydro schemes from 60 MW in 2011 to 490 MW by 2020.¹⁹⁰

We note that not all such opportunities will be eligible under the Climate Bonds Standard. The complexity of hydropower means that the development of criteria under the Climate Bonds Standard has been a long process and there are currently no criteria available for certification.

Financing options

To achieve its national RE goals, it is estimated that Malaysia will need investments of MYR33bn (USD8.2bn) in its renewable energy sector. This would need to come from not only the government, but from public-private partnership and private financing.¹⁹¹

The Government has already taken steps to unlock the private investment and encourage private participation in renewable energy development. Apart from the adoption of government incentives, such as the Green Technology Financing Scheme, Green Investment Tax Allowance and Green Income Tax Exemption, some institutional reforms have been implemented, including:

- Feed-in-tariff (FIT) mechanism under Renewable Energy Act 2011.¹⁹² This mechanism allows electricity generated from renewable sources to be sold to national power utilities at a fixed premium price during a specific duration. Full FIT rates are proposed under the Renewable Energy Act, as follows:
- The Net Energy Metering (NEM) programme,¹⁹³ which was introduced in late 2018 to allow PV solar energy to be first consumed and then the excess to be sold to the national utility company Tenaga Nasional Berhad (TNB) on a one-on-one offset basis.

FIT rates under the Renewable Energy Act

Renewable energy source	Tariff MYR/kWh (USD/kWh)		Duration
Biogas	Basic rates	0.28-0.32 (0.07-0.08)	21 years
	Bonus rates	0.0-0.02 (0.00-0.01)	21 years
Biomass	Basic rates	0.27-0.31 (0.07-0.08)	21 years
	Bonus rates	0.0-0.2 (0.00-0.02)	21 years
Small hydropower	Basic rates	0.23-0.26 (0.07)	21 years
Solar photovoltaic	Basic rates	0.3-0.54 (0.7-0.14)	21 years
	Bonus rates	0.05-0.1 (0.00-0.06)	21 years

Note: exchange rate applicable is 1MYR = 0.24USD on 1 Jan 2021)

(Source: SEDA²⁰⁴)

- The aforementioned Large Scale Solar (LSS)¹⁹⁴ competitive bidding that started in 2016. This program is applicable to large solar photovoltaic projects with an aim to drive down the cost of solar energy in Malaysia. The government also introduced competitive bidding for biopower technologies in the last quarter of 2018 and small hydropower in 2019.

Renewable energy project developers and asset owners have access to a wide variety of funding options, including banks, project financiers, debt clubs, investment funds, direct investors and the capital markets. Green bonds are very well suited to large renewable

energy projects or asset portfolios and can be structured as senior unsecured bonds, project bonds, covered bonds or ABS. Tadau Energy Sdn Bhd, a renewable energy and sustainable technology company, issued a green sukuk in June 2017, with use of proceeds for renewable energy. More green bonds and green sukuk issuances have since followed.

Aggregation of smaller projects can be done through securitisation or by banks originating green loans and refinancing in the green bond market. Renewable energy funds are being used to support greenfield projects and stimulate innovation.

65 MW (DC) Jasin plant^{199,200} Solar farm in South-West Malaysia

Proponent: Scatec Solar

Location: Jasin, South-west of Peninsular Malaysia, Malaysia

Status: It was completed in 2019 and is in commercial operation.

Classification: Solar energy, Renewable Energy

Description: Jasin plant is one of three PV projects developed under an agreement between Scatec Solar and a local consortium led by ITRAMAS. The partnership will produce 197 MW of electricity for Malaysia's grid under a 21-year PPA, with Tenaga Nasional Berhad, the country's largest utility provider.

Jasin plant has the registered capacity of 65 MW and was connected to the national grid in 2019. The two other plant are Gurun Plant (connected to the grid in 2018²⁰¹) and Merchang plant (beginning operation in 2019²⁰²).

The completion of the Jasin project brings Scatec Solar's global PV project portfolio to 714 MW in operation.

Output: Jasin solar plant can provide 94,000MWh of electricity each year, for more than 31,000 households. This large-scale solar can also help to reduce 70,000 tonnes of CO2 per year.



Source: 203

Cost: The total investment for three projects is MYR 1,235m (USD307m)

Financial structure: Private funding from Scatec Solar, of which MYR1bn (USD248m) was raised by green sukuk by Quantum Solar in October 2017 and MYR251m (USD62m) via preferential shares issuance.

Sinar Kamiri Sdn Bhd's power plant^{205,206,207}

Proponent: Sinar Kamiri Sdn Bhd

Location: Perak, Malaysia

Status: Completed

Classification: Solar energy, Renewable Energy

Description: Sinar Kamiri solar power plant is one of the first large-scale PV solar plants in Malaysia, which was awarded to the company under an open bidding. It is constructed to preserve the environmental features of the surrounding areas with minimum disturbance to the ground and existing vegetation

The project was started in 2017 and completed in August 2018. It fully adopts Huawei Fusion Solar Smart PV Solution, including smart PV string inverters and advanced technologies, which deliver a simple system with safe and reliable energy transmission.

This project will make an important contribution towards Malaysia's renewable energy commitments. With an installed capacity of 49 MW, the Sinar Kamiri solar project will constitute almost 4% of the total solar capacity targeted in the year 2020 by the Government of Malaysia.



Source:

Output: A 49MW solar PV plant. It will save approximately 50,000 tonnes of CO₂.

Cost: MYR306m (USD76m)

Financial structure: Private funding from Sinar Kamiri Sdn Bhd, which was raised via Green Sukuk certified by Rating Agency Malaysia (RAM)

TSH Resources Berhad Biomass Power Generation Plant²¹⁴

Proponent: TSH Resources Berhad

Location: Kunak, Sabah

Status: Completed

Classification: Biomass energy, Renewable Energy

Description: TSH Resources Berhad Biomass Power Generation Plant is part of the bio-integration projects developed by TSH Resources Berhad in Kunak to produce biomass power, biogas and pulp and paper from palm waste. The complex consists of a 14MW biomass power plant, a 4MW biogas power plant and a 30,000 tonne pulp and paper plant.²⁰⁸

The biomass power plant was commissioned in July 2004 and is the first biomass power plant in the country. It is designed to supply 10MW of electricity to Sabah Electricity Sdn Bhd for 21 years.²⁰⁹ It has a renewable energy power purchase agreement (REPPA) with Sabah Electricity Sdn Bhd at 21.25 sen/MWh.²¹⁰

Output: The bio integration complex will consist of a 14MW biomass power plant, a 4MW biogas power plant and a 30,000 tonne pulp and paper plant.²¹¹



Source:²¹³

Cost: MYR150m (USD37).²¹²

Financial structure: Private funding from TSH Resources Berhad

BELL Eco Power's Biomass Power Generation Plant^{217,218}

Proponent: BELL Eco Power Sdn Bhd

Location: Batu Pahat, Johor

Status: Completed

Classification: Biomass energy, Renewable Energy

Description: The project activity involves the installation of a new power plant consisting of a 52 ton per hour low pressure boiler and a turbine. It has the installed capacity of 11MW and export capacity of 10MW.

The plant harnesses the energy from palm oil mill biomass residues such as palm shells, mesocarp fibres, empty fruit bunch fibres, palm kernel shell and wood chips. Most of the raw material requirements of the project activity would be met from its group company Bell Palm Industries Sdn. Bhd. The flue gas generated from the combustion of biomass is treated and made harmless prior to being released into the atmosphere.

Output: The project is designed to supply about 775,780 MWh of electricity generated from renewable energy source to the grid during the crediting period of 10 years.



Cost: MYR54.576m (USD13.5m).²¹⁵

Financial structure: Private funding from BELL Eco Power Sdn Bhd

Source:²¹⁶

Low carbon transport

Transportation modes and ancillary infrastructure that produce low or zero direct carbon emissions. This can include national and urban passenger rail and freight rail networks; Bus Rapid Transit (BRT) systems; electric vehicles; and, bicycle transport systems.

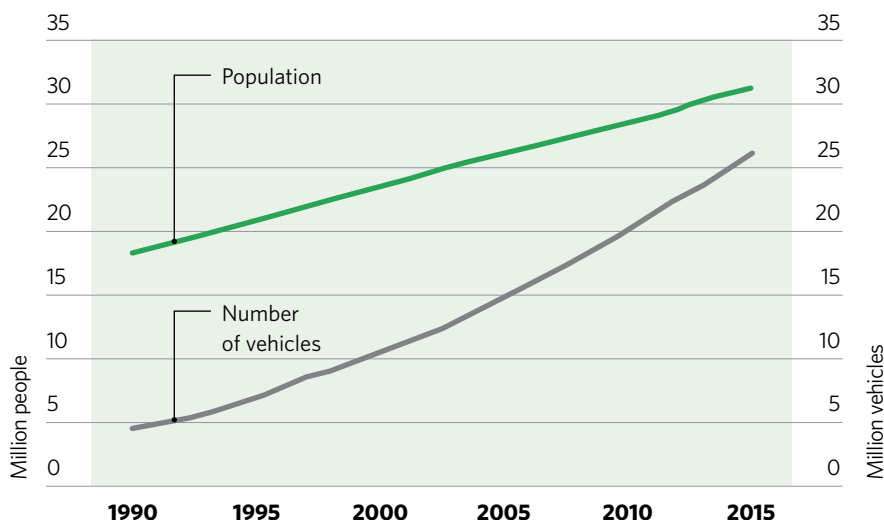
Sector overview

Transportation is the backbone of socio-economic development in Malaysia, contributing 3.6% to GDP with a value of MYR48.8bn in 2017.²¹⁹ Since 2004, the transport sector has grown by leaps and bounds, at an annual growth rate of over 5%.²²⁰ To support business and trade activities, the country has continuously built and upgraded its transport networks. Until 2016, Malaysia constructed over 200,000 km of roads, 2,900 km of railways, 18 ports and 22 airports.²²¹ The geographic position of Malaysia makes it a natural gateway to Southeast Asia, which makes it an important transport hub in the region.

