

AUSSEN WIRTSCHAFT BRANCHENREPORT MALAYSIA

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1. INTRODUCTION TO MALAYSIA: SOCIETY, ECONOMY, POLITICS

A federal constitutional monarchy, Malaysia consists of 13 states and 3 federal territories. Its landmass is separated into Peninsular (where the country's capitals Kuala Lumpur and Putrajaya can be found) and East Malaysia on Borneo by the South China Sea.

The population of Malaysia is estimated at 34.0 million in Q1 of 2024 (+2.3% y-o-y growth), consisting of 30.6 million (90%) Malaysian citizens and 3.4 million (10%) non-citizens. This reflects a return to status quo from the Covid-era when restrictions in international travel led to a sharp decrease in non-citizens. The Malaysian population is made up of a wide variety of ethnic groups, with the majority (70.1%) being Bumiputras ("Son of the Soil"). 22.6% of the Malaysian population is under the age of 15 and 70% are between the ages of 15 and 64, making the average population relatively young, though with 7.34% of the population being over 65, Malaysia is already considered an aging society, further expected to reach "aged" status (over 14%) in 2030. Due to the country's multicultural demographic, the majority of its residents grow up multilingual and speak at least two languages fluently. In large cities this generally includes English, which is the language of business throughout the country.

Malaysia ranked 55th out of 157 countries according to the World Bank's [Human Capital Index](#). In order to realize the full potential of its population, it will greatly need to make further progress in education, health, and nutrition, as well as in the outcomes of social protection. Improving the quality of school education, rethinking nutritional interventions, and providing adequate social protection are therefore among the main priority areas.

Malaysia is one of the leading nations in the Southeast Asian economic area: the gross domestic product (GDP) per capita was USD 12,570 in 2023, almost triple from 2003, and is expected to continue its upward trajectory to reach USD 13,310 in 2024. Today Malaysia can be seen as a stable emerging country with a diversified economy. In addition to a traditionally strong agricultural sector, the production and service sectors also make a large contribution to the economy today. Meanwhile, the country has become a leading exporter of electrical appliances, electronic parts, and components.

According to the World Bank, Malaysia is one of the most investment-friendly economies in the world (ranking 12th for [Ease of Doing Business in 2020](#)). This has been a major contributor to job creation and income growth. After the global financial crisis in 2009, the Malaysian economy recorded average growth rates of around 6%. However, this growth slowly flattened out over the years and was 4.4% in 2019. According to Bank Negara (Malaysia's central bank), this was the lowest economic growth since the great financial crisis and was mainly due to lower production of palm oil, crude oil and natural gas, as well as a decline in exports amid the trade war between the US and China. Due to the unstable political situation and the effects of the Covid-19 virus, the economy shrunk by -5.5% in 2020.

In 2021, Malaysia was under a state of emergency between January to August, and a resurgence in cases prompted the government to declare a nationwide lockdown on June 1st to curb the spread of the coronavirus. The tightening of containment measures pushed the country into recession for the first half of the year. However, due to the country's strong vaccination rollout as of July 2021, the year-end saw a modest recovery of +3.3%, and strengthened further in 2022 with +8.7%, moderating to +3.7% in 2023. The nation's borders fully reopened on April 1 2022, allowing a fairly strong economic recovery, as the trade and tourism sectors are among the strongest contributors to GDP. The 2024 forecast by the World Bank (as of August 2024) is +4.4%.

The current economic indicators per the [Economist Intelligence Unit \(EIU\)](#) forecasts (as of August 2024) are as follows:

Key Indicators	2023[a]	2024[b]	2025[b]	2026[b]	2027[b]	2028[b]
Real GDP growth (%)	3.5	4.4	4.5	4.4	4.7	4.6
Consumer price inflation (%)	2.5	2.5	2.5	2.3	2.4	2.3
Government balance (% of GDP)	-5.0[c]	-4.4	-3.8	-3.7	-3.5	-3.0
Current-account balance (% of GDP)	1.6[c]	2.5	2.7	3.1	3.5	3.4
Short-term interest rate (%)	3.6	3.4	3.4	3.4	3.2	3.2
Unemployment rate (%)	3.4	3.3	3.3	3.3	3.3	3.4
Exchange rate (USD:MYR)	4.56	4.70	4.57	4.44	4.27	4.17

[a] Actual [b] EIU forecasts [c] EIU estimates

A detailed statistical analysis can be found in the [Country profile Malaysia](#).

In the medium term, it is expected that Malaysia will successfully transition from an "upper middle-income economy" to a "high income economy" between 2024-2026. According to the World Bank, Malaysia's economy will depend heavily on government measures to strengthen the private sector in the short term. Currently, the external environment makes export-oriented growth difficult, while local or investment-based expansion remains limited as the country recovers from the pandemic. Other factors impeding growth are higher-than-reported inflation rates, and a weak currency.

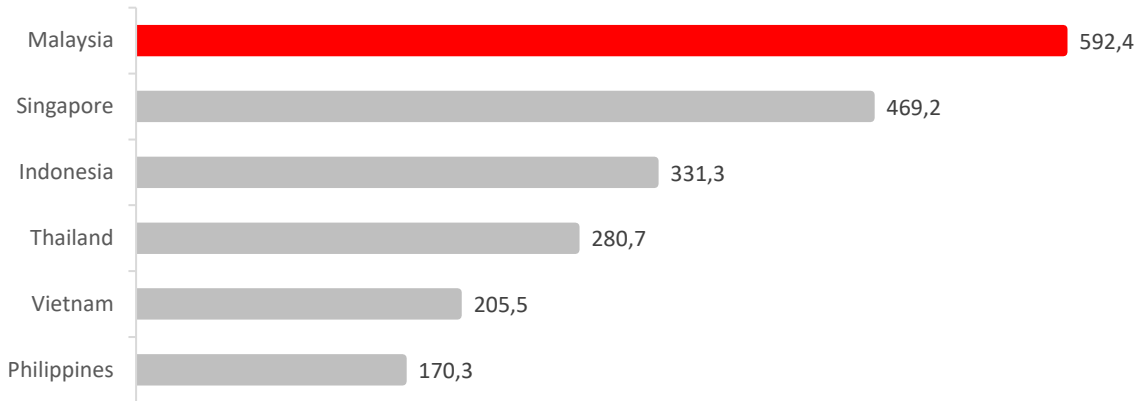
In the long run, economic growth will depend on increasing productivity levels. Although the productivity level in Malaysia has risen sharply over the past 25 years, it was still below that of several regional countries by comparison. Ongoing reform efforts are crucial.

At the political level, Malaysia is also far from stable. In 2018 the ruling coalition Barisan Nasional, which had been the dominant party, was defeated by the opposition for the first time since Malaysia's independence. This gave the country a strong, if temporary, upturn in sentiment. However, the resignation of the Prime Minister two years later, in February 2020, and that of his successor in August 2021, showed that the country still appears to be at a political impasse even after a change of government. The 15th General Election was held November 19th 2022. You can find more about the current political situation in our [Economic report Malaysia](#), as well as our [Malaysia country report](#).

2. STATUS QUO

MALAYSIA'S ECONOMIC RELATIONS WITH AUSTRIA

The importance of Malaysia for Austrian foreign trade is often underestimated and lesser known compared to other countries in the ASEAN community. In reality, however, the situation is very different, as the following graphic illustrates.



Foreign trade - Austria's exports in 2023 to the most important ASEAN countries in EUR million (source: Statistics Austria, 2024)

With EUR 402.7 million in Austrian exports in 2020, EUR 469.2 million in 2021, EUR 561.4 million in 2022, and 592.4 million in 2023 **Malaysia has ranked first among the ASEAN buyer countries for three consecutive years**. Singapore was in second place with EUR 496.2 million, followed by Thailand and Indonesia.

Exports to Malaysia have seen an especially strong growth in recent years (+23.4% in 2020-2021, and +13% in 2021-2022). This eased in the 2022-2023 term to +5.5%, but the continued growth reaffirms Malaysia's position as the most important buyer of Austrian goods and services in the ASEAN region. While Singapore also enjoys a strong position, in terms of export volume relative to population size, it is important to note that some of the export goods reported for Singapore have their final destination in Malaysia. This positions Malaysia as the biggest and one of the most promising future markets for Austrian companies in the region.

Austria also imported some EUR 583.2 million worth of goods from Malaysia – a 8.9% decline from 2022's EUR 640.1 million. The majority comes from HS code 85 (Electrical Machinery, Equipment and parts thereof) and 84 (Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof), for values of EUR 304.5 million and 93.1 million respectively.

Malaysia's manufacturing industry is a stronghold of the country. In 2023, exports of manufactured goods were valued at RM1.217 trillion or 84.5% of Malaysia's total exports, with E&E products holding the biggest share of Malaysia's total exports in 2023 at 40.4% or RM575.45 billion, a decline of 3% from 2022.

Other manufactured products that recorded significant growth in exports for 2023 were:

- Photosensitive semiconductor devices, ↑15.6% to RM30.18 B;
- Batteries and electric accumulators, ↑14.3% to RM8.5 B;
- Static converters, ↑21.8% to RM5.37 B;
- Electric control panels/parts for switching apparatus, electric control panels, ↑6.8% to RM10.35 B; and
- Parts for diodes, transistors, piezoelectric crystals & other semiconductor devices, ↑9.5% to RM6.91 B.

Malaysia's wealth of fossil resources has attracted a large number of foreign investors to the country over the past few decades. Its well-developed infrastructure and low energy prices made Malaysia an international industrial mecca, with many of the world's largest companies setting up their corporate headquarters. The period until the early 2000s was marked by rapid economic, prosperity and population growth. However, the development of water supply, sewage and waste management systems was not on par with the growth of the population, leading to issues that are ongoing up to now. In addition, the industry was not geared towards the sustainable use of resources, greatly increasing the pollution and waste per capita.

In 1990, CO₂ emissions in Malaysia were 3.1 tonnes per capita; due to continuous annual growth rates, consumption of 8.1 tonnes was measured in 2014 - this corresponds to an increase in CO₂ emissions per capita since 1990 by more than 200%, but has since dropped to 7.4 in 2020, a sign of the efforts to reduce emissions. The following graphic is used for an international comparison of CO₂ emissions. By 2030, CO₂ emissions in Malaysia are to be reduced by 45% of the 2005 level.

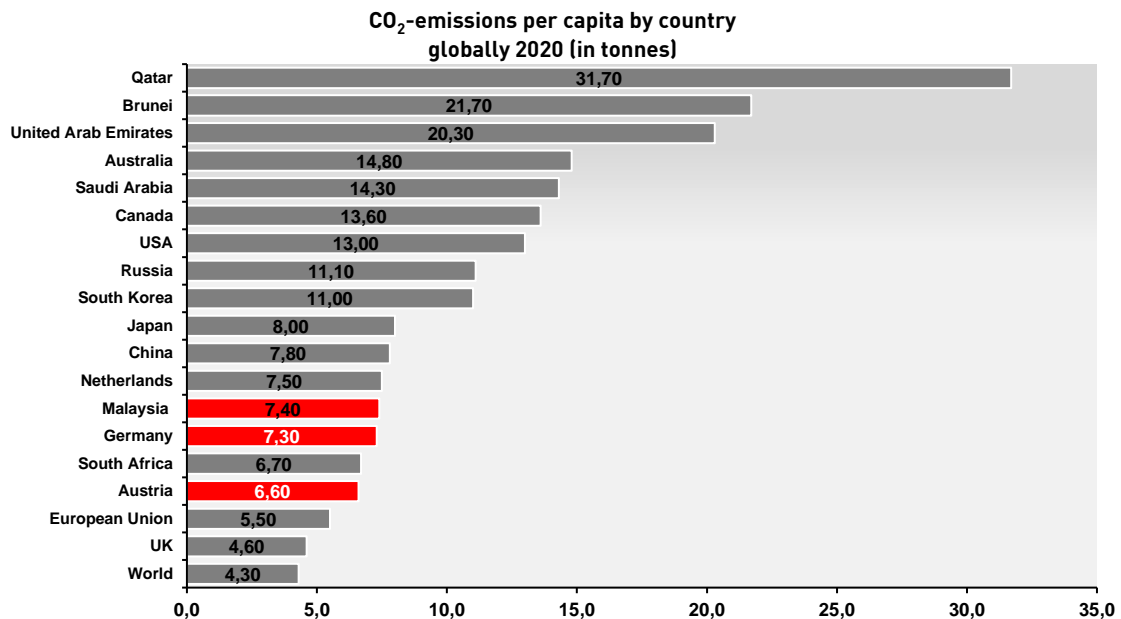


Illustration 1: CO₂ emissions per capita, Source: [World Bank](#) (2020 as the last available year)

Malaysia's National Energy Policy (1979) set out to ensure the more cost-effective use of resources and more efficient use of energy. Until the late 1990s, the Malaysian government officially followed a "Four Fuel Policy", originally announced in 1981 with the aim of reducing dependence on oil as a source of electricity generation by introducing more coal and gas as energy sources. As a result, natural gas became Malaysia's main energy supplier, followed by oil and coal and hydropower. The Five Fuel Diversification Policy, which came into effect in 2001, added renewable energy to the mix.

The demand for electricity has increased considerably in recent years and will continue to increase in the future, in tandem with economic growth. Between 2012 and 2016, the average annual growth rate in electricity consumption was around 6%. The per capita energy consumption in Malaysia (4.93 MWh in 2021), while not alarming compared to other countries (the world average in 2021 was 3.4 MWh, with Austria at 8.4 MWh), is notable in its rapid increase in consumption, which is directly comparable to the country's economic growth (2.9 MWh in 2005).

While conventional energy sources will doubtlessly remain an important part of Malaysia's energy mix, due to being rich in resources such as oil, gas, and coal, the country has recently intensified their focus on renewable energy such as hydropower, biomass, and solar. The share of renewable energies is also set to be expanded significantly with the introduction of new policies and targets, wherein the goals have increased from an initial 20% by 2025 to 31% RE contribution in the same period, and 40% by 2035. Companies have also started to take renewable energy seriously as a profitable industry. Projects in this field are now supported by the government through many different initiatives and grants in order to pave the way into an age of environmentally conscious behaviour. This creates some exciting opportunities for Austrian companies on the Malaysian market.

VIEW OF THE FUTURE

Forecasts by the International Energy Agency (IEA) predict a continuously increasing energy demand in Southeast Asia. By 2030, demand is expected to have increased by 30%. The ASEAN member states have therefore agreed to a multilateral energy cooperation (the [ASEAN Plan of Action for Energy Cooperation](#), APAEC), as well as committed to increase their share of renewable energies with an accelerated transition. The aspirational targets are a 23% share of RE in the region's energy mix, and 35% in installed capacity by 2025. To achieve these targets, the countries are both enhancing their respective national policy options and targets, as well as their strategies to accelerate their RE development.

For Malaysia, this includes the deployment of large-scale renewable energy systems, increasing infrastructure investment, and promoting smart grids, as well as improving the available technology and digitalisation. In particular, advanced RE technologies that are being explored are waste-to-energy, green hydrogen, energy storage, and solar thermal.

Although Malaysia has the shortest history of promoting renewable energy in Southeast Asia, it nevertheless has the fastest development in the region, and has surpassed its initial targets set for 2025, leading to a renewed higher target (from 20% to 31%). The current approaches and efforts suggest that there is great interest in achieving the set goals and that the country will take significant steps forward in terms of development. That is why Malaysia is certainly one of the most interesting ASEAN markets at the moment.