However, increasing urbanisation, coupled with rapid growth in mobility, has imposed great pressure on Malaysia's urban road transport.²²² Urbanisation in Malaysia is on the rise, projected to reach 80% in 2030.²²³ Malaysia's population is also estimated to reach 41.5 million by 2040.²²⁴ These trends put additional demands on transportation infrastructure. It is estimated that Malaysian will make roughly 131 million daily trips via roads in 2030, a significant surge from 40 million trips in 2010.²²⁵ Between 1990 and 2015, the number of motor vehicles increased by more than fivefold, a higher growth rate than the population. Insufficient public transport facilities are a contributing factor to the ever-increasing motor vehicle population in Malaysia.

The great leap in private vehicle ownership has come with a cost to the environment and the economy as a whole. In 2016, the cost of congestion in the Greater KL region was around 1.1% to 2.2% of GDP, equivalent to MYR6,144 per person per year.²²⁶ In addition, as the transport sector relies primarily on petroleum fuels, this sector accounted for about 36.4% of total final energy consumption as in 2018.²²⁷ As such, it is the second largest contributor of Greenhouse Gas (GHG) emissions in Malaysia, only after electricity power generation. Of the total 211 million tonnes of CO₂ emitted from fuel combustion in 2017, the transport sector produced 28.86%, equivalent to 60.9 million tonnes.²²⁸ The vast majority, 96.72%, of transportation emissions

Vehicle growth outstrips population growth in Malaysia (1990-2015)



Source: Ministry of Transport and Department of Statistics Malaysia (2016)²⁵²

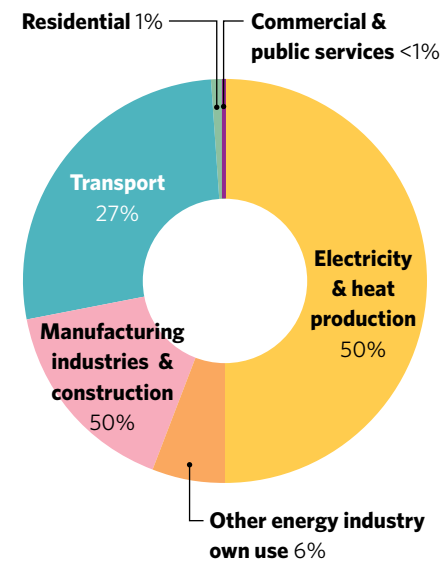
came from road transport.²²⁹ This is a worrying trend for the future in terms of energy security and CO₂ emissions.

Currently, Malaysia is among the countries with the highest CO₂ emissions per capita in ASEAN, about 7.27 tonnes, doubling that of Thailand's 3.64 tonnes and even higher than China's 6.59 tonnes (data as of 2015).²³⁰ As a result, low carbon mobility solutions are needed to push sustainable urban transportation in Malaysia. The newly introduced National Transport Policy 2019 - 2030 has set forth targets and strategies for enhancing the country's economic competitiveness, while reducing the negative impact of the transport sector on the environment.²³¹ Accordingly, a 45% reduction of GHG intensity of GDP is to be achieved by 2030.

The central strategy is to accelerate the implementation of low carbon transport incentives by prioritizing public transport development and adopting green technology and cleaner fuels such as biodiesel and electricity vehicles (EVs).²³² This is in line with three main objectives dictated in The Low Carbon Mobility Blueprint and Action Plan²³³ announced in 2019, which are (i) increasing ridership of public transport; (ii) accelerating the use of clean energy vehicles; and (iii) improving vehicles technologies towards higher efficiency and lower emissions.²³⁴

The market for EVs started in Malaysia in 2013, with the country's very first registered electric car - Mitsubishi i-MiEV.²³⁵ The demand for EVs has been on the rise since then - with the amount of listed EVs making a leap from an estimated 100 units in 2013 to about 52,384 units as at March 2019.²³⁶

Transport accounts for 27% of CO₂ emissions from fuel combustion



Source: IEA (2020)²⁵³

Compared with more than 28.2 million vehicles registered in the country up to the beginning of 2019²³⁷, the figure represents only a fraction, showing the great potential of this market.

In 2018, the charge EV network in Malaysia used up 254,802 kWh of electricity, doubling the figure of 2017.²³⁸ To push the domestic use of EVs and give the public easier access to EV charging stations, the Federal Government has aspired to have 125,000 public chargers by 2030, up from only 400 units at September 2018.²³⁹ This reveals a promising growth of the EV industry in Malaysia, which aims to become a regional EV hub by 2030.²⁴⁰

The country's first solar electric vehicle charging station was launched in 2018; and more are being planned.²⁴¹ At the moment, Malaysia is in the middle of developing autonomous and self-driving vehicles which are believed to enhance vehicle safety and energy consumption.²⁴² Semi-autonomous cars are already on road,²⁴³ whilst fully-automated ones are expected to appear in the market soon. In addition to improving the sustainability of private transport, the government is prioritizing the improvement of the efficiency of public transport networks. Targets for which are set out in the country's National Transport Policy 2019-2030.²⁴⁴ The existing National Land Public Transport Master Plan (NLPTMP),²⁴⁵ introduced in 2013, also aims to increase the modal share of public transport. By 2020, 40% of Klang Valley residents are projected to use public transport services. For other cities, the 40% target is to be reached by the year 2030.

The public transport system in Malaysia has been much improved since the implementation of the NLPTMP. Various services are being provided, such as buses, electric BRT, light rail transit (LRT), monorail, mass rapid transit (MRT) or electric train service (ETS). The share of public transport in Klang Valley rose from 16% in 2010 to 20% in 2015.²⁴⁶ However, although the overall train and rail services in Malaysia are almost complete, its usage only reached

30% in 2019.²⁴⁷ This could be due to erratic timing of buses which ferry people from their resident zone to train stations and from train stations to their destinations (and vice versa), long distance to the nearest train station, and a lack of uniformity in signage designs (different owners of rail public transport use different design schemes).²⁴⁸ Much still needs to be done to improve the rate of public transport use in Malaysia.

In terms of innovation in sustainable transportation, Malaysia has had some important achievements. For example, its current BRT system is an all-electric bus service and can serve up to 1000 passengers per hour. The integration between Rapid KL buses and MRT/LRT is working well, increasing the connectivity for inner-city transportation.²⁴⁹ The launch of MRT Phase One successfully removed 9.9 million cars in 2017, and is estimated to remove an additional 62-89 million cars between 2020 and 2030.^{250,251}

Funding Pathways

Most funding for transport comes from the government budget, ODA (i.e. from ADB, China, etc.), PPP arrangements, Build-Operate-Transfer or Build-Transfer contracts. Capital mobilisation for low-carbon transport continues to be targeted towards encouraging the use of energy-efficient transportation and the development of green infrastructure projects that reduce carbon emissions.

There are also potential funding structures available to encourage private sector involvement in the long-term financing required for low-carbon transport projects including green bonds, outright asset acquisitions and the securitisation of green assets. Green bonds provide indirect exposure for investors to specific projects and assets and provide attractive credit and liquidity credentials for institutional investors. No green bonds have yet been issued in Malaysia, where the use of proceeds is to be allocated to low carbon transport.

Government-backed concessional loans are a new structure that exists in ASEAN, which provides greater leverage against the revenue streams of transport (i.e. fares). Another innovative mechanism is 'value capture', which refers to the value that is generated for private landowners from infrastructure and surrounding business operations. As private sector appetite increases, funding sources will continue to diversify, and investment will accelerate.

East Coast Rail Link (ECRL) Project^{254,255}

Proponent: Malaysia Rail Link (MRLSB) as the developer - jointly operated with China Communications Construction Company (CCCC)

Location: Kelantan, Terengganu, Pahang, Negeri Sembilan, WP Putrajaya, and Selangor

Status: Under Construction. It was started in 2017 and is expected to be complete in 2026.

Classification: Rail, Infrastructure

Description: The ECRL's 640km line connects different parts of the east coast region and the west coast region of Malaysia. The route consists of 14 passenger stations, five combined passenger and freight stations and one freight station, providing both passenger and freight transport services. It passes through the states of Kelantan, Terengganu, Pahang, Negeri Sembilan, WP Putrajaya, and Selangor.