Furthermore, Malaysia offers the highest production density in this sector in Southeast Asia. With an expected increase in electricity demand, a corresponding infrastructure is required. According to [Tenaga Nasional Berhad](#) (TNB), the country's national energy provider, they foresee an increase in demand from 18 GW to 30 GW over the next 15 years.

Other important points to note with regards to Malaysia's targets to improve and encourage use of renewable energy include the decommissioning of coal power plants, and the development of the electric vehicle segment.

The government pledged that it would no longer build new coal-fired power plants. Cleaner electricity generation will be implemented through the operation of several gas power plants in Peninsular Malaysia to replace coal-fired power plants. This would also be supported by energy efficiency and conservation laws to regulate consumption by high-intensity consumers in the industrial and commercial sectors. In June 2024, the government announced they would begin phasing out coal-fired power plants, with targets of a 50% reduction by 2035, and complete retirement by 2044. Meanwhile, while gas plants are still expected to be part of the energy mix, all future builds will be combined cycle gas turbine plants (CCGTs), and the government is also engaging industry players to replace expiring plants with hydrogen-ready CCGTs, in order to reduce carbon emissions.

The Malaysian government is also prioritising the development of energy-efficient vehicles (EEV) production to support environmentally friendly mobility initiatives. Alongside the cancellation of all related taxes for purchases of EVs, including import fees (usually the bulk of the cost of imported vehicles), the government is also expected to encourage investments in the production of EVs or their components and infrastructure support, including EV charging stations.

Despite their swift advances in the sector, Malaysia still has a lot of catching up to do in some areas, particularly to guarantee stability and security of their energy supply. This presents manifold opportunities for Austrian companies in the sector who might have technological advancements suitable for the market.

Policies & Plans

The 11th Malaysia Plan (2016-2020) & 12th Malaysia Plan (2021-2025)

In its five-year plans, the Malaysian government regularly sets the strategic goals and formulates fundamental commitments to the economic policy pursued. Since the 8th Malaysia Plan (2000-2005), renewable energies and general issues of sustainability have played a role in Malaysian economic planning.

Despite initially modest goals from the 8th -10th plans, many of them were not realised due to cost issues. For the 11th Malaysia Plan of 2016-2020, the target was set at a fairly ambitious 2080MW, which they did manage to achieve and surpass, with the final actual installed capacity of 2774MW (excluding large hydro).

Meanwhile, in the **12th Malaysia Plan** announced in October 2021, the topics of renewable energy, energy efficiency, as well as mitigation of climate change continue to be an integral part of the plans.

The new goals include a pledge for Malaysia to become a carbon neutral country by 2050 “at the earliest”, alongside other measures to accelerate green growth. 12MP also puts a focus the 2030 SDG Agenda, where the government looks for more equitable wealth distribution to narrow disparities across income groups, ethnicities and geographic regions while ensuring environmental sustainability.

12MP's three key themes are:

- Resetting The Economy
- Strengthening Security, Wellbeing and Inclusivity
- Advancing Sustainability

with four catalytic policy enablers:

- developing future talent
- accelerating technology adoption and innovation
- enhancing connectivity and transport infrastructure
- strengthening public service.

In September 2023, a mid-term review of the 12MP was conducted, and among key points were the following environmental focuses:

- RE development and electricity supply system upgrades
- Climate change laws to be enacted, ESG regulatory frameworks to be developed
- Restructuring of electricity, diesel, and petrol subsidies

National Energy Policy (NEP)

The Malaysian government launched its **National Energy Policy (NEP)** in September 2022, with the objectives of enhancing macroeconomic resilience and energy security, achieving social equitability and affordability, and ensuring environmental sustainability. The NEP was developed to underscore the government's commitment to energy transition, and in order to achieve its objectives, numerous action plans have been laid out in the NEP. The NEP is a 'live document' and subject to periodic reviews every 3 years to ensure that the targets are achievable and to keep in line with international development in the energy transition space.

The NEP's key action plans are divided into the sectors of Energy, Hydrogen, Carbon Footprint Reduction, Electric Vehicles (EV), and Oil & Gas, while the Malaysian Government's aim to produce a low carbon economy have particular focus on:

1. Increasing urban public transport and EV penetration;
2. Advocating the use of lower carbon fuels or LNG in heavy or marine transport;
3. Increasing energy efficiency savings; and
4. Increase of both RE installed capacity and RE contribution to primary energy supply.

National Energy Transition Roadmap (NETR)

In August 2023, the government launched the **National Energy Transition Roadmap (NETR)**, designed to guide Malaysia's transition from a fossil fuel-dependent economy to a high-value green economy. This shift to cleaner energy necessitates the electrification of major polluting sectors, such as transportation, which will significantly impact the electricity sector.

The NETR seeks to decrease Malaysia's reliance on fossil fuels by promoting energy efficiency, renewable energy, and carbon capture. Its objective is to phase out coal-fired power generation by 2050, with natural gas serving as a transitional energy source. The roadmap sets a target for renewable energy (RE) capacity to reach 70% by 2050, creating substantial opportunities for TNB to grow its domestic RE portfolio. Additionally, the NETR introduced ten flagship catalyst projects, with TNB leading three of them.

New Industrial Master Plan (NIMP) 2030

On September 1 2023, Malaysia unveiled the **New Industrial Master Plan (NIMP) 2030**, an ambitious plan set to enhance the manufacturing sector with a target of increasing its GDP contribution by 6.5% annually, potentially reaching RM 587.5 billion by 2030. The NIMP 2030 focuses on six core goals: increasing economic complexity, creating high-value job opportunities, extending domestic linkages, developing new and existing industrial clusters, improving inclusivity, and enhancing Environmental, Social, and Governance (ESG) practices.

The plan introduces 21 strategies and 62 action plans across four key missions, which aim to drive technological advancement, sustainability, and deeper integration into the global value chain. Four critical enablers—financing, talent development, investor journey, and governance framework—will underpin this transformation, ensuring effective implementation and creating a supportive environment for industrial growth.

9 Mission-Based Projects (MBPs) are central to the plan, including initiatives such as launching locally-manufactured electric vehicles and converting 3,000 factories into smart factories by 2030. The government is committed to fostering high-value and innovation-driven sectors like Electrical & Electronics, Specialty Chemicals, Aerospace, Pharmaceutical, and Medical Devices, while also targeting growth in Advanced Materials, Electric Vehicles, Renewable Energy, and Carbon Capture, Utilisation, and Storage (CCUS).

To support these initiatives, RM 8.2 billion will be allocated from 2024 to 2030, with RM200 million initially set aside in the 2024 Budget. This funding will be managed through the NIMP Strategic Co-Investment Fund (CoSIF) and the NIMP Industrial Development Fund (NIDF). The NIMP 2030 also emphasizes inclusivity, aiming to stimulate economic growth across all states by leveraging their unique strengths, such as mineral-rich areas and renewable energy hubs.

Hydrogen Economy Transition Roadmap (HETR)

The **Hydrogen Economy Transition Roadmap (HETR) Malaysia 2023** was officially introduced in October 2023 as part of Malaysia's commitment to transitioning towards a more sustainable and resilient energy future. The roadmap outlines Malaysia's strategy to integrate hydrogen as a key component of its energy system. It sets ambitious targets for hydrogen production, infrastructure development, and market growth.

The HETR Malaysia 2023 is structured in phases: the short-term focus (2023-2025) involves setting up pilot projects and foundational infrastructure, while the medium-term (2026-2030) aims to scale up hydrogen production and infrastructure. The long-term goal (2031-2050) is to achieve widespread hydrogen adoption, contributing significantly to the country's carbon reduction targets.

The roadmap highlights the importance of public-private collaboration and substantial investment in hydrogen technologies. It aims to position Malaysia as a leader in the hydrogen economy, promoting environmental sustainability and creating new economic opportunities through advanced hydrogen technologies.

3. CONVENTIONAL ENERGY SOURCES

There are more than 3,500 local and international companies operating in the oil and gas industry in Malaysia. The **Ministry of International Trade and Industry (MITI)** in Malaysia is responsible for issuing licenses for the processing and refining of petroleum products. The **Ministry of Domestic Trade, Cooperative and Consumerism (MDTCC)** was also commissioned to license marketing and sales. Together, these two institutions regulate all of Malaysia's downstream activities.

With the **Petroleum Development Act (1974)**, the government gave all of Malaysia's petroleum resources to the state-owned **Petroleum Nasional Berhad (PETRONAS)**. As the trustee of all Malaysian oil and gas resources, Petronas has grown to become one of the largest oil and gas companies in the world since it was founded in the 1970s. Petronas businesses cover large areas of the oil and gas value chain: exploration, development, production, transport and logistics, marketing and distribution of crude oil, natural gas and natural gas products in Malaysia and overseas, as well as liquefaction, transport and sales of liquid natural gas (LNG).

Since oil production reached its all-time high of 294 million barrels per year in 2004, production in Malaysia has been falling continuously. Malaysia's total proven oil reserves were 6.9 billion barrels in 2022. Malaysia's exports of petroleum-based products amounted to RM 143.49 billion (EUR 30 billion) in 2023 and thus accounted for around 15% of total exports. More than half of Malaysia's refined petroleum product exports go to Singapore (24.2%), Australia (14.9%), and Indonesia (13.5%).

Malaysia has one of the best-developed natural gas pipeline networks in the ASEAN community, and its natural gas supply for the electricity supply industry is domestically sourced from Petronas with prices slightly discounted to international market prices. It is one of the most important net exporters of natural gas worldwide. However, coal is entirely imported from markets like Indonesia and Australia, used to fire power plants due to its cheaper cost compared to oil.

While Malaysia has large coal deposits on Borneo (Sarawak & Sabah), these have only been used to a limited extent because they are of low quality and are also difficult to access. Furthermore, the government has also taken steps to divest from coal, committing to total decommissioning of coal-fired power plants by 2044.

In 2020, 57,169 ktoe (kilotons of oil equivalent) of energy were consumed in Malaysia. Not surprisingly, the transportation and industrial sectors are among the top spots in the rankings.

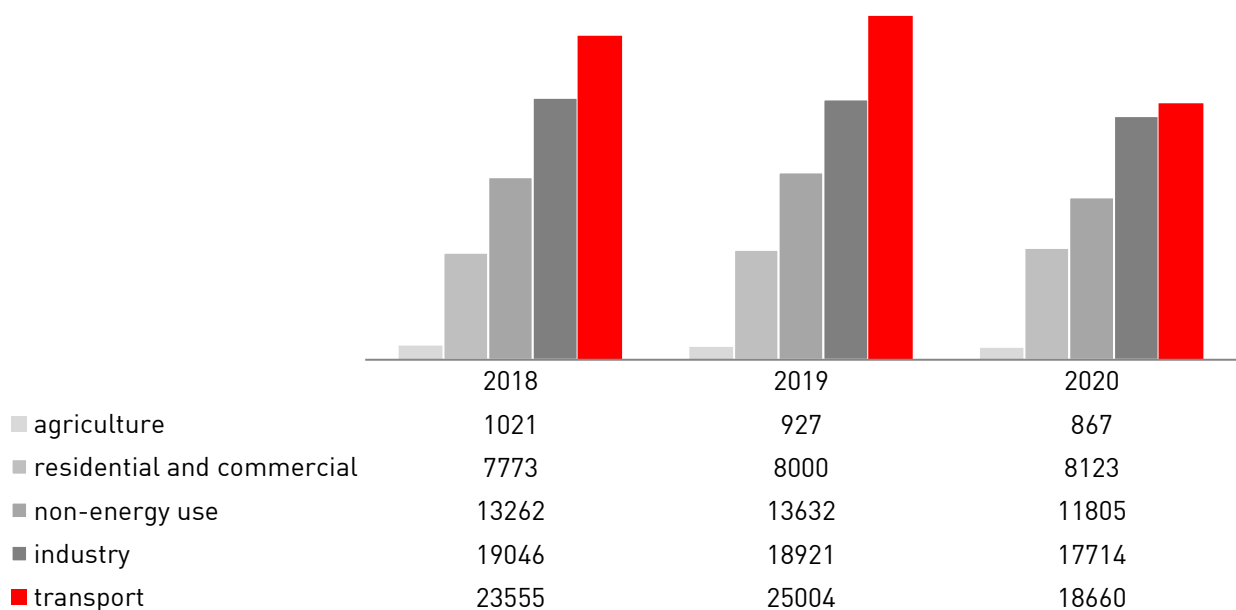


Illustration 2: Energy consumption by sector –2018-2020 in ktoe (Malaysia Energy Statistics Handbook 2022)

With fossil fuels dwindling, the Malaysian government is feeling the urgency to find alternative energy sources, especially considering that oil reserves will run out in Malaysia in the next 20 years and gas in the next 30 years.

In 2021, according to a [statement made by the Prime Minister's Department \(Economy\)](#), Malaysia's energy mix is led by natural gas (41%), crude oil (25.8%), coal (22.3%) and hydro (6.2%), with renewable energy making up the balance (4.7%). However, in the IEA's statistics of 2021 natural gas accounted for 44.9%, crude oil for 27.0%, coal for 24.0%, and hydro for 2.8%, meaning RE only made up 1% of the energy mix.

While there is still a long way to go to achieve the 31% RE capacity by 2025, the sharp growth (over +180% annually) is promising and shows the commitment made by the government to achieve its ambitious goals.

Companies are also increasingly exploring renewable energy or energy efficiency, even ones traditionally in the O&G space. A prime example is Petronas, who is building up another pillar in the RE market, acquiring companies in the solar energy sector. Petronas is also collaborating with one of Malaysia's leading research universities, Universiti Kebangsaan Malaysia, to create sustainable energy solutions, and has so far invented an electrolyser design that enables better hydrogen yield with lower power consumption.

In September 2022, PETRONAS established Gentari, a clean energy solutions company focused on delivering integrated sustainable energy solutions and seizing opportunities in the energy transition. Gentari's main areas of focus include Renewable Energy, Hydrogen, and Green Mobility, offering a range of lower-carbon solutions to help customers achieve net zero emissions.

Solarvest Holdings Bhd's subsidiary, Solarvest Energy Sdn Bhd, has been contracted by Gentari Renewables Sdn Bhd to [install solar power systems at over 300 Petronas stations across Malaysia by 2027](#). Starting in April 2024, the project will deploy more than 5.4 megawatts of solar capacity, with the installed systems expected to offset approximately 5,035 tonnes of CO₂ emissions annually once operational.

In November 2022, Petronas updated its commitment to reducing its carbon footprint, targeting a cap of 49.5 million tonnes of carbon dioxide equivalent (tCO₂e) emissions by 2025 and a 50% reduction in methane emissions by the same year. The company aims to achieve net-zero emissions by 2050, focusing on carbon capture and storage (CCS) technology and energy efficiency as key strategies for decarbonization.

In January 2024, Petronas awarded Production Sharing Contracts (PSCs) for six exploration blocks and one Discovered Resource Opportunity (DRO) as part of the Malaysia Bid Round 2023 (MBR 2023), which had been initiated the previous year. Simultaneously, Petronas launched the MBR 2024, offering five exploration blocks and five DRO clusters. In February 2024, Petronas signed two additional PSCs for DRO areas.