There are three interchange stations along the line, which will link the ECRL with the Kuala Lumpur International Airport (KLIA), Kuala Lumpur International Airport 2 (KLIA 2) (at Putrajaya Sentral); KTM Electric Train Service (ETS) and KTM Komuter service (at Bangi/Kajang); and KTM Intercity and KTM Kargo service (at Mentakab).

When complete, the tracks allow passenger and freight trains to reach the speed of 160km/h and 80k/h respectively.



Source:²⁵⁷

Output: ECRL is expected to reduce the travel time from Kota Bharu of Kelantan to WP Putrajaya to approximately four hours. Upon completion, the link will welcome about 5.4 million passengers and 53 million tonnes of cargo each year by 2030. It is also intended to be a catalyst for economic equality between the west and east coast and boost economic growth in the region by 1-1.5%.

Cost: MYR44bn (USD10.9bn)

Financial structure: F85% of the project is financed with a soft loan from the Chinese government and the rest 15% is funded by the Malaysia Government.²⁵⁶

Putrajaya Line (formerly known as Sungai Buloh-Serdang-Putrajaya MRT)^{259,260}

Proponent: Mass Rapid Transit Corporation

Location: Kuala Lumpur

Status: Under development.

Classification: Rail, Infrastructure

Description: Putrajaya Line is the second part of the Klang Valley Mass Rapid Transit (KVMT) project, after the Sungai Buloh-Kajang line. The line began construction in 2016 and is expected to be fully completed by 2022 and operational by 2023.

It is about 52.25km long and will connect the townships of Sungai Buloh, Serdang and Putrajaya. The line will have 36 stations, including 25 elevated stations and 11 underground ones.

The construction of the SSP line is divided into two phases. The first phase involves the construction of new stations between Kwasa Damansara and Kampung Batu, which are expected to be operational by July 2021. The second phase, which involves the construction of the stations, is expected to be completed by July 2022.

Output: The line will serve Sungai Buloh to Putrajaya corridor, which has a population of approximately two million. It will have a daily ridership of roughly 529,000 passengers upon its completion in July 2022.



Source:²⁵⁸

Cost: MYR30.53bn (USD7.6bn)

Financial structure: It is fully funded by Mass Rapid Transit Corporation Sdn Bhd (MRT Corp)



Sustainable water management

Assets that do not increase greenhouse gas emissions or that aim at emission reductions over the operational lifetime of the asset, address adaptation, and increase the resilience of surrounding environments. This covers built as well as nature-based water infrastructure.

Water management projects could include water capture and collection, water storage, water treatment (with methane emissions treatment), flood defence, drought defence, stormwater management, and ecological restoration/management.

Sector overview

Climate change, rapid urbanization and strong population growth mean that Malaysia needs to prioritise more resilient and sustainable water management.

Malaysia is endowed with abundant water resources. The country receives 907 billion m³ of rainfall²⁶¹ yearly, with renewable water resources (both surface water and groundwater) being 630 billion m³ per year, making an annual average water availability of about 28,400 m³ per capita²⁶². As 97% of the water supply in Malaysia is derived from surface water, in rivers and reservoirs, management of these water catchment areas is crucial to ensure a reliable source of water supply.²⁶³ However, changing weather patterns due to climate change, combined with irrational water use (water that is over-used, stolen or wasted) has put more challenges for water sustainability in Malaysia.

Malaysia has made great achievements in terms of clean water accessibility.

According to WHO/Unicef Joint Monitoring Programme report in 2000-2017, in 2017, 93% of the Malaysian population had access to safely managed water services and 87% to safely managed sanitation services.²⁶⁴

As the Government aims to have 99% of the population served by clean and treated water by 2020, water supply systems will need to be expanded, especially in rural areas such as Kelantan, Pahang, Sabah, and Sarawak. Rainwater harvesting systems will need to be developed in remote areas with high rainfall while the highland areas with limited access will need more gravity feed systems.²⁶⁵

Despite having relatively plentiful water resources, Malaysia still faces water shortages in several states, such as Negeri Sembilan, Johor, Perak, Kedah, Pahang and Kelantan, due to global warming and unevenly rainfalls.²⁶⁶ The Government will need to ensure water supply sustainability, especially in these stressed areas, by constructing new treatment plants or upgrading existing ones. The focus will be given to states which have water supply reserve margins of less than 10%, such as Kedah (0%), Selangor (4.5%), and Negeri Sembilan (7.5%).²⁶⁷

Another long-standing issue in Malaysia is the high level of non-revenue water - with a national average of 36.6% in 2013.^{268,269} As the government aims to reduce the non-revenue water (NRW) to 25% by 2020²⁷⁰, a holistic NRW reduction programme will need to be implemented, including meter and pipe replacement²⁷¹, monitor installation²⁷² and strict enforcement on illegal tapping.²⁷³ Hence, additional funding for research and development in water saving techniques and improving water quality is needed.²⁷⁴

Funding for expanding sewerage services and upgrading sewage treatment plants is also required. About six million tons of sewage is generated every year in Malaysia, most of which is treated and released into the rivers.²⁷⁵ Proper treatment of sewerage is pivotal, as about 97% of the water supply comes from surface water (including rivers).

According to the Eleventh Plan of Malaysia, by 2020 around 3,000 small and inefficient sewage treatment plants will be rationalised through the construction of centralised plants with larger capacities and advanced

technologies.²⁷⁶ To attract new sources of funding for these developments, as stated by the government, alternative financing methods based on privatisation concepts²⁷⁷ will be further promoted, and green financial instruments such as green sukuk²⁷⁸ will be deployed accordingly.

Due to its geographical location and weather conditions, Malaysia is prone to seasonal floods. The average annual loss from these floods amounts to MYR915m.²⁷⁹ From 2004 to 2014, Malaysia invested over MYR9.3bn in flood mitigation programmes²⁸⁰, and over MYR51bn in climate change-resilient-infrastructure during the 2011-2015 period.²⁸¹ As the focus of the Eleventh Malaysia Plan (2016-2020) was on strengthening disaster risk management, the government pledged to spend more on flood mitigation projects and maintenance of existing flood retention ponds, with an allocation of MYR443.9m and MYR150m in the 2020 Budget, respectively.²⁸² These infrastructure investments are necessary to reducing flood risk in a changing climate as well as protecting other forms of infrastructure in the future.

Financing options

Currently, the sector is mostly supported by public finance, as the majority of water infrastructure in the Malaysia is publicly owned. Green bonds could complement the funding of public water infrastructure issued by the local governments (provinces, cities, or utility companies owned by them).

One green sukuk has been issued in Malaysia where the use of proceeds is allocated to water infrastructure. Pasukhas Group (a non-financial corporate) issued a MYR200m green bond in February 2019 with use of proceeds allocated for energy, buildings, water, waste, and land use.²⁸³

Non-revenue water (NRW) among states in Malaysia 2014-2015

State	2014				2015			
	System Input Volume (MLD)	Billed Authorised Consumption (MLD)	NRW (MLD)	NRW (%)	System Input Volume (MLD)	Billed Authorised Consumption (MLD)	NRW (MLD)	NRW (%)
Johor	1,640	1,215	426	25.9	1,640	1,215	426	25.9
Kedah	1,294	697	596	46.1	1,294	697	596	46.1
Kelantan	445	225	220	49.4	445	225	220	49.4
Labuan	69	48	20	29.5	69	48	20	29.5
Melaka	478	376	102	21.4	478	376	102	21.4
N. Sembilan	744	476	267	35.9	744	476	267	35.9
Pulau Pinang	995	813	182	18.3	995	813	182	18.3
Pahang	1,108	520	588	53.1	1,108	520	588	53.1
Perak	1,237	858	379	30.6	1,237	858	379	30.6
Perlis	216	95	121	55.8	216	95	121	55.8
Sabah	1,196	577	618	51.7	1,196	577	618	51.7
Sarawak	1,192	810	381	32	1,192	810	381	32
Selangor	4,593	3,048	1,545	33.6	4,593	3,048	1,545	33.6
Terengganu	605	417	188	31	605	417	188	31
MALAYSIA	15,809	10,176	5,633	35.6	15,809	10,176	5,633	35.6

(Source: data.gov.my²⁸⁴)

Penang water supply projects^{289,290}

Proponent: The Penang Water Supply Corporation Sdn Bhd (PBAPP)

Location: Penang, Malaysia

Status: Planned. The projects will be implemented between 2019 and 2021

Classification: Water treatment and distribution

Description: These five water supply projects are worth MYR501m. The project works include the development of the Butterworth-Penang island Twin Submarine Pipeline, Sungai Perak Raw Water Transfer Scheme (SPRWTS); upgrade of all existing water treatment plants, reservoirs and pumping stations; installation of new pipelines; and, replacement pipelines; and non-revenue water management. Among them, SPRWTS will be the last for development, projected to finish by 2025²⁸⁵.