Tenaga Nasional Berhad (TNB), the main power company on the Malaysian Peninsula and the largest publicly traded energy company in Southeast Asia, founded its subsidiary [TNB Renewables Sdn Bhd \(TRe\)](#) in 2015 as part of a transformation program intended to help make the company one of the 10 largest electricity suppliers in the world. TRe covers several segments to expand the RE area in the local market, including Large Scale Solar (LSS), biomass and biogas projects, and emerging technologies such as battery energy storage systems (BESSs) and microgrids and virtual power plants (VPPs).

TNB is also launching [hybrid hydro-floating solar \(HHFS\) photovoltaic \(PV\) projects](#) at its hydro dam reservoirs as part of Malaysia's National Energy Transition Roadmap (NETR). Following the success of a pilot project at the Sultan Azlan Shah power station in Manjung, Perak, TNB plans to develop 2,500 megawatts (MW) of HHFS PV projects. The rollout begins with a 30MW installation at the Chenderoh hydro-reservoir in Perak, followed by similar projects at the Temenggor and Kenyir reservoirs.

Another example of transitions towards improved energy efficiency is the recent Pulau Indah Power Plant (PIPP) project, a 1,200MW plant in Pulau Indah, Selangor, Malaysia, featuring a natural gas powered Combined Cycle Gas Turbine (CCGT) with an efficiency of more than 60%, much higher than its coal or oil equivalent.

4. RENEWABLE ENERGY

The IEA definition of renewable energy includes the following sources: “electricity and heat derived from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen derived from renewable resources”. For Malaysia, according to its Sustainable Energy Development Authority (SEDA), the relevant sources are:

- Biomass
- Biogas
- Hydropower*
- Solar photovoltaic

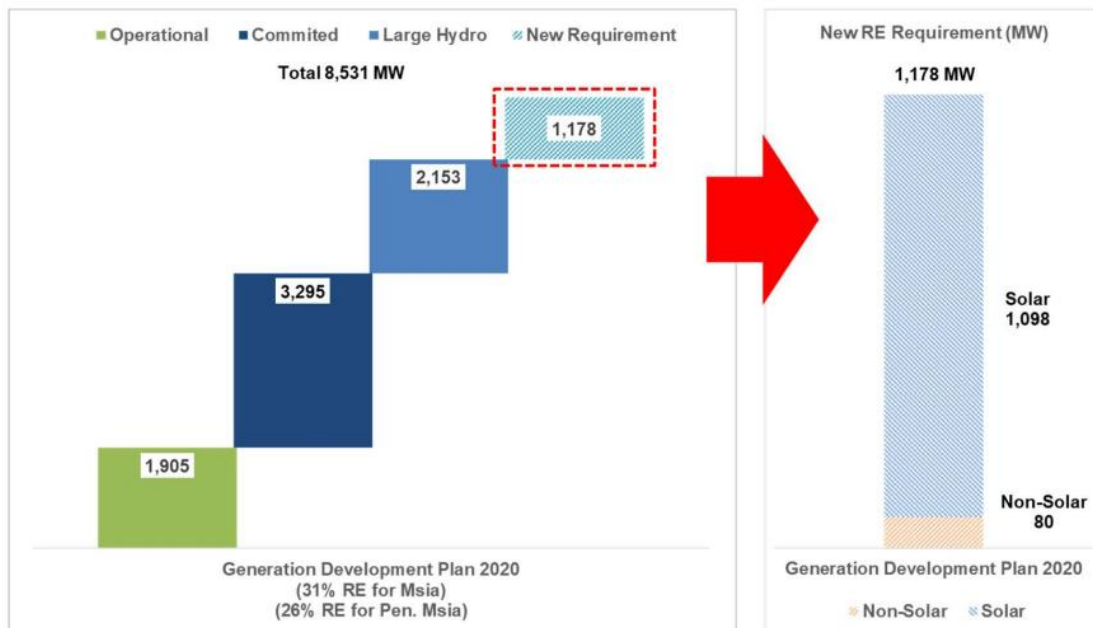
*Note: While large hydropower certainly plays a significant role in the nation’s energy generation, it did not figure into the government’s definition of Renewable Energy until 2021. This inclusion is also a factor in propelling the sharp growth of Malaysia’s RE contribution to its targets. Nevertheless, large hydro is not included in the FiT list of renewable resources.

SOLAR POWER

Geographically, Malaysia is ideal for solar power generation due to its proximity to the equator ensuring stable temperatures, a high average solar radiation, and over 2,200 hours of sunshine a year (over 6 hours/day, for an **average PVOUt of 3.26 to 4.1 kWh/kWp**).

Aside from the production of solar energy itself, this is also promising for the production and sale of the necessary equipment. Prices for solar panels have also continuously decreased over the past two decades, which makes solar energy increasingly attractive. Together with government incentives such as the Feed-in Tariff (FiT) and the Net Energy Metering (NEM) programs, and growing conscience of ESG goals, interest in solar energy has spiked in recent years: PV solar systems accounted for 63% of the total installed capacity of the commissioned renewable energy systems (RE) in the 2012 – 2018 period, while **2014 – 2019 saw solar as a RE source growing by 432% in installed capacity**. As of end 2023, Malaysia had 2165 MW of installed solar capacity, with plans to increase it a further 1098 MW by 2025, and yet another 2414 MW by 2035.

In achieving the 31% RE capacity mix target for Malaysia by 2025, a total of 1178MW¹ of new RE capacities will need to be developed in Peninsular Malaysia (from 2021), which should consist of 1,098MW of solar and 80MW of non-solar (graph below, taken from the **Report on Peninsular Malaysia RE Generation Plan 2039**).



Solar Manufacturing

Malaysia is the third largest solar cell and module manufacturer in the world, after China and Taiwan, exporting mostly to the US, Singapore, and Hong Kong. Malaysia is also the largest supplier of solar cells and modules to the US. Chinese manufacturers, in face of trade disputes and tariff hikes, found a workaround by shifting production to other countries like Malaysia, which has further strengthened its position in the industry.

Malaysia has a complete solar energy industry value chain, from materials and PV modules manufacturing to system integration. 7 of the 11 largest solar PV companies have operations in Malaysia, including First Solar, Longi, SunPower, Hanwha Q Cells, Jinko, and JA Solar. However, it must be noted that a large amount of the manufactured items are for export and not necessarily domestic usage, as solar energy remains in its infancy in Malaysia, representing less than 4% of total energy mix in 2024. However, local players are optimistic that this could surge to 58% by 2050.

Photovoltaic

In Malaysia, power generation from solar energy is monopolized by photovoltaic solar, due to a lack of knowledge regarding solar thermal technology. Most of the government initiatives and incentives related to solar energy are dedicated to PV technology, for example, the FiT scheme is limited for only four sources of renewable energy namely solar PV, Biomass, Mini Hydro and Biogas.

However, the issues with PV is that the installation of solar systems requires specialist knowledge and professional maintenance for long-term use. Compared to production, there is little expertise in this area in Malaysia and solar systems are often not maintained after installation, which slows down amortization. In order to stimulate take-up by the residential segment, the government has adopted a two-pronged approach – simultaneously increasing energy tariffs (above a certain usage) as well as offering rebates for solar PV installation in the home. The commercial sector is more accepting of PV and RE in general, due to corporate ESG goals and government incentives. There are also multiple agencies dedicated to assisting businesses to implement RE with financial assistance or shared savings plans.

There are several major solar energy projects. Among the government-led projects are a 50 MW solar park in the state of Selangor in 2018 and a 30 MW solar park in the state of Kedah in 2020, **both of which are performing ahead of schedule**; while in the private sector, 2 out of 4 Scatec Solar power plants are **in operation**.

Building Integrated PV (BIPV) is also increasingly important in Malaysia. The market for this is growing rapidly as the products are becoming more and more flexible and creative in terms of color and function, which means that solar cells can have a positive influence on the design of buildings and become a symbol of energy-efficient construction, design and modernity. BIPV is estimated to have a total potential of 11 GWp and could cover 20% of the energy demand through optimal use of the available surfaces.

Feed-in tariff

Solar photovoltaics (21-year contract):

Base FiT rate with installed capacity	2021 (RM / kWh)	2022 (RM / kWh)	2023 (RM / kWh)	2024 (RM / kWh)
up to and including 4 kW	0.4872	0.4385	0.3947	0.3552
Between 4 and 24 kW	0.4752	0.4277	0.3849	0.3464
Between 24 and 72 kW	0.2724	0.2315	0.1968	0.1673
Between 72 kW and 1 MW	0.2632	0.2237	0.1901	0.1616
Bonus payments	0.05-0.0915	0.05-0.0824	0.05-0.0742	0.05-0.0668

Illustration 3: FiT Rates, Source: [SEDA](#)

*any updates to new rates in the future will be published on SEDA's site.

Solar Thermal

Meanwhile, in Malaysia solar thermal is used almost exclusively for domestic water heating and while there is potential in this, it still remains under-explored. The government is now trying to intensify this, with passive systems in particular used in households, which are not only cheaper, but also easier to install and are well suited due to the climatic conditions. These systems are mainly used in residential areas in which there has not yet been a connection to the power grid and electrical water heaters cannot be used.

Hospitals are becoming a key interest for this sector as well, as they require warm water all day long, which means there is a potential saving of around 30%. There is also potential in tourism, for example in spas or hotels or in the food industry. Here, too, the government tries to set a good example, unfortunately all too often with prestige projects. The Awana Kijal Golf & Beach Resort in Terengganu is one of the hotels that now use solar energy to heat their hot water. Although this system only takes over 35% of the hot water supply, the investment has already been completely amortized within six years.

Solar thermal heating technology has a great potential in industrial applications, as well as for the hospital sector. Unfortunately, the enabling policy framework and support programs in Malaysia for RE have focused on solar PV for grid electricity power generation over thermal applications, despite the fact that large portion of the energy in the industrial sector is expended for heating requirement. Apart from domestic solar water heaters, the government does not yet have policies, incentives or standards that specifically target larger-scale solar thermal system applications in commercial buildings or in industrial applications.

The National [Malaysia Energy Statistics Handbook 2022](#) reported that total final energy demand in 2020 was 57,169 kilotonne of oil equivalent (ktoe); a drop from 2018's 64,658 ktoe. From this demand, 30.9% was used by industry. Of this amount, the heating requirement accounts for a large portion i.e. approximately two-thirds of the total energy use. Therefore, solar energy has a big potential, especially given the fact that 30% of the total industrial process heat demand requires temperature below 100°C, which can be met by commercially available solar thermal collectors.

There is also potential for the application of solar thermal technology in cooling – while heating is important to the industrial sector, in the residential segment, it remains limited to water heating. Due to Malaysia's tropical climate, a bigger concern is cooling – in urban areas most houses (approx. 68%) have at least one air-conditioning (AC) unit, where it contributes between 26-50% of total energy consumption (depending on number and type of units). Meanwhile almost all commercial and office buildings have central AC, with a 42-57% share of total energy consumption. However, solar thermal's potential for cooling has not been explored, notably to either lack of access to the right technology, or high costs incurred.

Due to the space it requires, solar thermal energy competes with the palm oil industry, one of Malaysia's biggest industries. Another problem is the time factor: warm water is required in the morning and in the evening, but the highest amounts are produced at noon. This makes the installation of storage facilities necessary, further raising costs, as well as increasing the space requirements.

BIOENERGY

Importance of Palm Oil to Bioenergy

Bioenergy in Malaysia largely originates from the oil palm industry, with large contributions from biofuel and biomass. The reason for this is obvious, with over 5.6 million hectares of oil palm plantations, and Malaysia being the world's 2nd largest producer of palm oil (24% of world production in 2023), which leads to a large amount of raw materials for the production of biomass, which can be harvested all year round due to the climatic conditions.

Only about 5% of Malaysia's palm oil production goes directly into food processing. The remaining oil goes to industry and is processed there. The further processing is divided into three large areas, with the olein refinery having the largest share. The production of oil palm Empty Fruit Bunches (EFB) and Palm Oil Mill Effluent (POME) account for the highest proportion of waste. POME is then used to produce biogas, while EFBs are usually used to generate energy from biomass.

China is the largest export market for palm oil from Malaysia. China's imports are almost twice as high as those of the second-ranked importer, the EU. As of 2022, approximately 9.4% of Malaysia's palm oil exports went to the EU, which in turn made up 28% of total EU palm oil imports. Over the past few years, the consumption of palm oil in food in the EU has steadily decreased. However, its use as a biofuel has increased at the same time. Nevertheless, palm oil exports to the EU have shown a declining trend, falling since 2019. In 2023, the EU imported 3.3 million tonnes, a decline of 19% compared to the previous year. A further reduction of palm oil exports to the EU in 2024-2028 is expected following the adoption of the deforestation law in 2023. Malaysian authorities have therefore sought alternative markets such as China, Saudi Arabia, and Qatar to compensate for the reduction in EU-bound exports.

However, also in 2019, the European Commission decided that palm oil cultivation leads to excessive deforestation and should not count towards renewable energy targets. As a result, biodiesel based on palm oil is no longer viewed as renewable and its use as a transport fuel will in fact end from 2024. This has created a strong point of contention between the EU and Malaysia as well as Indonesia, the world's largest supplier, and the two ASEAN countries are trying to discuss the issue with the EU in order to protect the income of their domestic palm oil industry.

As part of the efforts to assure sustainability of the industry, many initiatives have been undertaken by the public as well as private sector, in particular:

- Under the Malaysian Palm Oil Board (MPOB) licensing requirements effective Jan 1, 2014, new mills are required to trap/avoid methane gas emissions from palm oil mill effluent (POME). **By 2021, 135 palm mills out of 451 had biogas plants, with 87 generating green energy.**
- The possible revival of the production of bio oil using biomass-to-liquid technology as per Entry Point Project 7 (EPP 7) of the Palm Oil National Key Economic Area that was shelved in 2018.
- Much work is also going on to reduce palm oil loss at the mill. The industry uses the term "oil extraction rate" (OER) and in Malaysia, this is between 19% and 21%. Based on the global production of palm oil in 2018, about three million tonnes of additional palm oil can be produced globally with a 1% increase in OER. In both instances, less land will be required.
- Oil palm biomass to increase in demand as the second-generation biofuel, not only be for palm kernel shells (PKS) and palm mesocarp fibres (PMF) but also the less-easy-to-use empty fruit bunch (EFB). The palm mill would be a self-sufficient production unit in terms of energy when it uses its own biomass and biogas, and such a mill could be considered to have net-zero carbon emissions.
- The industry has availed itself of digitalisation across all sectors. Currently, it is widely used for production management, improving efficiency, reducing cost and increasing productivity. A 3% to 4% increase in OER as a result has been claimed.

Biomass

Biomass is in a solid aggregate state and comprises non-fossil and biodegradable material, including products, by-products, and residues from agricultural, industrial, or municipal waste. Biomass is the biggest potential source of renewable energy in the country but is yet to be completely utilised.

Palm waste and residues can be converted perfectly into biomass energy, which makes the palm oil industry the most important potential supplier to the biomass sector by far: about **85.17% of the existing biomass comes from this industry**. For every hectare of a palm oil plantation, between 50 and 70 tonnes of biomass material can be generated annually.