Once implemented, the Butterworth-Penang island Twin Submarine Pipeline will ensure more efficient delivery of treated water from the Sungai Dua Water Treatment Plant in Seberang Perai and serve as a back-up to the first submarine pipeline, commissioned in 1973. Meanwhile, Sungai Perak Raw Water Transfer Scheme helps to tap the second major raw water resources for Penang.²⁸⁶



Source:²⁹¹

Output: Upon completion, the SPRWTS treatment plant can pump 1000 million litres of water per day.²⁸⁷ The projects will reduce Penang's over-dependence on water supply from Sungai Muda and ensure the state's water sufficiency and security towards 2050.

Cost: MYR501m (USD124m)²⁸⁸

Financial structure: The project is 100% funded by The Penang Water Supply Corporation Sdn Bhd (PBAPP)

Stormwater Management And Road Tunnel (SMART) project

Proponent: Government of Malaysia, Malaysian Highway Authority (LLM), and Department of Irrigation and Drainage Malaysia (JPS)

Location: Bukit Bintang, Malaysia

Status: Completed in 2007

Classification: Flood defences, water infrastructure, water

Description: The Stormwater Management And Road Tunnel (SMART) is a multi-purpose tunnel that combines floodwater storage and diversion tunnel with a highway tunnel that will carry traffic. This tunnel is 9.7 km long, and 13.2 m in diameter. The tunnel has a combined capacity of 3 million m³. This tunnel is the longest stormwater tunnel in South East Asia.²⁹²

Output: The construction of the tunnels makes the city more resilient to flash flooding and mitigate recurring floods in the area. The tunnel is used to divert and store stormwater, whilst allowing traffic to flow when the tunnel was not being used for the stormwater. In cases of severe storms, the traffic tunnel can be evacuated and floodwater will fill the tunnel.



Source:²⁹⁴

Cost: MYR1.89bn (USD4706m)

Financial structure: Public-Private Partnership (PPP), joint venture pact between MMC Corp Berhad and Gamuda Berhad with the Department of Irrigation and Drainage Malaysia and the Malaysian Highway Authority²⁹³

Langat 2 Water Treatment Plant^{298,299}

Proponent: Pengurusan Aset Air Berhad (PAAB)

Location: Selangor, Malaysia

Status: Completed

Classification: Water distribution, water infrastructure, water

Description: The Langat 2 Water Treatment Plant (Langat 2) is the country's largest water facility. The plant is made up of two distribution channels, Stream A & B, each with a capacity of treating and distributing 565 million litres of water daily.²⁹⁵ The channels will feed into the Northern and Western Corridors that supply water to areas in Puchong, Jalan Klang Lama and Petaling Jaya Selatan within Petaling, Setiawangsa, Desa Tun Hussein Onn, Ulu Kelang, and Ampang in Gombak, Jalan Hulu Langat and Sungai Lui in Hulu Langat. In 2020, the plant is only one-third operational. The plant will be fully operational in 2023.

Output: The plant will process and distribute about 350 MLD a day. When it is fully operational and at its maximum capacity, the plant will deliver 1,130 MLD of treated water to millions of people in the Klang Valley.²⁹⁶



Source:³⁰⁰

Cost: MYR8bn (USD 1.99bn)

Financial structure: Malaysia State Budget and Soft Loan from Japan International Cooperation Agency (JICA)²⁹⁷

Pantai 2 Sewage Treatment Plant

Proponent: Ministry of Energy, Green Technology & Water (KeTTHA) as owner and Sewerage Services Department (JPP) as implementor

Location: Pantai Dalam, Kuala Lumpur, Malaysia

Status: Completed (operational)

Classification: Water treatment, water infrastructure, water

Description: Pantai 2 Sewage Treatment Plant was the largest sewage treatment plant and the first underground sewage treatment plant in Malaysia. With a treatment capacity of 320,000 tons per day, it could serve treatment needs for 1.43 million people.³⁰¹

The Pantai catchment area covers 6,700 hectares in the central and south-western parts of Kuala Lumpur—including Bandar Baru Sentul, Sentul Raya, the Bukit Kiara central business district, Taman Botani and parts of Petaling Jaya.

Output: The bio-gas generator in this plant converts methane produced during the sludge treatment to generate up to 700 kilowatts of auxiliary power. The rainwater harvesting system in the plant has a multi-stage filtration and reverse osmosis membrane system that recycles bio-effluent into 2,460 cubic metres of treated water daily for plant operations.



Source:³⁰⁴

This plant centralizes the sewage treatment, and closed 140 small plants, reducing the pollution into the Klang River. This plant also capitalizes renewable resources for energy and water to reduce pollution.³⁰²

Cost: MYR983mn (USD244m)

Financial structure: PPP, Beijing Enterprise Water Group (BEWG) as the EPC Contractor³⁰³



Sustainable waste management

The efficient use of resources to cut down on waste production, coupled with collection and disposal systems that promote reuse and recycle, thereby minimising residual waste going into energy from waste facilities. Where waste must go to landfill, there are gas capture systems installed to minimise emissions as well as measures to minimise run-off and other negative impacts on surrounding environments.

Sector overview

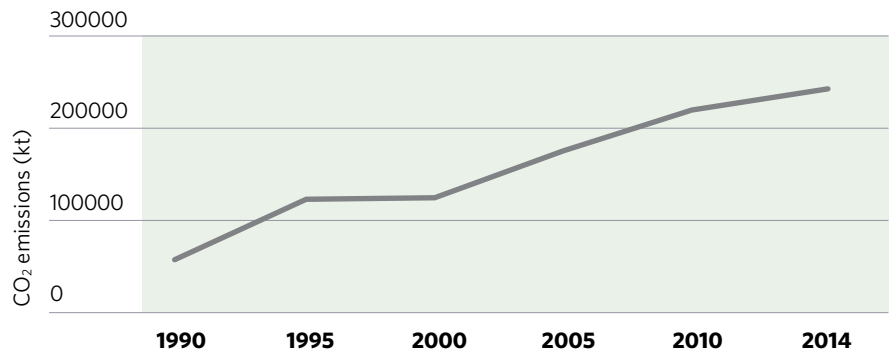
CO₂ emissions have been significantly increasing in Malaysia since 2000. Emissions amounted to 250.3 million tonnes in 2018, up from 241.6 million tonnes in 2017.³⁰⁵ The waste sector was the third contributor to CO₂ emissions after energy (electricity consumption and transportation).³⁰⁶

At the 2015 Paris Climate Conference and Conference of Parties (COP21), Malaysia made a commitment to reduce its CO₂ emissions per unit of GDP by 45% based on 2005 levels by 2030.³⁰⁷ This 45% target is also specified in the intended Nationally Determined Contribution (NDC), of which 35% on an unconditional basis and a further 10% is with international support.³⁰⁸ Accordingly, the country's authorities acknowledge the importance of waste management to mitigate GHG emissions in its NDC to achieve this goal.³⁰⁹

With regard to waste discharge, around 38,000 tonnes of waste was generated each day in Malaysia in 2016, of which only 17.5% was recycled.³¹⁰ Food waste is a major component of generated waste (45%) and contains high organic compounds.³¹¹ Due to unseparated waste, more than 30% of potentially recyclable materials such as paper, plastic, aluminium and glass are still directly disposed of in landfills.³¹² With an estimated population of nearly 30 million Malaysians in 2020, it is expected that the amount of waste will increase to 16.76 million tonnes.³¹³ Among different generation sources, household disposal is the highest contributor to waste discharge.

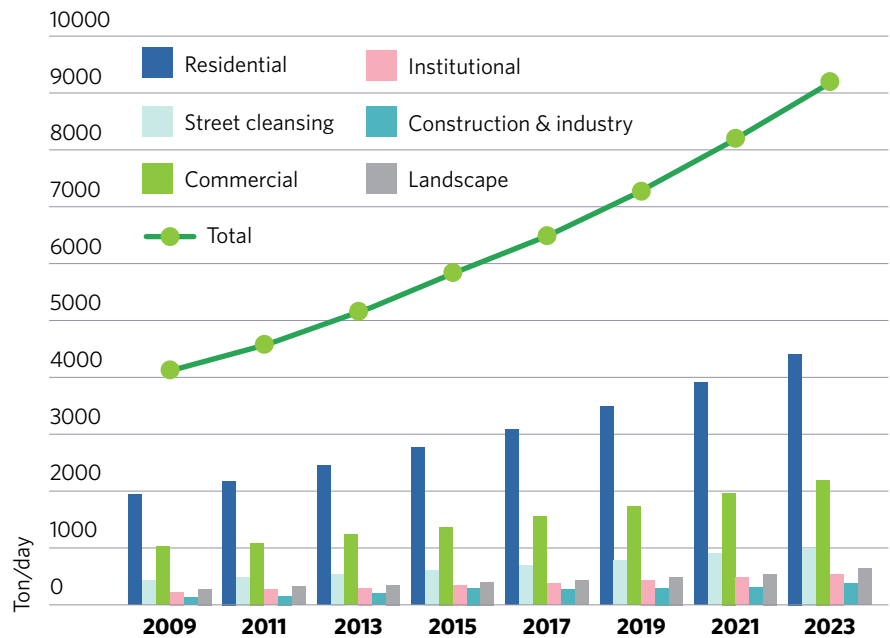
Regarding management methods for waste disposal, the highest percentage flows to 'Other disposal sites' (open dumpsites, where waste is illegally disposed of) followed by sanitary landfill and then recycling (see table right). The government aims to close all the illegal dumpsites by 2020,³¹⁴ so it is expected that landfilling be the most common practice followed by recycling and incineration.³¹⁵

CO₂ emissions in Malaysia continue to rise



Source: World bank, 2020³²¹

Residential sector accounts for the largest proportion of waste generation in Kuala Lumpur



Source: Fauziah & Agamuthu, 2003³²²

However, most landfills in the country are small scale operations with varying designs and environmental and health conditions.³¹⁶ According to the Solid Waste Management and Public Cleansing Corporation (SWCorp Malaysia), there are 161 operational landfills and 141 closed sites across the country.³¹⁷ Among those operates, there are only 14 sanitary landfills.¹⁸

In addition to improving landfill conditions, the Malaysian government plans to reduce landfill waste disposed by 40%. They aim to reduce 22% through recycling and around 80% through intermediate treatment, such as waste-to-energy, composting and material recovery.³¹⁸ Waste-to-energy (WTE) plants will be part of this solution with projects under construction and planned in Ladang Tanah Merah, Negeri Sembilan and Sungai Udang.³¹⁹

Method of waste disposal in Malaysia³²³

Treatment	Percentage of Waste Disposed		
	2002	2006	2020 (target)
Recycling	5.0	5.5	22.0
Composting	0	1.0	8.0
Incineration	0	0	16.8
Inert landfill	0	3.2	9.1
Sanitary landfill	5.0	30.9	44.1
Other disposal sites	90.0	59.4	0

Source: A. Periathamby, et al. (2009)

It is suggested that large-scale incineration technology in Malaysia is inevitable, due to the scarcity of spared land for new landfill areas in the future.³²⁰ The challenge will be to develop facilities that use processes that produce low to no GHG emissions and have minimal impact on the surrounding environment and the health of local populations.

Financing options

Most of the major waste management assets and projects in Malaysia are publicly owned, with public financing used primarily for waste treatment facilities, waste-to-energy processing and sanitary refill infrastructure. Waste treatment facilities usually demand significant capital. Development via PPPs or through the issuance of green bonds could offer options for municipalities to fund projects.

Privately owned assets and projects, which could include recycling facilities and some waste-to-energy facilities, offer other means of debt and equity investment. Accordingly, investment pathways could include participation in green bonds and consortium debt arrangements and/or equity stakes in individual projects via PPPs or other public-private or private ownership and financing structures.

Ladang Tanah Merah Waste-To-Energy (WTE) incinerator plant^{324,325}

Waste-To-Energy (WTE) incinerator plant

Proponent: Cypark Resources Bhd

Location: Ladang Tanah Merah, Port Dickson, Negri Sembilan

Status: Completed

Classification: Waste, Energy from Waste

Description: Ladang Tanah Merah Waste-To-Energy (WTE) incinerator plant is known as a SMART (solid waste modular advanced recovery and treatment) WTE project, designed to sustainably convert solid waste into electricity.

The project covers an area of 4ha and includes a waste receiving and segregation facility with material recovery or recycling technology, and Fully Anaerobic Bio-reactor System.

The project was put into commercial operation in 2019, being the first WTE incinerator project in Malaysia.

Output: When fully operational, the plant should be able to handle 600 tonnes of solid waste per day and produce from 20 MW to 25 MW of energy, which is sufficient for about 25,000 households within its vicinity.



Source:³²⁶

Cost: MYR300m (USD74m)

Financial structure: PPP arrangements under Build-Operate-Management-Transfer Contract for at least 25 years

Kajang Waste-to-Energy Plant

Proponent: Core Competencies Sdn Bhd/Recycle Energy Sdn Bhd

Location: Semenyih, Malaysia

Status: Completed

Classification: Waste to energy plants, waste to energy, waste and pollution control

Description: The WTE plant consists of a refuse-derived fuel (RDF) facility, which prepares the fuel, and the steam power plant. The facility has the capacity to process approximately 1100 tons of municipal solid waste (MSW) daily into RDF in fluff form and then use that fuel to produce approximately 8 MW of electricity daily.³²⁷

This plant enables waste recovery of recyclables in Kajang municipality and enabling further digestion process to release methane-rich biogas for power generation.

It operates 16 hours a day, producing enough fuel for 24-hour operation of the power plant.³²⁸

Output: Waste to Energy plant that processes 1100 tonnes of



Source:³²⁹

MSW daily and produces 8 MW of electricity used in-house and exported to the national grid.

Cost: MYR 1bn (USD 250m)

Financial structure: Equity

Waste to Energy Jeram Worldwide Holdings/ Western Power Clean Energy Sdn Bhd WTE Project³³²

Proponent: Worldwide Holdings Berhad

Location: Jeram, Selangor, Malaysia

Status: Planned (first phase to be completed in 2022)

Classification: Waste to energy plants, waste to energy, waste and pollution control

Description: The plant will be developed in two phases in a 15 acre of land in Jeram Sanitary Landfill in the state. The plant will have a capacity to process 1,200 tonne of waste per day.³³⁰

Output: The first phase of the facility will produce between 20 to 24 MW of green energy, delivering energy to 25,000 households³³¹

Cost: MYR 1bn (USD 250m)

Financial structure: Joint venture between China Western Power Industrial Co. and China Western Power International; Western Power Clean Energy



Source:³³³

Other green opportunities

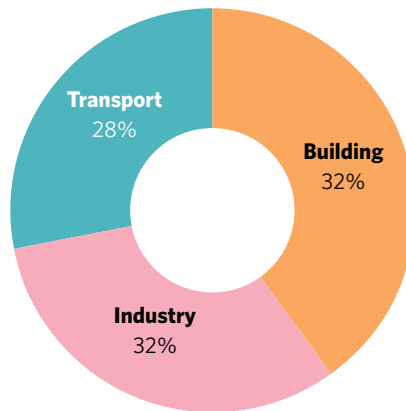
Green buildings

Globally, the buildings and construction sector has been a large contributor of CO₂ emissions, stubbornly remaining at around 39 percent of total carbon dioxide emissions.³³⁴ In Malaysia, buildings consume almost the highest energy and the highest energy consumption comes from electricity³³⁵ which is also the biggest CO₂ emitter.³³⁶

Thus, embracing low carbon development approaches for buildings is essential towards making Malaysia a low-carbon, climate-resilient green economy. In its 2030 Sustainable Goals, the country aims to reduce 25% of gross consumption of electricity from the building sector, while pledging to reduce up to 40% of CO₂ emission per GDP by 2020.³³⁷ Among the first actions taken was the introduction of new building definitions and concepts; for instance, Low Energy Office (LEO) in 2002 and Green Energy Office (GEO) in 2007.³³⁸ While LEO's designer target to achieve 50% of energy saving and reduce construction cost by 10% compared to conventional office buildings, a GEO building strives to minimize energy demand and make full use of renewable energy from its own solar panels.³³⁹

In addition, a number of green building rating tools have developed in Malaysia. The pioneer is Green Building Index (GBI) which was introduced by Pertubuhan Akitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia in 2009.³⁴⁰

Energy consumption by sector



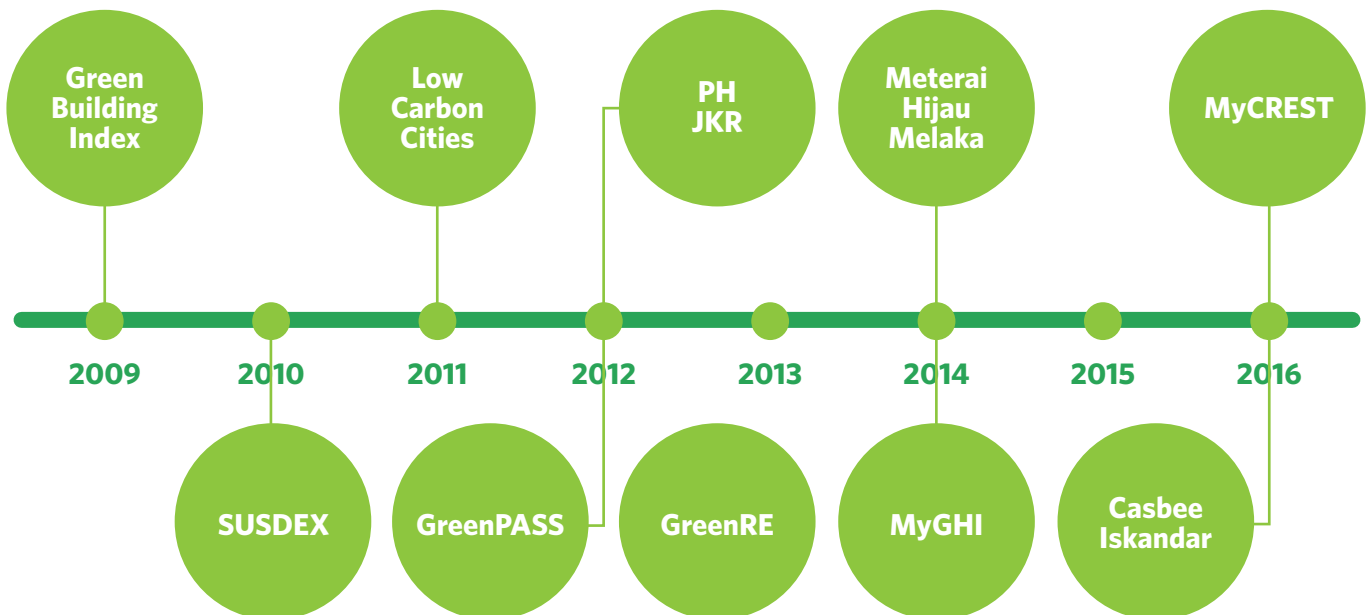
(Source: Energy Malaysia, 2017³⁵¹)