In general, little focus has been placed on the recycling of waste from palm oil mills, as the FiT for biogas and biomass is not as attractive compared to PV and offers little incentive to generate renewable energies. However, it should be noted that around 8% of the biomass produced in Malaysia comes from household waste. This makes this area the second most important supplier of biomass after the palm oil industry.

Biomass conversion technology converts renewable biomass fuels into heat or electricity. The most widely used method currently is direct combustion, where biomass fuel is burned in a boiler to generate high-pressure steam. This is fed into a steam turbine, connected to a generator to produce energy.

Under palm biomass, the empty fruit bundles, fibres, casings or stems each have a different intensity for generating energy:

Component	Amount available (Million tonnes)	Calorific value (kJ / kg)	Energy potential (Mtoe)
Empty Fruit Bundles (EFB)	17.0	18,838	7.65
Fibers	9.6	19,068	4.37
Sheaths	5.92	21,108	2.84
Shells / stems	21.1	-	-
Cores	2.11	18,900	0.95
total	55.73		15.81

Source: [Ahmad et al.](#)

To a significantly lesser extent, other materials like bagasse and waste from sugar cane, rice hulls and waste wood are also used for the production of biomass. Of the biomass produced annually (90 million mt), 80 million tonnes of dry weight are fibrous palm oil biomass, 6.2 million tonnes of sawdust and other waste come from the wood processing industry, while household waste contributes 2.6 million tonnes of organic waste, and the residues from rice and sugar cane cultivation are around 1.2 million tonnes.

By 2030, biomass in Malaysia is expected to increase by 67.5% to 1,340 MW of installed capacity. The government has also released the [National Biomass Action Plan 2022-2030](#), which looks at various sectors as potential contributors to a biomass economy – aside from oil palm, rubber, and other agricultural sectors, forestry biomass (timber, wood waste), livestock, and fisheries waste are foreseen to have strong potential.

Feed-in tariff

Biomass (16 year contract):

Base FiT rate with installed capacity	2022 (RM per kWh)	2023 (RM per kWh)	2024 (RM per kWh)
up to and including 10 MW	0.3085	0.3085	0.3085
Between 10 and 20 MW	0.2886	0.2886	0.2886
Between 20 and 30 MW	0.2687	0.2687	0.2687
Bonus payments	0.01-0.05	0.01-0.05	0.01-0.05

Source: [Sustainable Energy Development Authority Malaysia \(SEDA\)](#)

*any updates to new rates in the future will be published on SEDA's site.

Biodiesel/Biofuel

The gradual depletion of fossil resources has led to renewable energy development, to cater to the demands in the future. Biofuel is alternative fuel conventionally made out of food crops such as palm, rapeseed, soybean and sunflower oils. Malaysia, being the world's second-largest producer of palm oil, has abundant raw materials for biofuel production.

Alternatives to palm oil, sourced from used cooking oil (UCO), palm fatty acid distillate (PFAD), palm oil methyl ester (POME) and algae later led to the production of second-generation biofuels, also known as advanced biofuels. Non-food crops, including lignocellulosic feedstocks, industrial waste and residue streams, also produce these biofuels.

In Malaysia, biofuels are largely used in the automotive and energy industries, but can also be used in various types of machinery without any modification to compression ignition engines designed to operate on diesel fuel. Biofuels are also becoming more and more interesting for aircrafts. There are now airlines

whose tanks are filled with recycled cooking oil. This also creates interesting opportunities for the palm oil industry. Together with Airbus, AirAsia (Asia's largest low-cost carrier) announced in 2019 that it will invest more in research and development for biofuels for aviation and will soon be introducing biofuel for scheduled flights. However as of 2024, this has not yet been achieved, and the airline is exploring SAF, targeting an introduction of SAF to their fuel mix by 2025, and 70% SAF use by 2050.

Meanwhile, the Government of Malaysia released its **National Biofuel Policy** in 2006, that encourages the use of biofuels, spelling out a comprehensive framework with concrete initiatives in line with the objectives of the United Nations Framework Convention on Climate Change (UNFCCC). The Policy envisions that biofuel will be 1 of the 5 energy sources for Malaysia, enhancing the nation's prosperity and well-being, and prioritises the use of environmentally friendly, sustainable, and viable sources of energy. Its key objectives are:

- supplementing the depleting supply of fossil fuels with renewable resources;
- mobilising local resources for biofuels;
- exploiting local technology to generate energy for the transportation and industrial sectors;
- paving the way for exports of biofuels; and
- benefiting from the spin-off effect of more stable prices for palm oil.

In 2007, the Malaysian Parliament passed the **Biofuel Industry Act**, which included provisions from the National Biofuel Policy, to implement a biodiesel blend mandate. The Malaysian Palm Oil Board (MPOB), under the Ministry of Plantation Industries and Commodities (MPIC), is entrusted to implement the mandate nationwide.

Many challenges remain for biofuel: one of the main challenges in implementing biofuels is the users' perception of the quality of biofuels produced locally, with concerns on the use of local biofuel production technology in meeting the stringent international biodiesel specifications. This has led to the rollout of awareness programmes in collaboration with relevant agencies to increase acceptance of local biofuels, and proving that Malaysia produces one of the high-quality palm oil in the world. For example, Malaysian palm biodiesel for transportation has been accepted by the Japan Automobile Manufacturers Association (JAMA) where it can be used up to 20% biodiesel blend.

However, another major issue in the Malaysian biofuel industry is its slow implementation of policies. The rollout of the initial B5 (5% biofuel blend), and the subsequent plans (B7, B10, B20) have all suffered from long delays. Full national implementation of the B5, originally targeted for 2008, was not achieved until 2014, while B10 for the transportation sector and B7 for the industrial sector were only implemented in 2019.

The B20 programme for the transportation sector was launched in Feb 2020, with implementation done in phases, starting in Langkawi and Labuan and later in Sarawak. However, with the impact of Covid19 on the country, the subsequent introduction in Sabah and Peninsular Malaysia were postponed to 2022 in order to prioritise the nation's economic recovery. Instead, the government has **considered** expanding its B10 biodiesel programme (mandatory use of 10% palm oil), to the industrial sector and has a mandate to use biodiesel with 30% palm oil by 2025. Per the NETR, there is also a target of B30 to be mandated by 2030.

The ever-changing specifications are also a hurdle in the biofuel industry. Europe is one the largest producer and consumer of biodiesels in the global market along with the USA and Brazil. Despite its growing trend in major end-user industries including automotive, power generation, marine and machinery, palm oil production suffers from stringent limitations on import to the USA and EU.

Due to EU restrictions and post-pandemic effects, the Malaysian Biodiesel Association (MBA) have noted that Malaysia's exports of palm-based biodiesel in 2023 were at their lowest since 2017. MBA estimates the EU's total consumption of palm biofuel in 2019 was 6.2 million tonnes, but further exports have been hampered by the EU's Delegated RED II Act, which has capped palm oil-derived biofuel use as part of renewable energy targets. In the last few years, liquid byproducts of palm oil extraction, such as palm fatty acid distillate and palm oil mill effluent, have also seen rising demand from biofuel producers as EU regulations incentivize the use of waste feedstocks for making biodiesel.

Besides biodiesel production, bioethanol is also a promising sector as a replacement for gasoline and fossil petrol. However, bioethanol has not been emphasized in the country due to a lack in domestic feedstock.

Biogas

Biogas is defined as a resource in a gaseous state that is created by anaerobic digestion or fermentation of non-fossil and biodegradable organic material. This includes manure, sewage sludge, by-products and residues from agricultural, industrial or municipal waste. Biogas mainly consists of methane, but has significant amounts of CO₂ and smaller amounts of hydrogen and nitrogen. Methane, hydrogen and carbon monoxide can be burned, which allows it to be used, for example, as fuel for gas engines.

It is estimated that the palm oil industry generates 80 million tons of solid waste and 60 million tons of liquid waste every year. The potential to recycle this waste to generate energy, especially in the form of biogas, has for the most part not yet been fully exploited. The industry is still in its infancy, but projects are in the works: in August 2019, a contract was signed between TDM Bhd (subsidiary of the Terengganu state government), and Concord Biotech Sdn Bhd. The project is to include two biogas plants on palm oil plantations with a projected value of RM38 million.

In September 2019 it was announced that Cenergi SEA Sdn Bhd, a wholly owned subsidiary of Khazanah Nasional Bhd (Malaysia's sovereign wealth fund), had secured 9 biogas projects with a total project value of RM100 million. The loans are provided by the 50:50 joint venture between MIDF Amanah Investment Bank Bhd and China Construction Bank Bhd. The plants should each generate between 1MW - 2MW of electricity. Contracts for 16-21 years have been concluded for feeding into the Malaysian power grid.

Finally, as of 2021, biogas from some water treatment plants (WTPs) are now used to generate electricity and reduce operational costs. According to IWK (Indah Water Konsortium, the nation's largest water operator), there are currently six plants with facilities to reuse methane, with the potential of generating up to 10, 000m³ per day and produce 20MWh per day.

In 2024 the Ministry of Plantation and Commodities is **encouraging the establishment of more centralized biogas plants** to optimize the use of oil palm waste for renewable energy. Malaysia's Deputy Minister highlighted that such plants could bridge agriculture and advanced technology by converting palm oil mill effluent into clean energy. The recently opened 3.5-MW centralized biogas plant in Bukit Pasir has already contributed over 1.6 million kilowatt-hours to the national grid. Centralized plants are particularly suitable in areas like Pagoh and Muar, where multiple palm oil mills are located within a 70km radius, offering cost benefits and promoting investment in renewable energy projects.

Feed-in tariff

Biogas (16 year contract):

Base FiT rate with installed capacity	2022 (RM / kWh)	2023 (RM / kWh)	2024 (RM / kWh)
up to and including 4 MW	0.3184	0.3184	0.3184
Between 4 and 10 MW	0.2985	0.2985	0.2985
Between 10 and 30 MW	0.2786	0.2786	0.2786
Bonus payments	0.0199-0.05	0.0199-0.05	0.0199-0.05

Source: [Sustainable Energy Development Authority Malaysia \(SEDA\)](#)

*any updates to new rates in the future will be published on SEDA's site.

WASTE TO ENERGY

Waste-To-Energy (WTE) solutions are now recognised as a preferred waste treatment option for residual waste and is one of the new directions for solid waste disposal and management in Malaysia. WTE is an energy recovery form where non-recyclable waste materials are converted into usable heat, electricity, or fuel through a variety of processes. These include combustion or incineration, gasification, pyrolysis, anaerobic digestion, and landfill gas recovery.

Malaysia's municipal solid waste (MSW) is estimated at over 38,200 tonnes per day (2021). This amount is projected to have a 3-5% increase in annual generation, and consists of 50% organic fraction (45% food + 5% garden waste), which makes it a potential landfill gas (LFG) source.

WTE facilities can therefore substantially contribute toward Malaysia becoming a zero-waste nation and also provide a comparatively hygienic processing of waste which reduces the risk of contamination by polluted waste and diverts non-recyclable waste from landfills, dumpsites, and open fires. Moreover, the energy generated creates spillover benefits by supplying electricity and heat to neighbouring residential, commercial, and industrial establishments.

Some researchers have found anaerobic digestion to be the optimal WTE method for organic-rich waste like food waste, converting it efficiently into bio-fertiliser and biogas with little to no hazardous by-products compared to incineration. As an example, Malaysia's first anaerobic digestion plant, Pusat Anaerobic Digester MPAJ in Ampang Jaya, had processed over 35,000kg of food waste into 19,120L of liquid compost, a form of fertilizer, in just its July - December 2022 operation period. In addition to the valuable compost, which is currently in high demand due to fertilisers shortage, anaerobic digestion produces biogas that can be used for electricity generation or as fuel for natural gas vehicles.

Another WTE technology that is being considered is plasma gasification, for treating inorganic waste like glass, metal, and plastic.

However, per a recent study, incineration presents the highest potential heat and electricity production potential among three technologies (along with anaerobic digestion and landfill gas recovery system) – capable of producing 1,430MWh of heat and 480MWh of electricity per day from 1,000 tonnes of waste per day.

Malaysia currently has two waste-to-energy (WTE) plants. The first was the Kajang Waste-to-Energy Plant commissioned in 2009, where MSW is converted into fuel for use in an integrated steam power plant. It generates 9 MW of electricity from 700 tonnes of MSW per day.

In 2019, the second WTE plant begun operations in Port Dickson, Negeri Sembilan, which takes in 600 tonnes of segregated and processed MSW to produce between 20-25 MW daily.

In 2023, the Ministry of Housing and Local Government targeted 6 more plants built nationwide by 2025, and the first one has begun transformation from landfill to WTE plant – Sungai Udang in Melaka, which is expected to receive 1000 tonnes of MSW to produce 25 MW of energy. In 2024, the Ministry identified 18 more locations to develop WTE plants, as part of its plans to reduce the existence of unsanitary landfills. There are currently still 154 conventional landfill sites that are still operating nationwide, though 60 unsanitary sites are in line to be closed.

HYDROPOWER

Malaysia has relatively abundant hydropower resources, albeit unevenly distributed among the different states, with heavier concentrations in Sabah and Sarawak (of the total estimated hydropower potential, two thirds are located in Sarawak). So far, Malaysia has used this in the form of large and small power plants, with 12 large projects and 58 small hydropower plants in existence, and very little micro-hydropower being explored.

The first major hydropower dam, the Chenderoh Dam (27MW), was constructed in 1930. In the decades that followed, systematic development of the country's natural resources has contributed over 27,300GWh of energy annually from an overall installed capacity of 6240MW. This represents about 17% of total generation capacity (34,200MW) in the country.

The development of major hydropower projects in Malaysia is generally undertaken by the utility companies such as Tenaga Nasional Berhad (TNB) in Peninsular Malaysia, Sarawak Energy Berhad (SEB) in Sarawak and by the Sabah Electricity Sdn Bhd (SESBB) in Sabah. Attempts by private players to participate in the

development of major hydropower in Malaysia has met with very little success to date, and instead they play a more important role in the development of smaller hydropower projects (below 30MW) which incentivized by the Feed-in Tariff (FiT) mechanism managed by the Government.

Tenaga Nasional Bhd's (TNB) subsidiary, **TNB Power Generation Sdn Bhd** (TNB Genco) will develop a RM5 billion 300MW hydroelectric power plant at Mukim Ulu Nenggiri, Jajahan Gua Musang, in Kelantan. The construction is estimated to take five years, with the expected scheduled commercial operation date in June 2027. This project, which also involves collaboration with Austrian company Andritz Hydro, would reinforce the security of energy supply in Peninsular Malaysia, particularly to the eastern region.

In 2023 TNB partnered with the Dutch-Norwegian company SolarDuck and Norsk Hydro ASA, a Norwegian company, to advance **offshore floating solar energy** in Southeast Asia. Hydro will supply engineering support and aluminium components for a **780 kW floating solar plant off Tioman Island**, set to be completed by 2025. This collaboration addresses land and wind energy limitations in the region, with a focus on making floating solar the most affordable marine energy technology by 2030.

Despite the importance of hydroelectric power in Malaysia, due to some of the associated environmental impacts of large hydropower dams, it is important to note that the government did not consider large hydro as part of the RE contribution basket until 2021. Large hydro also remains excluded from the FiT scheme.

Sarawak Corridor Renewable Energy (SCORE)

The Sarawak Corridor Renewable Energy (SCORE) is the most important growth engine for the rural areas of Sarawak. It was one of the five economic development corridors initiated under the Ninth Malaysia Plan to address development imbalances across the country.

SCORE spans an area of more than 100,000km², about 80% of Sarawak, which extends from the central region to the northern region of Sarawak. SCORE leverages on abundant clean renewable energy (hydro-electric power) and natural resources to drive energy-intensive industries and attract other investments into the area, with an investment volume of RM 334 billion forecast, of which RM 267 billion (80%) is expected from the private sector and the remaining RM 67 billion from the public sector.

As of end 2019, SCORE has 26 approved projects worth RM40.5 billion. If the SCORE development plan is fully implemented by 2030, it is also expected to have created 1.6 million new job opportunities. **A list of open tenders under SCORE can be found on their website.**

Both the federal and state governments provide a range of tax and incentives for investors within the SCORE region. The Federal tax and incentives include pioneer status tax exemptions, investment tax allowance and more. The Sarawak Government provides additional incentives such as competitive land prices, electricity tariffs and water rates, to motivate investors to get involved in energy-intensive industrial projects and in energy generation in general in Sarawak.

At the moment, three hydropower plants in Sarawak are connected to the electricity grid and several more are in various stages of development (planned projects between 2017-2026):

Bakun:	2,400 MW	Trusan 2:	240 MW
Murum:	944 MW	Baram 3:	300 MW
Belaga:	160 MW	Baleh:	1.285 MW
Limbang 2:	130 MW	Pelagus:	465 MW

The Sarawak government has also expressed their interest in cascading hydropower plants as well as pump storage, and **have visited Austria to explore the technology**. The state's Premier has said that the construction of cascading dams is one of the Sarawak government's new strategies to generate electricity without having to inundate large areas of land. The fast flowing water from the cascading dams can also be used to breed freshwater fish and prevent crocodile breeding and preserve the river's biodiversity. Besides electricity generation, cascading dams are also expected to help Sarawak's venture into green hydrogen production.

HYDROGEN

Malaysia began exploring the use of hydrogen as an alternative fuel source for the energy sector as far back as the 1990s. Despite the introduction of dedicated road maps or blueprints, implementation was slow and most of the targets were not achieved. One of the major challenges was developing a large-scale supporting infrastructure for hydrogen.

But as hydrogen is increasingly being considered globally as a potential fuel of the future to decarbonise the energy sector, Malaysia is determined to become a leading hydrogen economy nation by 2050 and achieve global decarbonisation targets. The country has restarted their explorations into hydrogen energy, notably in the state of Sarawak.

In Malaysia, **Sarawak Energy Bhd** (SEB) launched Southeast Asia's first integrated hydrogen production plant and refuelling station in 2019, in collaboration with Linde EOX Sdn Bhd, a subsidiary of the Linde Malaysia / Linde Group. The refuelling station was initially intended for Sarawak's three buses that use hydrogen fuel cells, donated by the Chinese car manufacturer Foshan Feichi Automobile Manufacturing. The buses began servicing routes in 2020 on a 14 km route through the capital Kuching, free of charge. Spurred on by the success of the pilot project, the government in Sarawak announced at the beginning of 2020 that it would build six more hydrogen filling stations. The filling stations are to be built in Kuching, Sri Aman, Sibu, Bintulu and Miri.

In 2023, another state-owned agency, **Sarawak Economic Development Corp's** (SEDC) subsidiary, **SEDC Energy Sdn Bhd**, finalised a tripartite agreement with Japan's Sumitomo Corp and ENEOS to build 2 hydrogen plants in Bintulu and Kuching. The H2ornbill project is expected to be operational by 2028 and will produce 90,000 tonnes per annum of green hydrogen. SEDC Energy is also collaborating with three South Korean companies — Samsung Engineering, Posco and Lotte Chemical — to develop hydrogen derivative facilities under a second project, named Project H2biscus, expected to produce 150,000 tonnes per annum of green hydrogen. Together, both projects will contribute **240,000 tonnes per annum for a value of MYR 20.7 billion** (ca. EUR 4 billion) by 2030.

Also in 2020, SEB teamed up with Petronas to explore the production and supply chain for green hydrogen. This comes on the back of Petronas's experience in producing blue hydrogen, which is extracted from by-products at their facilities. The plant, which uses water to produce carbon-free hydrogen, covers the possibility of utilising Sarawak's renewable hydro power in the electrolysis process to produce green hydrogen and in doing this, generate renewable energy certificates.

Although production cost of hydrogen is currently high, over time and with efficient production technology, production cost would come down, leading hydrogen to become a competitive fuel source with other available fuels for the world.

Fuel cells for energy storage are also becoming increasingly important. The stored energy can then be released to support strong demands at peak periods or when other RE generators are offline. SEDC is conducting feasibility studies on the manufacture/assembly of hydrogen fuel cell components to expand the hydrogen economy in Sarawak, where the service stations could be fully converted to electric charging and hydrogen refilling in the future when the usage of battery and fuel cell electric vehicles has increased.

In 2024 Malaysian company Semarak Renewable Energy and China Hydropower (Malaysia) have signed a MYR1.88 billion (ca. EUR384 million) agreement to develop **Malaysia's first large-scale green hydrogen project using floating solar power**. Located in Perak, the project aims to produce and store green hydrogen, marking a significant step towards sustainable energy. PowerChina will leverage its expertise in new energy to support the project's design, procurement, and construction, positioning Semarak RE as a key player in Malaysia's green hydrogen industry.

Hydrogen Economy Transition Roadmap (HETR)

The government launched its **Hydrogen Economy Transition Roadmap, HETR** in 2023 as a guide for industries and the government to have a clearer direction of what to do to develop a hydrogen-based economy. The Hydrogen Roadmap is intended to be a supporting document to the National Energy Policy 2022-2024, which envisages the development of a hydrogen economy in Malaysia, and also the NETR, in which hydrogen was identified as one of the six energy transition levers that will drive the country's efforts to be a net-zero nation by 2050.

HETR lays out 5 strategic thrusts, which in turns sets out proposed action plans, summarised below.

- Governance System, Institutional Framework & Regulatory Mechanism:
 - establishment of a national Hydrogen Economy and Technology Steering Committee;
 - development of collaborative platforms and strategic G2G partnerships;
 - implementation of a centralised database and tracking system;
 - development of guidelines for certification schemes;
 - enhancement of mechanisms & tariffs to facilitate hydrogen production and consumption;
 - adoption of hydrogen taxonomy, codes and standards across the value chain
- Enabling Environment And Economic Instruments:
 - acceleration of hydrogen adoption by local industries;
 - introduction of subsidies and incentives, including phasing out of fossil fuel subsidies;
 - dedicated funding for hydrogen initiatives and projects, including a National Hydrogen Fund;
 - study of feasibility of blue hydrogen (from natural gas and CCUS)
 - acceleration of transition to circular economy
- Commercialisation Of Technology To Enable Export And Domestic Uptake:
 - advancing research and development, innovation and commercialisation;
 - increase of RE competitiveness for hydrogen production from RE;
 - development of local hydrogen infrastructure for domestic consumption and export;
 - development of low-carbon and hydrogen industrial clusters
- Capacity Development And Capability Enhancement:
 - building talent for the hydrogen economy;
 - dedicated continuous development programme in hydrogen
- Communication, Education And Public Awareness:
 - application of hydrogen as a fuel in public transport;
 - nurturing interest and awareness of hydrogen as a career pathway

A notable initiative promoted in HETR is the government's aim to make it affordable for the local market, at a price of MYR 0.15 per kilowatt hour (kWh) within five years.

OTHER SOURCES

Geothermal energy

As far as geothermal energy is concerned, research is still being done into what possibilities exist in this area if at all, as Malaysia is safely located out of the Pacific Ring of Fire. The only potential is generally believed to be in Sabah as a study in Apas Kiri, near Tawau, found an underground hot water field with a potential of 67 MW. However, the total production volume requires a borehole to a depth of approx. 2.5 km. Another possible potential hotspot also exists in the state of Perak, but is still under research.

A few small mud volcanoes are also active in the same area of Tawau, indicating the presence of additional geothermal energy. Plans for the first geothermal power plant in Malaysia (a 21-year subsidy contract negotiated between the operator Tawau Green Energy and the SESB, which includes feeding 30 MW into Sabah's power grid) was put on hold in 2018, and no further progress in this sector has been made. Nevertheless, the government remains optimistic and geothermal is still counted as one of the RE sources under the FiT scheme by SEDA.

On August 21, 2024, a Memorandum of Understanding (MoU) was signed between UK-based Primeval Energy, the Institute of Geology Malaysia (IGM), and Digital Geoscience Global Sdn Bhd (DGeG) to conduct detailed assessments of Malaysia's geothermal potential. **This partnership aims to develop geothermal projects** as part of Malaysia's green energy agenda, reducing reliance on fossil fuels and supporting climate change mitigation. The collaboration marks a significant step toward a sustainable energy future for Malaysia.

Wind energy

Wind energy can be generated more cheaply than solar energy, but in contrast is subject to fluctuations. Wind energy has next to no place in West Malaysia, as there is neither enough wind on land nor on the water. Meanwhile in East Malaysia, there exist a few projects for the generation of wind energy, mostly offshore.

Malaysia, which is located in a low-wind location, would face difficulties to use wind for profitable energy production. The factors for successful wind energy include wind speed and its annual distribution, air density, and land costs. Since Malaysia's mean annual wind speed is no more than 2 m/s, and most commercially available wind turbines require a minimum switch-on speed of 4 m/s to generate electrical energy, it has been mostly unsuccessful in this area.

To date, there are no wind energy projects that have been executed for electricity generation in Malaysia, but wind turbines have been installed for educational and research purposes only, as the Government is still assessing whether to determine wind energy potential as one of the nation's RE sources. The list of wind turbines installed in Malaysia are as follows:

- 150 kW wind turbine at Pulau Terumbu Layang-Layang, Sabah
- 100 kW of wind turbines hybridized with 100 kW solar PV and 100 kW diesel at Perhentian Island, Terengganu
- 3 - 25 kW of wind turbines at Kudat (Sabah), Kuching (Sarawak), Kuala Perlis (Perlis) and Terengganu
- 3 kW wind turbine in Setiu, Terengganu

Despite the shortcomings in the research projects' results, the Government is still continuing its effort to study the potential of wind energy in Malaysia. Plans have been made to set up a research centre for RE in Kudat, Sabah which would be supported by local universities and ASEAN energy institutes.

Ocean energy

When it comes to generating energy from the tides, Malaysia faces a similar situation to wind energy, with even more negative initial results, as the tide force is too low to allow commercial use. So far, potential has only been found in Labuan. However, it is currently not possible to estimate how feasible it is.

Meanwhile, the use of thermal ocean energy (obtained from the different temperatures of the cold seabed and the warm surface) has only recently been considered as a possibility, and research is still in its infancy. The Universiti Teknologi Malaysia (UTM) has set up a research centre - the Ocean Thermal Energy Centre (OTEC), one of only 4 in the world - as it is expected that this area has great potential.

The Sabah State Legislative Assembly has passed the **Ocean Thermal Energy Conversion Enactment (OTEC) 2024** and the **Energy Commission of Sabah (Amendment No. 2) 2024**. **These laws will enable Sabah** to develop OTEC technology, which uses ocean temperature differences to generate up to 20,000 MW of electricity. This initiative is a key part of Sabah's Blue Economy, aiming to produce green hydrogen and expected to attract investments and create jobs. Additionally, the amendments reaffirm Sabah's territorial rights over its waters, enhancing its position as a leader in renewable energy innovation within the ASEAN region.

5. MARKET ENTRY

ACTORS & INSTITUTIONS

The main players in the energy sector in Malaysia include the government and the **Energy Commission (EC)** as well as **SEDA** and **MOSTI**, which regulate the market in the form of guidelines and laws. EC is a statutory body responsible for regulating the energy sector in Peninsular Malaysia and Sabah with powers to regulate the energy supply activities in Malaysia, while SEDA is a statutory body established pursuant to the SEDA Act. SEDA's functions include promoting and implementing national policy objectives for renewable energy and promoting, facilitating and developing sustainable energy.

The **Malaysian Green Technology and Climate Change Centre (MGTC)** and the **Malaysian Investment Development Authority (MIDA)**, which take care of financial matters and attract investors, also promote the development of green energy. MGTC in particular has been given the mandate to drive the country in the scope of Green Growth, Climate Change Mitigation and Green Lifestyle.

MGTC implements initiatives and programs that detail the long-term impact of the Nationally Determined Contribution (NDC) to reduce the intensity of greenhouse gas emissions by 45% based on GDP by 2030 (compared to 2005), increase green technology's contribution to the GDP to RM100 Billion, and generate 230,000 green jobs. This is done through a series of financing schemes, training and product/service certification programmes, as well as other roadmaps and platforms.

The country's power supply is dominated by three large state-owned companies: **Tenaga Nasional Berhad (TNB)**, which takes care of the supply of West Malaysia and thus takes over the majority of the country's electricity supply (almost 90%), and **Sabah Electricity Sdn. Bhd. (SESB)** and **Sarawak Energy Berhad**, which supply to East Malaysia. TNB has undergone substantial restructuring over the past few years, including their recent explorations in the RE field.

Petroleum Nasional Berhad (PETRONAS), as the country's oil and gas supplier, also has its role in energy generation, and has also entered into the RE sector.

In addition to the three large electricity suppliers, there are several independent, smaller energy producers. These **Independent Power Producers (IPPs)** were first allowed to enter the national power generation sector in 1992, to transfer the burden of power plant financing from government-owned electricity utilities to the private sector. The impetus for the IPP programme came from a prevailing shortage in generation capacity, and repeated supply problems by TNB, leading to a decision to reduce this dependency and deregulate the industry. The first five IPP licences were awarded to large corporate entities. The IPPs generate and sell electricity to the three major utility companies, and are heavily subsidized by the state, with secured prices for fixed purchase of the electricity they produce. In May 2024, it was announced that IPPs would be allowed to start selling electricity directly to consumers starting September 2024, via the Third Party Access (TPA) scheme, but this plan has seen delays and is expected to commence only in 2025.

LEGISLATIONS & POLICIES

The **Renewable Energy Act 2011 (REA)** is the main legislation which provides the legal framework for RE in Malaysia, particularly for the establishment and implementation of a special tariff system (FiT) to catalyse the generation of RE. In addition to the REA, there are subsidiary rules, regulations and guidelines administered by SEDA pursuant to the REA such as the Renewable Energy (Feed-in Approval and Feed-in Tariff Rate) Rules 2011 and the FiT Guidelines which generally support the RE legal framework through the implementation of the FiT.

Other relevant acts include the **Electricity Supply Act 1990** which regulates, amongst others, the electricity supply industry; the **Energy Commission Act 2001** which provides for the establishment of the Energy Commission of Malaysia; and the **Sustainable Energy Development Authority Act 2011 (SEDA Act)** which provides for the establishment of the Sustainable Energy Development Authority Malaysia and to provide for its functions and powers and for related matters.

There is also the **National Renewable Energy Policy** (National RE Policy 2009) – approved by the Cabinet in 2010 with the objectives of increasing the renewable energy contribution in the generation mix (20% by 2025), facilitating growth of the renewable energy industry, ensuring reasonable renewable energy generation costs, conserving the environment for future generation and enhancing awareness on the role and importance of renewable energy.