Buildings are awarded GBI based on six criteria, including Energy Efficiency, Indoor Environment Quality, Sustainable Site Planning and Management, Materials and Resources, Water Efficiency and Innovation. Subsequently, a series of newly developed tools were introduced and can be applied to all types of buildings. Recently, the Malaysia Carbon Reduction and Environment Sustainability Tool (MyCREST)³⁴¹ was introduced to quantify carbon emissions and sustainable impacts of the built environment and is considered to be the most comprehensive of all tools since it takes into account both criteria check list and carbon calculation.³⁴²

There are two leaders in Malaysia's green building space - the current Ministry of Entrepreneur Development and Cooperatives and the Malaysian Green Technology Corporation which are LEO and GEO buildings respectively.³⁴³ In recent years, many other Malaysian government buildings have also adopted green building standards and are labelled GBI.³⁴⁴ In 2010, Perdana Putra, the Malaysian Prime Minister's office building was refurbished following GBI's inception, helping to reduce the building's energy intensity by 38%, water usage by 40% and CO₂ emissions by 30%.³⁴⁵ The building was granted with Platinum GBI rating and set an iconic example for the nation.³⁴⁶

Furthermore, in 2011, the then Ministry of Energy, Green Technology and Water introduced the Low Carbon Cities Framework (LCCF) which looks at addressing carbon emissions in 4 main areas: urban environment, urban infrastructure, urban transportation and buildings.³⁴⁷ One of the pioneering and flagship green townships is the Federal Government Administrative Centre of Putrajaya.³⁴⁸ It is taking the lead with a goal to reduce its GHG emissions intensity by 60% by 2025 compared with 2012 levels, making the city cooler by two degrees Celsius.³⁴⁹

Development of sustainability rating tools in Malaysia



(Source: Building and Investment, 2018³⁵⁰)

Merdeka PNB 118 Tower^{353,354,355}

Proponent: PNB Merdeka Ventures Sdn Bhd

Location: Kuala Lumpur, Malaysia

Status: Under construction

Classification: Green building

Description: Merdeka PNB 118 Tower (or Merdeka 118) is being built in the vicinity of Merdeka Stadium in Jalan Hang Jebat, Kuala Lumpur. It is a 118-storey building with a completed height of more than 635 meters. It will have 83 levels of office space, 16 levels of luxury hotel, while the remaining floors will accommodate the sky lobby, observation deck, restaurants, etc. Upon completion, it will be the tallest building in Malaysia and rank amongst the world's ten tallest buildings.

The construction of the Tower was proposed in 2010 and is divided into 3 phases. Phase 1 and phase 2 are expected to be completed by the second quarter of 2022 while the Phase 3 is due for completion in 2024/2025.

Output: The tower will serve as the next great icon of Kuala Lumpur. The development of Merdeka PNB 118 is also expected to create about 10,000 jobs and business opportunities for over 100 skills.



Source:³⁵⁶

Cost: MYR5bn (USD1.24bn)³⁵²

Financial structure: Private funding from PNB Merdeka Ventures Sdn Bhd, which was partly raised via a MYR2bn green sukuk.

Sustainable land-use

Agriculture, including forestry and timber products, has long been a major sector of Malaysia's economy.³⁵⁷ According to a Food and Agriculture Organization (FAO) study in 2017, Malaysia was the world's largest producer and exporter of palm oil, and the third largest producer and exporter of natural rubber.^{358,359} In the 1970s, Malaysia was a predominantly agriculture-based economy.³⁶⁰ Today, agriculture is the third largest contributor to the country's economy, accounting for approximately 7.8% of total GDP in 2020.³⁶¹

Resilience in the agriculture sector is important to secure not only Malaysia's food sources but also economic growth. The development of the agriculture sector was guided by the National Agro-food Policy, 2011-2020 and the National Commodity Policy, 2011-2020, which aimed to increase food production and exports of industrial commodities.³⁶² The sector recorded an average growth of 2.4% during 2011-2015 period, continued with 3.5% per annum during 2016-2020.³⁶³

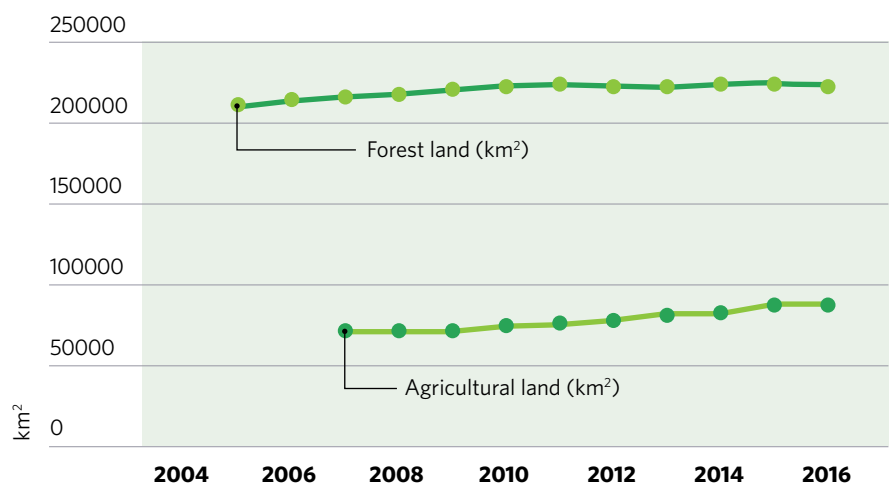
Both agricultural land and forest land have slightly increased over the past 10 years. Regarding agriculture, there was a diminishing rate of agricultural land use for rubber, cocoa, coconut and paddy while the corresponding land use for oil palm, vegetables and fruits were on the increase due to the shift in food consumption.³⁶⁴ Deforestation happened in

Malaysia with a forest cover loss of nearly 5Mha in 2011;³⁶⁵ however, plantation and conservation efforts have been heavily exercised to reverse the trend. Today, more than half the tree cover of peninsular Malaysia consists of tree plantations.³⁶⁶ Key achievements of land use and sustainable forest practices in Malaysia include the gazettements of Permanent Reserved Forest in Pahang, Perak and Selangor, leading to GHGs emission avoidance of 11.8 million tCO₂eq as of 2013.³⁶⁷

Finance for sustainable agriculture comes from both public and private

sectors. The Government offers flexible repayment based on harvest cycles of agro-food commodities, and soft loans for certified farms through the Agrobank, while private investment comes from individual farmers.³⁶⁸ The National Conservation Trust Fund for Natural Resources was established in 2014 dedicated for conservation efforts.³⁶⁹ Bonds are not commonly used as a tool to raise finance within the agriculture sector and the same applies to green bonds with very few green bonds issued globally to finance land use and agriculture projects.³⁷⁰

Land use change in Malaysia



(Source: World Development Indicators, World Bank)

7. Measures for growing green infrastructure

The growth of green infrastructure pipelines and associated green finance (including the green bond market) can be aided by key policy and institutional changes. Such measures act to raise the profile of green infrastructure, support critical finance channels for infrastructure development stakeholders, diversify risks and create more options for investors.

Malaysia has already shown leadership in this regard by incentivising green bond issuance through the Green SRI Sukuk Grant Scheme (now called the SRI Sukuk and Bond Grant Scheme). Other measures could include:

Governments/policymakers:

- Incorporate climate risk exposure into new infrastructure plans, accounting for future depreciation of assets due to change in precipitation patterns, temperature increases and extreme weather events.
- Adopt international guidelines/best practice on green. International consistency of definitions is critical for attracting international capital flows. Policymakers should therefore leverage ambitious internationally-accepted definitions of green to avoid market fragmentation.
- Improve the visibility of green infrastructure investment pipelines to help investors understand that there is a sufficiently large pool of financially attractive investments that are also green.
- Adjust regulatory requirements, including the promotion of a standardized green tagging approach for project finance and integration of climate criteria. It could also include the use of regulation as well as the mandating of national development banks to support climate-related infrastructure projects.
- Issue a sovereign or sub-sovereign green bond, to send a strong signal to the market.
- Promote “COVID Recovery” bond programmes, with the issuance of green, resilience and/or blue bonds that support a more sustainable recovery, and which exclude activities that are at risk from future shocks, for instance, assets that could become stranded as a result of climate policy changes, or which are not resilient to climate physical risks.