Malaysia Energy Supply Industry 2.0 (MESI 2.0) – In September 2019, the Cabinet approved MESI 2.0, a 10-year masterplan to transform and liberalise the energy sector. MESI 2.0 sets out to increase industry efficiency in the industry, to future-proof key processes, regulations and structure in the industry, and to empower consumers by democratising and decentralising the electricity supply industry. MESI 2.0 is currently under review after the change in government in 2020.

With the implementation of the REA in 2011 also came the introduction of feed-in tariffs (FiT), intended to accelerate the growth of the RE sector. In 2018, the government aimed to achieve a RE share of 20% in the energy mix by 2025, and this goal has since been updated as of June 2021 to 31% RE capacity by 2025. The development of the policy shows the commitment of the government to improving RE in the local energy mix. In 2021, renewable energies made up **20.2% of the total electricity generation mix in Malaysia** (with the inclusion of large hydropower). The strong development of **solar increased this to over 25% in 2023**, however in order to attain the 40% share the country aims for by 2030, the growth rates in the RE sector required would be over 15%. The following graphic illustrates the development of individual energy sources in the state power grid.

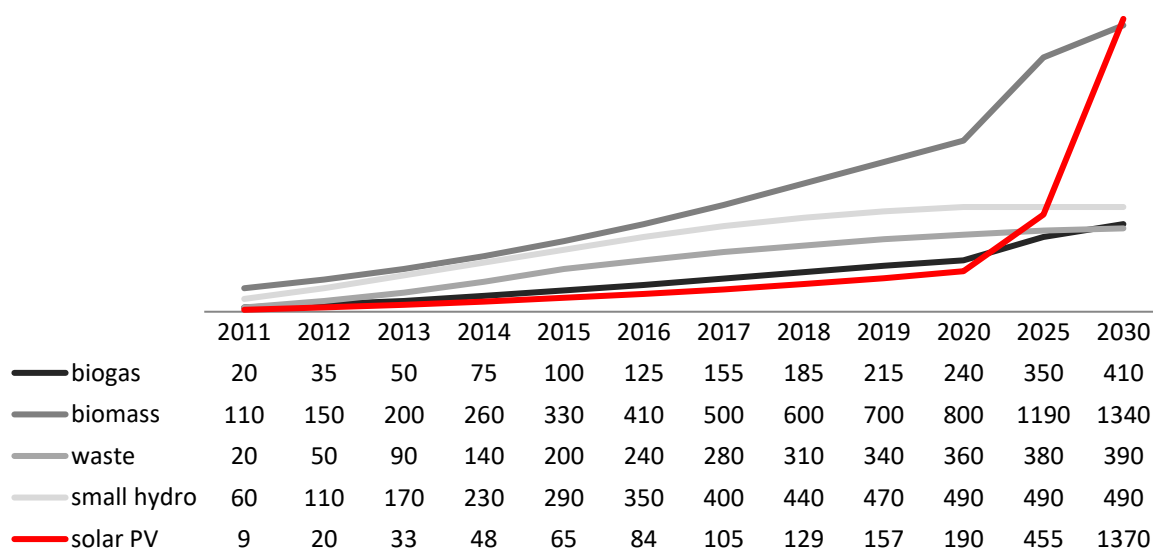


Illustration 4: Development of energy sources. Source: [Sustainable Energy Development Authority \(SEDA\)](#)

Government plans to develop the RE sector include, most notably, the Green Technology Master Plan 2017-2030, the Renewable Energy Roadmap (MyRER) 2035, the National Energy Transition Roadmap (NETR) as well as dedicated segments in the 12th Malaysia Plan (12MP) 2021-2025. Meanwhile, Malaysia continues to enhance its Net Energy Metering (NEM) and Feed-In Tariff (FiT) schemes in support of RE.

Green Technology Master Plan (GTMP) 2017-2030

The master plan for green technology encompasses the six categories of:

- energy
- production
- transportation
- construction
- waste management
- water

and describes the strategic plans for developing green technologies to create a low-carbon and resource-efficient economy in Malaysia.

The master plan is intended to set out the country's advancement in green technologies and lays the foundation for cultivating mindsets and behavioural changes to instil a greener lifestyle amongst the community. The GTMP also plays an integral part in supporting the **Transformasi Nasional 2050 (TN50)** plan, an initiative that aims to put Malaysia in the top tier of countries in the world for economic development, citizen well-being, and innovation by 2050.

The GTMP outlines the targets of respective key focus areas of green technology applications and aims to provide a clearer picture on the Government's commitment to creating a conducive ecosystem for green technology development, shifting from technology adoption to technology production. The document also details within the key focus areas the achievements, targets, and existing initiatives which the Government and/or private sector are undertaking, or will commit to.

The six key sectors are Energy, Manufacturing, Transportation, Building, Waste and Water, and the goals established in each sector will be progressively fine-tuned in each 5-year National Development Plan. Each sector has its own unique challenges but there are also common cross-cutting challenges from which strategic areas of intervention have been identified.

A summary of the key points describing the embedding of green technology in the Energy sector is as follows:

- ensuring the long-term sustainability of the energy sector through resource diversification, continuous investment in new infrastructure and state-of-the-art technology deployment
- governance in the future energy economy especially harnessing renewable energies and energy storage technologies
- addressing efficiency in electricity generation and consumption: funding to buffer the transition to a more market-based approach in energy generation, and funding for R&D&C
- leveraging on disruptive technologies such as scale-up of distributed generation, micro-grids, independent energy storage, the internet of things, and electric vehicles

The targets for the Energy sector are summarised below:

SECTORS / AREAS	YEAR		
	2020	2025	2030
Renewable Energy (RE)	<ul style="list-style-type: none"> • 20% • RE mix (installed capacity) 	<ul style="list-style-type: none"> • 23% • RE mix (installed capacity) 	<ul style="list-style-type: none"> • 30% • RE mix (installed capacity)
Energy Efficiency	-	<ul style="list-style-type: none"> • 10% Reduction in electricity consumption 	<ul style="list-style-type: none"> • 15% Reduction in electricity consumption

Table A: Targets in Energy Sector

*Information taken from the **GTMP**.

Malaysia Renewable Energy Roadmap (MyRER) 2035

The **Renewable Energy Roadmap (MyRER) 2035** is a strategic roadmap developed by SEDA along with industry stakeholders which outlines, amongst others, the strategies and action plans to support and achieve the key renewable energy policies and targets in Malaysia.

In order to further strengthen and drive the growth of sustainable energies, SEDA carried out a study on the decarbonisation of the electricity sector. The resulting MyRER 2035 is intended to support the government in expanding the share of renewable energies in the energy mix to 31% by 2025 (large hydropower plants with >10 MW are not included). This is expected to drive a reduction in GHG emission in the power sector to

support Malaysia in meeting its NDC 2030 target of 45% reduction in GHG emission intensity per unit of GDP in 2030 compared to the 2005 level, and further reduction of 60% in 2035. The buildup of RE capacity is expected to support an investment of over RM53 billion (ca. EUR 11 billion) and create close to 50,000 jobs.

The MyRER formulates strategies to achieve the Government's committed targets by maintaining affordability and system stability, with technology-specific pillars in Solar, Bio-Energy, Hydro, and new solutions including wind, hydrogen, and energy storage systems.

Malaysia is also aiming to implement a Third Party Access (TPA) framework, retail and REC markets, and other measures to support customer choices.

National Energy Transition Roadmap (NETR)

The **National Energy Transition Roadmap (NETR)** was launched in 2023 to steer Malaysia from its traditional fossil-fuels based economy to a high-value green economy. The NETR establishes the pathway for the nation's energy mix, GHG reduction, and energy transition initiatives with 6 energy transition levers:

- Energy Efficiency (EE)
- Renewable Energy (RE)
- Hydrogen
- Bioenergy
- Green Mobility
- Carbon Capture, Utilisation and Storage (CCUS)

and 10 flagship catalyst projects:

- Efficient Switch
- RE Zone
- Energy Storage
- Energy Security
- Green Hydrogen
- Hydrogen for Power
- Biomass Demand Creation
- Future Mobility
- Future Fuel
- CCS for Industry

Seeking a whole-of-nation approach, the government has also been developing new policies and strategies to complement NETR in strengthening Malaysia's low-carbon transition. Among others these include:

- the **Nationally Determined Contribution (NDC) Roadmap**, Long-Term Low Emissions Development Strategies (LT-LEDS) and Future Proofing MESI by the NRECC (since restructured, now **NRES** – Ministry of Natural Resources & Environmental Sustainability);
- the Carbon Pricing Instrument developed by the **Ministry of Finance (MOF)**
- the **National ESG Industry Framework**, the **New Industrial Master Plan (NIMP)** and the **Chemical Industry Roadmap (CIR)** by the **Ministry of Investment, Trade and Industry (MITI)**
- the Hydrogen Economy and Technology Roadmap (HETR) by the **Ministry of Science, Technology and Innovation (MOSTI)**
- the **National Biomass Action Plan** by the **Ministry of Plantation and Commodities (KPK)**.

As natural gas will continue to play a pivotal role in Malaysia's energy landscape as the nation moves towards a low carbon economy, the Ministry of Economy is in the midst of developing the Natural Gas Roadmap (NGR).

INITIATIVES

Feed-in Tariffs (FiT)

One important progress towards reducing dependency on fossil fuels was the establishment of the Feed-in Tariff (FiT). In Malaysia, FiT is a special tariff system which obliges distribution licensees (DL) such as power utility companies to buy from the producers of RE, known as Feed-in Approval Holders, the electricity produced from the RE sources (solar, biomass, biogas, and small hydropower) for a price set by SEDA.

In December 2011, the state began accepting applications for the new FiT system, which includes remuneration for feeding renewable energies into the state power grid. The concept is relatively simple with low administrative costs and has already been implemented in several other countries. To protect the poorer population, minimum levels have been set for energy consumption; if these are not met then there is no electricity price increase to those consumers. (For those who are affected, the money generated from the price increase goes to the Renewable Energy Fund, which collects payment from those who actually produce a lot of pollutants or consume more energy.)

By guaranteeing access to the grid and setting a favourable price per unit of RE, the FiT ensures that RE becomes a viable and sound long-term investment for individuals, companies and industries alike. FiT encourages the adoption of RE in households by enabling house owners to sell excess electricity generated for and from their homes.

The payout is divided into two parts. First, a minimum tariff is paid for the grid feed-in, and then for the amount delivered. The advantage compared to a flat rate is that it increases the installation of high quality equipment and ensures correct maintenance. However, the payout also depends on the time of market entry: a later start date leads to lower subsidies. This is due to the annual depression rates associated with the FiTs which aims to create a price balance between conventional, non-renewable and renewable energy sources, but also depends on how far the respective technology has developed and how high its potential for savings is.

Since their introduction, the FiTs have been particularly well received in the field of solar PV, while applications for the other three possible energy sources biomass, biogas and small hydropower seem to be less attractive despite significantly lower depression rates. The reason for this is a combination of factors including lower tariffs, higher entry costs, less experience or knowledge, and a lack of price mechanisms and funding.

In the 4th quarter of 2018, SEDA introduced an e-bidding system for RE (biogas). The system was expanded in 2019 to include applications for small hydropower plants and then Biomass in 2021. The aim of e-bidding is to make it easier to set prices for renewables obtained from resources and to promote healthy competition. The average effective rate for the first round of e-bidding for biogas in the 4th quarter of 2018 was RM0.4055 / kWh. In the second round in July 2019 it was RM0.4058 / kWh. This price is far lower than the regular rate of RM0.4669 / kWh that was offered before e-bidding was introduced, and corresponds to total savings of RM 683 million for the EE fund during the 21-year term of the electricity purchase agreement

In December 2019, SEDA also announced the results of the first e-bidding system in the small hydropower category with an initial quota allocation of 160 MW. Due to the price efficiency of some of the submitted technologies with high funding levels, 176.69 MW were ultimately awarded to small hydropower plants as part of the e-bidding process.

In August 2024, it was announced that **SEDA will allocate up to 190 MW of FiT quota** for biogas, biomass, and mini-hydro projects through their e-bidding process. This aims to diversify Malaysia's energy mix and boost the adoption of non-solar renewable energy sources. The FiT quota allocation will be conducted via an open tender, with timing details to be announced by Seda. Previously, Seda concluded new FiT awards in 2023, allocating 36.5MW across 21 biogas projects and one biomass project. Over the past three years, Seda has awarded a total of 555 MW in FiT quotas for biogas, biomass, and mini-hydro projects.

Until 2024, only West Malaysia was participating in the FiT program, while Sabah and Sarawak (East Malaysia) were not yet included. This was due to policy complications, where there is an RE levy for consumers in Peninsular Malaysia, allowing FiT to be implemented, which was not yet gazetted in Sabah. However, as of Jan 2024, the state introduced its **Renewable Energy Enactment 2024** which provides the rules for Feed-In Approval and FiT rates. Meanwhile, Sarawak has developed its own legislation, regulations, and incentives in the RE sector, notably in large hydropower, as outlined in the Sarawak Corridor Renewable Energy (SCORE) programme.

Amid rising electricity costs and increasing green energy demand, there has been growing interest in large-scale and rooftop solar projects. However, the FiT program has seen less focus and fewer FiT quota have been awarded compared to 2021, when more than 90% of the available quota for biogas, biomass and hydro was given out; in 2023, just 74% of the biogas quota was awarded, 17.5% for biomass and none for hydro. Over the past three years, FiT quotas totaling 555 MW were awarded, but SEDA has paused new FiT awards for 2024 to review the program and address issues such as underbidding and project delays. **SEDA aims to introduce a new bidding process** and improve financial viability for projects.

Net Energy Metering (NEM)

As a complement to the FiT, the Malaysian government introduced the Net Energy Metering Scheme (NEM) in November 2016 with quota allocation of 500 MW up to year 2020 to encourage Malaysia's RE uptake. The concept of NEM is that the energy produced from the solar PV installation will be consumed first, and any excess will be exported to TNB (Tenaga Nasional Berhad, a state-owned and sole electricity utility company in Peninsular Malaysia) at prevailing displaced cost. These measures were meant to accelerate the growth of the solar industry by increasing market capacity and helping to turn local players into regional solution providers.

After a successful rollout of the first NEM with all the quota taken up ahead of schedule, the government subsequently announced the introduction of a new NEM system, which included a new solar leasing concept enabling consumers to purchase and install solar modules on a leasing basis. This allowed consumers to benefit from solar savings while reducing the cost of installing PV panels.

NEM 2.0 was introduced on 1st January 2019, and the true net energy metering concept was adopted, where it allows excess solar PV generated energy to be exported back to the grid on a one-on-one offset basis. The 500MW quota under the NEM 2.0 was fully subscribed by 31st December 2020.

Due to this overwhelming response from the PV industry and in an effort to boost the usage of Solar energy, the new Net Energy Metering 3.0 programme (NEM 3.0) was announced that same month to provide more opportunities to electricity consumers to install solar PV systems on the roofs of their premises to save on their electricity bill.

Thanks to a high takeup rate, the quota was increased by 630 MW in March 2023, with 180 MW designated for small hydro, biogas, and biomass projects. The NEM 3.0 was further expanded in January 2024 with another 400MW, increasing the total allocation from 500MW to 1550MW, divided into 3 categories as below.

Initiative/Categories	Quota Allocation (MW)	Quota Period
NEM Rakyat Programme	350MY (from 100MW)	01/02/2021 – 31/12/ 2024
NEM GoMEEn Programme (Government Ministries and Entities)	100MW	01/02/2021 – 31/12/ 2024
NOVA Programme (Net Offset Virtual Aggregation)	1100MW (from 300MW)	01/04/2021 – 31/12/ 2024

Currently, 450MW of NEM quota remains available for uptake until the end of the year. The announcement follows high demand for NEM quotas in 2023 and is part of **broader government efforts**, including the introduction of 2GW in large-scale solar (LSS) and 400MW in a low-carbon power generation programme.

There is still great potential for rooftop solar panels in Malaysia. SEDA estimates the country has a 269GW potential for solar PV, dominated by ground-mounted configurations (210GW) and including considerable potential from rooftop (42GW) and floating configurations (17GW). SEDA has therefore set itself the goal of continuing and intensifying efforts to increase public participation in the NEM programme. For example, in March 2024, the government also launched the Solar For Rakyat Incentive Scheme (SolaRIS), an incentive programme aimed at attracting new installations of solar PV amongst residential customers to increase the renewable energy capacity to 70% by the year 2050 and to reduce carbon emissions. A cash rebate of up to RM4,000 will be given to residential customers who submit NEM applications to SEDA Malaysia from 1 April 2024 onwards and successfully commission their solar PV system installations with TNB.

SELCO

Aside from NEM, self-consumption (SELCO) is another option for consumers looking to hedge against the rising cost of electricity. This program applies when electricity is being generated for own usage and any excess is not allowed to be exported to the grid. In order to encourage individual, commercial, and industrial consumers to install solar PV for their own consumption, the government has loosened the conditions for SELCO as of June 2023.

Sabah also introduced a similar initiative in February 2024, called the Grid-Connected Solar Photovoltaic System for Self-Consumption Programme in Sabah (SELCO-PV SABAH).

Solar Leasing & Power Purchase Agreement (PPA)

The government is also trying to encourage solar PC installation by promoting Solar Leasing or Power Purchase Agreements (PPAs). Among the benefits are reducing the high upfront cost of solar panels, equipment, and installation, as only a fixed monthly amount is paid to the service provider.

Households are given the option to lease out their rooftops for a monthly income to reduce electricity bills. Together with the NEM programme, excess power generated is exported back to the grid on a "one-on-one" offset basis, which means every 1kWh exported to the grid will be offset against 1kWh consumed from the grid, instead of a displaced cost.

While the take-up from industry and businesses are high, the demand from residential sector has not been great due to lack of incentives. Solar leasing for businesses is very popular due to the economies of scale for such commercial installations, which is not yet available to residential users, another factor in low interest. In order to stimulate the sector, the government has been working with the finance sector, that some banks offer loans specifically for solar PV installations with simplified procedures.

Another scheme known as the Power Purchase Agreement (PPA) was also introduced, which aims to enable business owners to enjoy cheaper, cleaner electricity while preserving their cashflows. A PPA is a long-term agreement for the sale and purchase of electricity generated from an approved RE generation system. The investor will install and operate the system in the premise of the off-taker, who purchases the electricity at an agreed tariff that is usually cheaper than the existing cost from TNB. Typically the tenure of such an agreement will be in the range of 15 years to 20 years while the PPA Tariff will tend to be at least 15% lower than the existing electricity tariff to allow both parties to achieve a decent return of investment and energy cost savings. The standardised RE PPA resources are Biogas, Biomass, Small Hydro and Solar PV.

In 2022, the concept of Virtual PPAs (VPPAs) were also introduced with a quota of 600MW (later expanded to 800MW), following the Corporate Green Power Program (CGPP), which intended to increase the build of new solar power plants by allowing the sale of electricity generated by these new plants to be sold to corporate consumers. The initial amount was only allocated for solar power, however other RE resources are under study.

Should other sources be approved, then a VPPA contract would allow corporate consumers to purchase RE certificates for the electricity generated, rather than requiring the traditional direct transmission of electricity. This would allow various power producers to widen their market, and also allow companies to purchase RE more easily, as they would not need a direct connection to the power plant.

Large Scale Solar (LSS)

One of the major drawbacks often cited for solar power generation is the lack of consistency and reliability. It is expected that the large-scale generation of solar energy can increase and regulate the security of the electricity supply. In an effort to reduce the Levelized Cost of Energy (LCOE) for the development of large scale solar PV (LSSPV) plants, the LSS, a competitive bidding programme, was introduced in 2016. The **LSS programme** is implemented by the EC who would invite bidders to submit their bids to build, own and operate LSSPV plants. The shortlisted bidders will subsequently enter into PPAs with TNB or Sabah Electricity Sdn Bhd (SESB).

With a successful pilot launch, the second round of the tendering process was carried out in 2017 with an increased total capacity of 557 MW for both Peninsular Malaysia and Sabah / Labuan. After the success of the first two rounds, the government announced an open call for tenders for projects valued at an estimated RM 2 billion in February 2019. In 2019, LSS Round 3 had 112 bidders of which EC awarded 491MW in capacity to 5 bidders which included foreign solar developers from Germany and France in consortium with local companies. With the implementation of LSS3, it is expected that every 1MW solar power plant will generate 1,490MWh / year. This is enough to supply around 160 households with electricity and reduce carbon emissions by 1,034 tons / year.

Meanwhile, LSS Round 4, launched end May 2020, saw a shortlist of 30 bidders with about 823 MW of total bids in two categories -- one for plants with capacities of 10 MW-30 MW and another targeting bigger projects of up to 50 MW. All projects are located in Peninsular Malaysia and are expected to reach commercial operation in 2022-2023.

LSS Round 5, launched beginning of April 2024 targets a total capacity of 2,000 MWac, divided into four packages with capacities ranging from 1 MWac to 500 MWac. The solar power plants under this programme are scheduled to start operating in 2026. As the maximum aggregated capacity for each bidder will be increased from 50MW to 500MW, there is expected to be a positive response to LSS. The substantial capacity being introduced marks a major advancement in the adoption of solar energy in Malaysia.

MAEESTA

The **Malaysian Energy Efficiency and Solar Thermal Application (MAEESTA)** project is a national initiative that ran from 2014-2019. The executing partners are the Malaysian Government (various ministries), **United Nations Industrial Development Organization (UNIDO)**, **Global Environment Facility (GEF)**, **Federation of Malaysian Manufacturers (FMM)** and **SIRIM Berhad**.

The project aimed to reduce GHG emissions by promoting and demonstrating sector-specific energy efficiency (EE) improvements and solar thermal technology utilization in the industry, focused on improving thermal EE at manufacturing and processing plants to integrate solar thermal systems in targeted sub-sectors (including but not limited to): Rubber gloves; Textiles; Food & Beverage; Surface treatment; and Agro-based industries like Palm oil and Poultry. It also aims to develop knowledge and new approaches to process optimization, particularly in heating and cooling. Among its benefits, the project offers: consultation and training on thermal EE at user and expert levels; free audits and recommendations; and funding and financial assistance from UNIDO.

In total, **16 companies and facilities**, along with six factories involved in the MAEESTA project, have successfully saved 351,055 megawatt-hours (MWh) of energy annually, valued at RM26.2 million, since 2018. The Minister of Science, Technology, and Innovation noted that these facilities which implemented energy efficiency measures, and the six factories that installed solar thermal systems, also achieved a reduction in total lifetime greenhouse gas (GHG) emissions by 995,554 tonnes.

6. SUBSIDIES & FISCAL INCENTIVES IN GREEN TECHNOLOGY/RENEWABLE ENERGY

To strengthen the development of sustainability in the nation, the Government of Malaysia will continue to provide incentives for green technology involving assets, services, and systems. To encourage the development of green technology, the government offers various incentives in the form of tax breaks for the purchase of green technologies, or income tax exemptions for the use of green technology services and systems.

The incentives cover a broader scope of green technology activities in the areas of energy, transportation, building, waste management, and supporting services. Any company which undertakes a **green technology project or services activity is entitled to apply to Malaysia Investment Development Authority (MIDA)** for the incentives. In order to further promote investments in the field of renewable energies, the Green Investment Tax Allowance (GITA) and the Green Income Tax Exemption (GITE) have been extended until 2026.

Green Investment Tax Allowance (GITA) for Assets or Projects

Applicable to companies that acquire qualifying green technology assets listed under the **MyHIJAU** Directory or carry out qualifying green technology projects (covering renewable energy, energy efficiency, green buildings, green data centres and integrated waste management activities).

The GITA incentive provides investment tax allowance for 100% of qualifying capital expenditure incurred on green technology assets/projects from the year of assessment 2013 until the extended year of assessment 2026 and such allowance can be offset against 70% of statutory income in the year of assessment. Unutilised allowances can be carried forward until fully absorbed. However, projects which have been approved with FiT for solar by SEDA are not eligible for the GITA for Projects.

Green Income Tax Exemption (GITE) for Services and Solar Leasing

Areas include renewable energy, energy efficiency, green buildings, green data centres, green communities, certification / review bodies and electric vehicles (EV). Services include system design and feasibility study, advisory and consultancy, testing and commissioning of renewable energy. For Solar Leasing, a new incentive launched in January 2020, the ITE is applicable for up to 10 years.

Qualifying companies must provide services verified by GreenTech Malaysia and listed under MyHIJAU. Applicants for services are eligible for income tax exemption of 70% of statutory income from the year of assessment until the end of 2026.

Note: For both GITA and GITE, the dates considered are when the applications are received and approved by MIDA. The full conditions, latest updated procedures, guidelines and forms can be obtained from the **MGTC website**.

Green Technology Financing Schemes – GTFS 2.0/3.0/4.0

In addition to the abovementioned tax incentives, the Ministry of Finance had agreed to introduce the Green Technology Financing Scheme 2.0 (GTFS 2.0) for the period of 2019-2020, an enhanced version of the first GTFS in 2010 to encourage the supply and usage of green technologies.

The GTFS programmes offers financial aid to producers of green technology, users of green technology and Energy Services Companies (ESCOs). GTFS 2.0 had a total financing/funding approval amount of RM2.0 billion and offered rebates of 2% per annum on interest and/or profit rate for the first seven years for each financing with sixty percent (60%) government guarantee on green technology cost.

GTFS 3.0 was announced in Budget 2021, with an allocation of another RM2.0 billion. As part of the Government's agenda to support Sustainable and Responsible Investment (SRI) as well as drive green and sustainable standards in Malaysia, the scheme included supporting the issuance of SRI Sukuk and green bonds and was open for application until 31 December 2022.

The government continues to support the development of green businesses with the reinstatement of the **GTFS 4.0** up to RM1.0 billion for the period until 31 December 2025. The financing scheme will continue its support to 6 key sectors which include Energy, Manufacturing, Transport, Building, Waste, and Water.

GTFS 4.0 will also continue to provide the 60% to 80% government guarantee on the green component cost financed by Participating Financial Institutions (PFIs) as well as the rebate of 1.5% per annum on interest/profit rate. One of the main enhancements of GTFS 4.0 is the inclusion of Housing Developer and Low Carbon Mobility Infrastructure to be eligible for financing investments related to Building and Transportation projects. The Housing Developer and Low Carbon Mobility Infrastructure is eligible to obtain a maximum financing of RM100 million and RM50 million respectively. The financing scheme continues supports other categories such as Producer, User and ESCOs, already previously introduced in the scheme.

Funding - Waste Eco Parks (WEPs)

The Waste Eco Park (WEP) incentives aim to promote waste recycling, recovery, and treatment by industry players to offer a sustainable solution to problems in the field of waste management. While the applications should have been submitted until 2020, the tax incentives for (WEP developers, WEP managers and WEP operators) are up to year 2025, and it is expected that this mechanism would be renewed thereafter, as the government is still encouraging investments in facilities and infrastructure with a view to holistic waste management activities. The guides and procedure for funding for WEPs can be found on the [MIDA website](#).

7. TRENDS AND OPPORTUNITIES FOR AUSTRIAN COMPANIES

As highlighted throughout this report, there have been strong indicators of accelerated RE growth, for example the early achievement of 2025 RE targets, leading to these targets being reviewed upward. From the initial target of 20% by 2025, the government set a new target of 31% for that year, having already achieved 24% in 2021.

The focus placed upon green technology and the energy transition in the recently released plans (NEP 2022-2040, NETR, HETR, GTMP, 12MP, MyRER) also indicates promising developments in the sector, as new energy efficient technologies are sought out and cities aim to achieve low-carbon goals.

Trends

Below are some trends and new developments in the field of renewable energies in Malaysia.

Solar

Malaysia's solar energy industry is on the rise thanks to increased government support, increased investor confidence and cost reductions. As the largest employer in the field of photovoltaics among ASEAN countries, the Malaysian solar sector is well equipped for further growth.

Other potential opportunities lie in East Malaysia, where despite steadily increasing economic growth, a third of the population in still live without a connection to the power grid. Currently, there are solar powered generators used to support small villages but these are not connected to the grid and would have capacity and generation restrictions. Therefore, there would be a need for other solutions to increase electricity supply and connectivity, such as mobile solar power generators.

More proof of the sector's potential can be seen with the Large-scale solar (LSS) initiative which has become an important part of the government's initiative to increase the share of solar energy in the overall energy mix. Phase 1 of the NETR also entails the setting up of five centralised large-scale solar parks with 100MW capacity each, co-developed by TNB.

Innovative solutions to optimise solar PV power generation, floating solar, mobile solar technologies will see strong potential.

Energy Efficiency

There is a multitude of opportunities in this sector, especially as Malaysia seeks to dramatically reducing its carbon footprint. In the electrical energy chain, this starts from energy generation, moving into its transmission, storage and finally consumption.

Firstly, there is the importance of securing existing resources, both conventional and renewable, by improving the energy output with the same input. This could be achieved by improving current processes and the associated efficiency gains. For conventional sources, global refinery and petrochemical benchmarks demonstrate that significant process improvements can be expected in this area, and typically contribute to efficiency gains of 0.5% per year.

With a growing and increasingly energy-demanding society (an expected increase in consumption of 3% annually), there is also an urgent need for energy-efficient products and services, or the technology to allow existing products to improve their efficiency and reduce the strain on energy demand. There is a particularly strong demand in the commercial, transport, and industry sectors, which are the highest consumers of energy. This encompasses all at once the technology for energy-efficient appliances, buildings, and storage.

Finally, there is also a need to minimise the emission of carbon or other polluting outputs from the use of such technologies. Ultimately, the goal is to develop clean electric power and reduce energy waste.

Battery Energy Storage System (BESS)

Battery Energy Storage Systems (BESSs) are an interesting area that could contribute to the development of RE in Malaysia. As the volume of renewable energies increases, the use of a BESS will be urgently needed and even unavoidable, to support the energy supply infrastructure.

BESSs are able to take on several important functions at the same time. These include, for example, frequency control, voltage support, spin reserve and black start for network operators. For electricity suppliers, a BESS is able to reduce transmission bottlenecks and serve as an alternative to transmission and distribution shifts. A BESS can also be used for reserve power, reducing peak demand, energy arbitrage and increased PV solar self-consumption.

The current biggest challenge when using a BESS for electricity suppliers is the high cost. However, with an estimated 5% decrease in costs per year, or improved technologies, it ought to find wider application in the near future.