Development Finance Institutions

- Increase blended finance solutions to channel capital to climate investments and activities. This could include blended finance facilities supported by development banks and developed country governments, risk mitigation measures, credit enhancement, guarantees and foreign exchange hedging products.
- Promote climate-related financial risks disclosure – e.g. supporting the implementation of recommendations of the Task Force for Climate-related Financial Disclosure (TCFD) – to boost investor confidence in the market.

Issuers

- Learn - Enhance capacity through training on green bond definitions and guidelines. A greater understanding of green definitions, taxonomies and concepts can allow for issuers to better consider future climate risks thereby stimulating green bond and sukuk issuances. Capacity building efforts must focus on technical skills development that is institutionalized rather than technical assistance through external consultants
- Report and track resilience investments. Accurate tracking of Green Bonds for Climate Resilience can help to identify opportunities available to investors and drive greater capital flows toward investments in resilience. It can support government agencies in developing policy and regulatory guidance around the labelling, issuing and reporting on Green Bonds for Climate Resilience. Importantly, tracking and reporting on the adaptation-focused bonds within the green bond market will ensure the continued integrity of the market as a whole. It must be noted that A & R may be embedded within bond issuances which complicate the labelling and tracking of capital that is dedicated to climate adaptation and resilience. To attract investors particularly interested in A&R financing, the issuer should provide such transparency.

Investors

- Expand green mandates. Green mandates have been critical in driving the green bond market by providing a ready source of capital to invest in the growing supply of investment opportunities. Expanded mandates should also consider better capacity to assess emerging market opportunities such as those in ASEAN.
- Get involved in asset creation and mediation – talk to governments about what they have to do to transition to a low carbon economy and what is capital is needed.

Appendix 1: Green standards in Malaysia

Green Standard	Description	Sector(s)	Applicability in Vietnam
National			
Green Building Index (GBI) ³⁸²	The index was introduced by Pertubuhan Akitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia in 2009. It provides guidance for certifying green buildings based on six criteria, including Energy Efficiency, Indoor Environment Quality, Sustainable Site Planning and Management, Materials and Resources, Water Efficiency and Innovation. ³⁷¹	Building, Construction, Township	As of end 2020, about 563 projects have been awarded with GBI, covering a total gross floor area of 24.7 million square metres. ³⁷⁵
Low Carbon Cities Framework (LCCF) ³⁸³	The framework was introduced by the then Ministry of Energy, Green Technology and Water in 2011. It provides guidance for local authorities, residents and businesses on how to transition their cities into low carbon cities; and looks at addressing carbon emissions in four main areas: Urban Environment, Urban Infrastructure, Urban Transportation and Buildings.	Building, Infrastructure, City	One of the pioneering and flagship green townships is the Federal Government Administrative Centre of Putrajaya. ³⁷⁶ It is taking the lead with a goal to reduce its GHG emissions intensity by 60% by 2025 compared with 2012 levels, making the city cooler by two degrees Celcius. ³⁷⁷
Malaysia Carbon Reduction and Environment Sustainability Tool (MyCREST) ³⁸⁴	The tool was introduced in 2016 to quantify carbon emissions and sustainable impacts of built environment. It is considered to be the most comprehensive of all tools, as it takes into account both a criteria checklist and a carbon calculation. ³⁷² MyCREST is focused on buildings design, construction and operation and offers 4 rating tools: (i) MyCREST New Construction, (ii) MyCREST Existing Building, (iii) MyCREST New Construction for Non-Air Conditioned Buildings and (iv) MyCREST New Construction(Healthcare)	Building	Kementerian Kerja Raya Tower (KKR Tower) is the first building to achieve a MyCREST rating of five. ³⁷⁸
Sustainable and Responsible Investment Sukuk Framework (SRI) ³⁸⁵	The SRI Sukuk Framework was launched by the Securities Commission Malaysian in 2014 to facilitate the financing of sustainable and responsible investment initiatives. It is considered an extension of the existing sukuk framework. In addition to all requirements in the Guidelines on Sukuk continued to be applied, this framework addresses areas for the issuance of SRI Sukuk, including: utilization of proceeds, eligible SRI projects, disclosure requirement, appointment of independent party and reporting requirement. ³⁷³	Sukuk	The first green sukuk issuances under Malaysian SRI sukuk framework includes MYR250m by Tadau Energy Sdn Bhd; MYR1bn by Quantum Solar Park (Semenanjung) Sdn Bhd and MYR245m by Sinar Kamiri Sdn Bhd. ³⁷⁹
Regional			
ASEAN Green Bond Standards (AGBS) ³⁸⁶	The standards were developed and launched in November 2017 by the ASEAN Capital Markets Forum. The standards also provide guidance on the classification of green projects in the region that are qualified for the AGBS label in the region. These projects specifically exclude fossil fuel-related projects. Companies in Malaysia, Singapore and Indonesia have already issued bonds labelled as ASEAN Green Bonds. ³⁷⁴	Energy, Transport, Water, Buildings, ICT, Waste, Nature Based Assets, Industry and Commercial activities.	The standards can be applied in Malaysia. Issuers may opt to issue bonds/sukuks which adopt both the ASEAN Bond Standards and SC's Sustainable and Responsible Investment ("SRI") sukuk framework. ³⁸⁰
ASEAN Sustainability Bond Standards (ASEAN SUS) ³⁸⁷	The standards provide the framework to finance or re-finance a combination of both Green and Social Projects that respectively offer environmental and social benefits. It also provides guidance on the classification of sustainable projects.	Energy, Transport, Water, Buildings, ICT, Waste, Nature Based Assets, Industry and Commercial activities.	The standards can be applied in Malaysia. ³⁸¹

Green Standard	Description	Sector(s)	Applicability in Vietnam
Global			
National Standards for Environmental Management Systems (ISO 14001)³⁹²	The ISO 14001 standard specifies requirements for an effective environmental management system (EMS). It provides a framework that an organization can follow to better control its environmental impacts.	Waste, commercial activities	The standard can be applied in Malaysia. ³⁸⁹
Effective energy management systems (EnMS)/ ISO 50001³⁹³	The ISO 50001 standard establishes an international framework for the supply, use and consumption of energy in industrial, commercial and institutional organizations. Implement an ISO 50001 compliant sustainable energy management system and demonstrate organization's commitment to continuously improving energy performance, leading to economic benefits and reduced greenhouse gas emissions.	Renewable energy, Energy efficiency	The standard can be applied in Malaysia. ³⁹⁰
Certified Emission Reduction (CERs)	Certified Emission Reduction (CERs) is a Clean Development Mechanism (CDM) that allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries. CERs is used to identify projects that can earn saleable carbon credits. ³⁸⁸	Energy, Transport, Water, Buildings, ICT, Waste Treatment	CERs can be applied in Malaysia. ³⁹¹
Climate Bonds Taxonomy³⁹⁴	Climate Bonds Taxonomy is used to identify green projects and assets which are aligned with achieving the goals of the Paris Agreement. This excludes fossil fuel power generation, internal combustion engine personal vehicles and new roads and infrastructure that facilitate their movement, and freight rail that is primarily used for fossil fuel transportation.	Energy, Transport, Water, Buildings, ICT, Waste, Nature Based Assets, Industry and Commercial activities.	The taxonomy can be applied in Malaysia
SOURCE³⁹⁵	SOURCE is a global standard created by Sustainable Infrastructure Foundation (SIF). It offers governments a global, reliable, secure, and user-friendly project preparation software to maximize public sector users financing options including PPPs by providing well-prepared projects in a consistent and transparent way to the international community of contractors, investors, and lenders.	Infrastructure	This standard can be applied in Malaysia
The Standard for Sustainable and Resilient Infrastructure (SuRe)³⁹⁶	SuRe is a global voluntary standard that integrates key criteria of sustainability and resilience into infrastructure development and upgrade, through 14 themes covering 61 criteria across governance, social and environmental factors.	Infrastructure	This standard can be applied in Malaysia
Envision³⁹⁷	Envision is a framework that includes 64 sustainability and resilience indicators, called 'credits', organized around five categories: Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Resilience. These collectively address areas of human wellbeing, mobility, community development, collaboration, planning, economy, materials, energy, water, siting, conservation, ecology, emissions, and resilience.	Infrastructure	This standard can be applied in Malaysia

Appendix 2: Sample Green Pipeline

This sample pipeline includes a list of 'green' and 'potentially green' projects taken from various publicly available sources.

Projects are categorised as **green** when we have a high degree of confidence, based on publicly available information that this project aligns with the Climate Bonds Taxonomy.

Projects are categorised as **potentially green** when there is a strong possibility that these are aligned with the Climate Bonds Taxonomy, but it is difficult to confirm alignment without going through the full and in-depth certification process.

We note that for some sectors, the definitions of 'green' are more complex meaning that 'potentially green' is often provided. For example, hydropower projects are classified as 'potentially green' due to the lack of criteria for hydropower projects within the Climate Bonds Standard and Criteria. Further, the Water criteria under the Climate Bonds Standard require an in-depth assessment which is not possible to make with publicly available information.

Four sectors are covered in the list, including: low carbon transport, renewable

energy, sustainable water management and sustainable waste management. The assessment of the 'greenness' of each project was based on the Climate Bonds Taxonomy (see back cover).

Green projects				
Sector	Project name	Location	Status	Greenness
 Low carbon transport	East Coast Rail Link (ECRL) Project ³⁹⁸	Kelantan, Terengganu, Pahang; Negeri Sembilan; WP Putrajaya; and Selangor	Under development	Green
	Sungai Buloh-Serdang-Putrajaya MRT ^{399,400}	Kuala Lumpur	Under development	Green
	Klang Valley Mass Rapid Transit Line 1 ^{401,402}	Klang Valley	Completed	Green
	Klang Valley Mass Rapid Transit Line 2 ^{403,404}	Klang Valley	Under development	Green
	Klang Valley Mass Rapid Transit Line 3 ⁴⁰⁵	Klang Valley	Planned	Green
	Johor Baru-Singapore Rapid Transit System (RTS) Link ⁴⁰⁶	Woodlands, Singapore and Johor Bahru, Malaysia	Planned	Green
	Electrification and double tracking of Gemas-JB route ^{407,408}	Gemas and Johor	Under development	Green
	Electrification of double tracking project between Subang Jaya and Terminal Skypark ⁴⁰⁹	Majlis Bandaraya Shah Alam; Majlis Bandaraya Petaling Jaya; Pejabat Setiausaha Kerajaan Negeri Selangor; Suruhanjaya Pengangkutan Awam Darat; KL Sentra	Completed	Green
	Rehabilitation of tracks in the Klang Valley phase 1 + 2 (KVDT) ⁴¹⁰	Klang Valley	Under development	Green
	Penang Sentral Phase 1 ^{411,412}	Penang	Completed	Potentially green
	Penang Sentral Phase 2 ⁴¹³	Penang	Under development	Potentially green
	Bandar Utama with Johan Setia LRT ⁴¹⁴	Bandar Utama to Johan Setia, Klang	Under development	Green
	Putrajaya monorail system ⁴¹⁵	Putrajaya	Under development	Green
Malaysian Institute of Economic Research EV manufacturing plant ^{416,417}	Negeri Sembilan	Planned	Potentially Green	

Green projects

Sector	Project name	Location	Status	Greenness
Renewable Energy				
Hydro-power 	Green & Smart Holdings mini hydro, Lubuk Palm ⁴¹⁸	Lubuk Palm, Maran	Under development	Potentially Green
	5 Kumpulan Powernet Bhd mini hydropower plants (total 32.47MW) ⁴¹⁹	Perak	Planned	Potentially Green
	Batu Bor Hidro SDN. BHD. Small hydro power ⁴²⁰	Peninsular Malaysia	Under development	Potentially Green
	Lubuk Paku Hidro SDN. BHD. Small hydro power ⁴²¹	Peninsular Malaysia	Under development	Potentially Green
Geothermal 	Tawau Green Technology Sdn Bhd geothermal plant ^{422,423}	Apas Kiri, Sabah, Malaysia	Development paused	Potentially Green
Solar 	Majulia and Greencells solar project ⁴²⁴	Mukim Bebar, Daerah Pekan	Completed	Green
	Sinar Kamiri Sdn Bhd's power plant ⁴²⁵	Sungai Siput, Perak, Malaysia	Completed	Green
	Kuala Ketil Photovoltaic Solar Farm ⁴²⁶	Kuala Ketil, Kedah	Completed	Green
	TNB Solar Sepang plant ⁴²⁷	Kuala Langat	Completed	Green
	Leader Solar Energy plant ^{428,429}	Kuala Muda	Completed	Green
	TNB Bukit Selambau Solar plant ⁴³⁰	Bukit Selambau, Kedah	Under development	Green
	Scatec solar's solar power plant 1 (Gurun solar power plant) ⁴³¹	Gurun, Kedah, Malaysia	Completed	Green
	Scatec solar's solar power plant 2 (Jasin solar power plant) ^{432,433}	Jasin, Melaka, Malaysia	Completed	Green
	Scatec solar's solar power plant 3 (Merchang solar power plant) ⁴³⁴	Merchang, Terengganu, Malaysia	Completed	Green
	Kota Tinggi Solar PV Park ^{435,436}	Kota Tinggi, Johor, Malaysia	Completed	Green
	Ib vogt GmbH and Coara Solar Sdn Bhd solar plant ⁴³⁷	Marang, Terengganu	Under development	Green
	Cypark Resources Berhad and Impian Bumiria Sdn Bhd solar plant	Marang, Terengganu	Under development	Green
	JKH Renewables Sdn Bhd and Solarpack Asia Sdn Bhd solar plant ⁴³⁸	Kuala Muda, Kedah	Under development	Green
	ENGIE Energie Services SA and TTL Energy Sdn Bhd solar plant	Kerian, Perak	Under development	Green
Konsortium Beseri Jaya Sdn Bhd and Hanwha Energy Corp Singapore Pte Ltd solar plant	Pekan, Pahang	Under development	Green	
Biomass 	Leaf Biorefinery facility ⁴³⁹	Segamat, Johor	Potential	Potentially Green
	BELL Eco Power's Biomass Power Generation Plant ⁴⁴⁰	Batu Pahat, Johor	Completed	Green
	THS Resources Berhad Biomass Power Generation Plant ⁴⁴¹	Kunak, Sabah	Completed	Green
	Sungai Dingin Palm Oil Mill Biomass Power Generation Plant ⁴⁴²	Sungai Dingin, Kedah	Completed	Green
	Titi Serong power plant, Parit Buntar (Perak) ⁴⁴³	Parit Buntar, Perak	Completed	Green

Green projects

Sector	Project name	Location	Status	Greenness
Sustainable Water Management 	Sayong 1 + 2 Water Treatment Plant ⁴⁴⁴	Johor, Malaysia	Completed (shut down)	Potentially green
	Semangar Water Treatment Plant ^{445 446}	Kota Tinggi, Johor	Completed	Potentially green
	Sungai Selangor Water Supply Scheme, Phase 2 + 3 ⁴⁴⁷	Bukit Badongunder, Selangor	Completed	Potentially green
	Langat 2 Water Treatment Plant ^{448,449}	Hulu Langat, Selangor, Malaysia	Completed	Potentially green
	Sri Gading Water Supply Scheme ^{450,451}	Batu Pahat, Johor	Completed	Potentially green
	Stormwater Management and Road Tunnel (SMART) ⁴⁵²	Kuala Lumpur, Malaysia	Completed	Potentially green
	Klang River Basin Environmental Improvement and Flood Mitigation Project ⁴⁵³	Klang river	Completed	Potentially green
	Putrajaya Wetlands Park in Putrajaya ⁴⁵⁴ ; Paya Indah Wetlands Park in Dengkil ^{455,456}	Selangor	Completed	Potentially green
	Development of LKIM Fishing Complex ⁴⁵⁷	Sarawak	Completed	Potentially green
	Telibong water treatment plant upgrading ^{458,459}	Tamparuli, Tuaran, Sabah	Under development	Potentially green
Telibong II water treatment plant ⁴⁶⁰	Tamparuli, Tuaran, Sabah	Under development	Potentially green	
Sustainable Waste Management 	Worldwide Holdings/ Western Power Clean Energy Sdn Bhd WTE Project ⁴⁶¹	Jeram, Selangor	Planned	Potentially green
	Kajang Waste-to-Energy Plant ⁴⁶²	Semenyih	Completed	Potentially green
	Bukit Tagar Sanitary Landfill ^{463,464}	Hulu Selangor	Completed	Potentially green
	Ladang Tanah Merah waste-to-energy plant ⁴⁶⁵	Ladang Tanah Merah, Port Dickson	Under development	Potentially green

Endnotes

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Climate Bonds Taxonomy

The Climate Bonds Taxonomy identifies the assets and projects needed to deliver a low carbon economy and gives GHG emissions screening criteria consistent with the 2-degree global warming target set by the COP 21 Paris Agreement. More information is available at <https://www.climatebonds.net/standard/taxonomy>.



ENERGY	TRANSPORT	WATER	BUILDINGS	LAND USE & MARINE RESOURCES	INDUSTRY	WASTE	ICT
Solar	Private transport	Water monitoring	Residential	Agriculture	Cement production	Preparation	Broadband networks
Wind	Public passenger transport	Water storage	Commercial	Commercial Forestry	Steel, iron & aluminium production	Reuse	Telecommuting software and service
Geothermal	Freight rail	Water treatment	Products & systems for efficiency	Ecosystem conservation & restoration	Glass production	Recycling	Data hubs
Bioenergy	Aviation	Water distribution	Urban development	Fisheries & aquaculture	Chemical production	Biological treatment	Power management
Hydropower	Water-borne	Flood defence		Supply chain management	Fuel production	Waste to energy	
Marine Renewables		Nature-based solutions				Landfill	
Transmission & distribution						Radioactive waste management	
Storage							
Nuclear							

Certification Criteria approved
 Criteria under development
 Due to commence

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