Hydrogen

Globally, hydrogen is increasingly being considered as a clean energy source, as it addresses several issues that exist in other forms of green energy technologies, such as battery, solar and wind technologies.

Malaysia is also extremely keen to advance in this sector to become a regional and international leader, with the state of Sarawak being a strong leader in this field, having already made several strong steps to progress in this sector. More projects on Peninsula Malaysia are also expected to crop up, as the Federal government has seen the success of Sarawak and wishes to catch up.

The Malaysian government also introduced the Hydrogen Economy and Technology Roadmap outlining measures to develop the sector and allow Malaysia to become a hub for hydrogen production and export. The government also envisages local use of hydrogen to increase, eventually being a significant contributor to the RE mix.

As it remains in its early stages of moving towards a hydrogen-based economy, Malaysia is currently exporting the hydrogen to immediate foreign markets (Japan, South Korea, soon Singapore) who have already developed a hydrogen economy based on a user model, until local demand catches up.

The government is encouraging the development of green hydrogen technology across the value chain, from electrolyzers, fuel cells, hydrogen vehicles, compression, co-firing tech, storage, and transport.

Biomass

The Malaysian biomass sector has gained significant momentum in recent years and already has considerable potential. Part 2 of NETR also names biomass as one of the focus sectors. Malaysia produces approximately 168 million tons of biomass and has achieved a significant use of RE technologies via the FIT mechanism compared to other technologies, making up around 17% of total use.

As the government has set a target for total decommissioning of coal power plants by 2044, the transition to other resources is especially urgent. Malakoff, Malaysia's largest IPP, has started decarbonising its largest thermal plant (2100MW capacity) through a pilot phase of **biomass co-firing** (2%), which is expected to develop further. For this, the company is looking at successful transition projects worldwide and is open to engaging with foreign players.

While the demand for wood pellets from Far Eastern markets such as Japan, South Korea and China give Malaysia a lucrative export business, the aim is to create a processing industry that can manufacture high-quality and high-value products itself and offer them on the world market. In this context, foreign know-how is essential.

Technically sophisticated composting solutions can also represent an additional source of income for producers of large quantities of biomass. European companies still have an excellent reputation in Malaysia and Austrian expertise and technology are highly valued.

Another sector being explored is **bio-hydrogen as a product of biomass**, as it is more sustainable and environmentally friendly. The cost of hydrogen production from biomass pathway is also expected to be significantly lower compared to electrolysis. However, it has been reported that the hydrogen production from agricultural residues (including palm biomass) is relatively small and has not been commercialized yet. Bio-hydrogen production solutions will also be interesting (either from thermo-chemical approach, i.e. biomass pyrolysis, gasification, or biological approach like fermentation, bio-photolysis, and biological water-gas shift reaction).

Waste to Energy

Like biomass, Part 2 of NETR names waste-to-energy (WTE) as one of the focus sectors.

Malaysia's high generation of municipal solid waste (MSW) - an estimated 38,294 tonnes per day (2020) - is a major point of concern for the government, especially as the country faces the impending maximum capacity limit for its landfills (expected within the next 10 years).

As 50% of the MSW consists of organic fraction, it has the potential to be a landfill gas (LFG) source. The incineration of waste for electricity generation is also developing, with two waste-to-energy (WTE) plants currently, and another 6 more plants planned nationwide by 2025. The sustainable treatment or recovery of household waste has great growth potential, as the government is still working on their plans for waste processing. Austrian companies in this field would have strong opportunities to present their expertise.

In addition, other technologies in this space are also sought out, as the nation seeks to swiftly reduce or reuse the waste being sent to landfills. Biogas capture, pyrolysis, combustion or other WTE solutions are high priorities for both government and companies in the sector.

Conclusion

While the Malaysian government certainly has ambitious plans and the will to achieve them, there has been a history of problems during execution, sometimes due to mismanagement or bureaucratic changes, but for the most part, because of costs or lack of access to the right technologies. It would be in this space that Austrian companies could enter the market to offer both their solutions but also expertise and experience.

FURTHER ACTION: PROJECT TENDERS, PARTNERS, EVENTS, TRADE FAIRS

Even though most tenders for projects are obliged to be publicly announced (information [HERE](#), via SEDA) foreign companies need a local partnership (i.e. any subsidiary should also have local representation), in particular with regards to government-related projects as (a) they would prioritise a local establishment; (b) many announcements are in the Malay language only; and (c) the tender process can be quite complicated.

Furthermore, while some private corporations are open to working with foreign partners, or using foreign technologies, they may only do a selective request for proposals. Therefore, our recommendations would be to engage with a suitable local partner that would be able to navigate the complexities of tendering for a project. This also applies for non-tender proposals, wherein you only wish to find a suitable distribution partner or local agent. For contact lists in your relevant field please write to kualalumpur@wko.at.

Finally we also suggest participation in events and trade fairs in the sector. You will find some of the key Trade Shows/Conferences below, and our office can also assist in crafting a trade mission.

1. International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM)

Kuala Lumpur | 09 - 11 October 2024

IGEM is Southeast Asia's largest trade event for green technologies and eco solutions, and is held annually. IGEM is a platform for solution providers and green energy businesses to tap into the fast expanding ASEAN market by showcasing the latest innovations to policy makers, government organisations, investors, and the general public. 2024's theme is "Race to Net Zero".

Note: Since 2022, Außenwirtschaftscenter Kuala Lumpur has organised an Austrian Pavilion at IGEM. For registration and more information: [HERE](#).

2. Sustainability Environment Asia (SEA)

Kuala Lumpur | 12 - 14 November 2024

SEA is an international business and trade event committed to advancing environmental preservation. The comprehensive event covers essential areas such as sustainable energy solutions, waste management & circular economy, water & sewage and green environmental & technology. SEA brings together thought leaders, industry experts, and innovative solutions to address the pressing challenges of our time.

3. Webinar on "Carbon Neutrality Initiatives in Malaysia"

Online | 16 December 2024

Featuring speakers from Malaysian Greentech and Climate Change Corporation and the Energy Commission, this webinar will provide an overview of the Decarbonisation sector, especially with regards to the ecosystem and policies in place to encourage foreign companies to collaborate with Malaysian companies. For Austrian companies who are interested in investing or developing their business in the region, this webinar will highlight what opportunities there may be, how to enter the market, and the importance of collaboration between local and foreign companies.

For registration and more information: [HERE](#).

4. ASIA 2023 – Hydropower & Dams Asia

Kuala Lumpur | expected March 2025

Note: An event focusing on dams and hydropower, welcoming the global water and energy community. Aside from conferences on hydroelectric power, study tours are organised to some of the large cascade developments in Peninsular Malaysia. Meanwhile the Technical Exhibition is the main hub for business networking between delegates and industry representatives who will be exhibiting their supplies and services. Exhibitors typically comprise consultants, contractors, manufacturers, developers and professional associations.

5. **International Energy Week**

Kuching, Sarawak | 15-17 July 2025

Sarawak is a major hub for the energy and petroleum industry in Malaysia and the region, with huge oil and gas reserves coupled with an abundance of hydropower and the Government's Sarawak Corridor of Renewable Energy (SCORE) initiative looks set to propel Sarawak into a developed economy. There are immense business and investment opportunities to be tapped, and 2025 will be the Expo's sixth edition. Hosted by the Ministry of Utilities Sarawak, the Industry Show also encompasses related events such as Petroleum Asia 2025. An integrated event that is sure to generate numerous opportunities, IEW 2025 will also highlight the path towards a sustainable energy landscape in Borneo and more.

6. **Workshop for Decarbonisation & Carbon Neutrality in Malaysia**

Kuala Lumpur | mid-October 2025

In conjunction with IGEM, Außenwirtschaftscenter Kuala Lumpur is organising a workshop on Decarbonisation and Carbon Neutrality, bringing together key stakeholders and technology providers to share knowledge and come up with solutions for implementing measures in Malaysia. This workshop is intended to show Malaysian decision-makers the technology from Austrian companies that are leading the way in this area, and to allow Austrian solution providers to learn more about the potential opportunities and projects in the country.

For registration and more information: [HERE](#).

7. **International Sustainable Energy Summit (ISES)**

Kuala Lumpur | August 2026

Organised by the Sustainable Energy Development Authority (SEDA) Malaysia, in collaboration with the Ministry of Energy Transition and Water Transformation, this biennial event stands as a global platform for sustainable energy. ISES has evolved into a premier knowledge-based hub, fostering collaboration between thought leaders in the public and private sectors. The summit spans two dynamic days: a knowledge-sharing conference and impactful business interactions through exhibitions and business matching sessions.

For a full list of events in Malaysia, please visit: <https://www.wko.at/aussenwirtschaft/malaysia-veranstaltungen> or contact kualalumpur@wko.at.

8. CONTACTS – MINISTRIES, AGENCIES & ASSOCIATIONS

Malaysia Energy Information Hub (MEIH)

The Malaysia Energy Information Hub (MEIH) serves to establish a comprehensive national energy database to support the dissemination and distribution of energy statistics in Malaysia to local and international stakeholders and the public. MEIH is a portal undertaken and managed by the Energy Commission (EC) of Malaysia.

Malaysian Green Technology and Climate Change Centre (MGTC)

The Malaysian Green Technology and Climate Change Centre (MGTC) is an agency of the Ministry of Environment and Water (KASA) mandated to drive the country in the scope of Green Growth, Climate Change Mitigation and Green Lifestyle. MGTC implements initiatives and programs that provide specific details in achieving the long-term reduction of greenhouse gas emissions by 45% based on Gross Domestic Product (GDP) by 2030 (from 2005), increasing the rate of contribution to GDP from green technology and the generation of 230,000 green jobs.

Malaysian Investment Development Authority (MIDA)

MIDA is the government's principal agency to oversee and drive investment into the manufacturing and services sectors in Malaysia; and to advise MITI on industry matters including the formulation of related policies. MIDA assists companies which intend to invest in the manufacturing and services sectors, as well as facilitates the implementation of their projects. The services provided by MIDA include providing information on the opportunities for investments, as well as facilitating companies which are looking for joint venture partners. They also evaluate the following applications for projects in the manufacturing sector and selected services sub-sectors: Manufacturing licenses, Tax incentives, Expatriate posts, and Duty exemptions.

Ministry of International Trade and Industry (MITI)

The Ministry of International Trade and Industry (MITI) is responsible for international trade, industry, investment, productivity, small and medium enterprise, development finance institution, halal industry, automotive, steel, and strategic trade. Their goals are to promote and strategise Malaysia's global competitiveness in international trade by producing high value added goods and services, and to spur the development of industrial activities. MITI plans, legislates and implements international trade and industrial policies that will ensure Malaysia's rapid development, encourages foreign and domestic investment, and promotes Malaysia's exports by enhancing national productivity and competitiveness in the manufacturing and services sector.

Ministry of Science Technology & Innovation (MOSTI)

MOSTI's goal is to transform Malaysia into a high-tech nation through Science, Technology, Innovation and Economy (STIE), and to use STIE to address national issues and challenges for sustainable development. They aim to develop local technology and innovation by strengthening policy and regulation, and provide effective and efficient STIE enablers and services through agile governance.

Suruhanjaya Tenaga / Energy Commission (ST / EC) – The EC is established under the Energy Commission Act 2001 as the regulatory agency for electricity supply and piped gas supply industries in Peninsular Malaysia and Sabah. Among EC's other roles and functions is promoting economy in the generation, transmission, distribution, supply and use of electricity.

Sustainable Energy Development Authority (SEDA)

The Sustainable Energy Development Authority (SEDA) Malaysia is a statutory body formed under the Sustainable Energy Development Authority Act 2011 [Act 726]. The key role of SEDA is to administer and manage the implementation of the feed-in tariff mechanism which is mandated under the Renewable Energy Act 2011 [Act 725]. SEDA also promotes the deployment of sustainable energy measures as part of the solutions towards achieving energy security and autonomy.

Malaysian Photovoltaic Industry Association (MPIA)

The Malaysian Photovoltaic Industry Association (MPIA) is the leading organization promoting and representing the interests of Malaysia's solar photovoltaic (PV) industry. MPIA members encompass the entire solar supply chain, including manufacturers, developers, service providers, and policymakers. MPIA plays a pivotal role in raising public awareness of solar energy and was instrumental in the establishment of SEDA, which advances renewable energy initiatives in Malaysia. The association actively engages in policy advocacy, market development, and capacity building to drive sustainable energy growth. With a goal to supply 12% of the nation's electricity via solar by 2030, MPIA continues to strengthen Malaysia's position in the global solar industry and contribute to its sustainable development goals.

Malaysia Biomass Industries Confederation (MBIC)

The Malaysia Biomass Industries Confederation (MBIC) is a non-profit organization dedicated to advancing the biomass sector in Malaysia. It achieves this through strategic partnerships with biomass SMEs, major feedstock owners, research institutes, and international bodies. MBIC focuses on utilizing renewable organic materials—such as oil palm waste, timber waste, and rice husk—for various applications including biofuel production, biomass power generation, and eco-products. The confederation aims to foster collaboration across different biomass sectors, enhance the commercial viability of high-value biomass products, and promote sustainable practices.

NanoMalaysia Berhad (NMB)

NanoMalaysia Berhad is the leading agency in Malaysia focused on the development and commercialization of nanotechnology. Established in 2011, the agency operates under the Ministry of Science, Technology, and Innovation (MOSTI) and aims to drive the adoption of nanotechnology across various industries, including electronics, energy, healthcare, and manufacturing. NMB is also one of the key players driving the Hydrogen initiative in the country.

Ministry of National Resources & Environmental Sustainability (NRES)

The Ministry of Natural Resources and Environment (NRES) is responsible for managing the country's natural resources and environmental protection. Aside from policies and programs related to natural resource management, environmental conservation, and climate change mitigation, NRES is also involved in the implementation of national strategies for renewable energy and energy efficiency, contributing to the country's efforts in addressing environmental challenges and promoting sustainable practices.

Ministry of Economy

The Ministry of Economy in Malaysia is responsible for shaping and implementing the nation's economic policies. With the Energy sector being a key responsibility of the Ministry, long-term strategies and national policies on energy including oil and gas sector as well as the sustainable development of the energy sector, fall under its purview. The Ministry is responsible to ensure energy security in term of reliable and sustainable supply, which includes the development of national oil and gas industry, paired with promoting the use of renewable energy and energy efficiency. They also provide development expenditure for the implementation of energy-related projects and programmes.

Malaysian Palm Oil Board (MPOB)

The Malaysian Palm Oil Board (MPOB) is the government agency dedicated to serving and advancing Malaysia's oil palm industry. MPOB's primary role is to promote and develop policies and objectives that enhance the well-being of the oil palm sector. MPOB's key functions include implementing industry policies and development programs, conducting research and development, and regulating and licensing all activities related to oil palm. It also focuses on commercializing research findings, providing technical advisory services, and collaborating with national and international organizations to strengthen the industry.

Bursa Carbon Exchange (BCX)

The Bursa Carbon Exchange (BCX), launched on September 25, 2023, is a platform by Bursa Malaysia for trading carbon credits. It supports Malaysia's transition to a lower carbon economy with two main contract types: technology-based and nature-based carbon credits. BCX also plans to introduce Renewable Energy Certificates (RECs) by Q3 2024.

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