

## Country Profile

# MALAYSIA

### GENERAL OVERVIEW

Malaysia consists of two main territories: Peninsular Malaysia (mainland) and Malaysian Borneo (island), separated by the South China Sea. As of August 2018 (Q2), its population counted over 32.4 million<sup>1</sup>. Malaysia is recognized as a newly industrialized market economy, that underwent a transformation from mining and agricultural-based economy toward multi-sector economy in the 1970s. Currently, Malaysia is an oil and gas exporter and 40% of the government revenues come directly from this sector. According to the Department of Statistics Malaysia in 2017, the GDP of Malaysia reached USD 327 billion, placing the country as the third largest economy in the ASEAN after Indonesia and Thailand. Moreover, in terms of GDP per capita, with USD 10,092, Malaysia ranks 3<sup>rd</sup> among the Southeast Asian countries, after Singapore and Brunei Darussalam. Kuala Lumpur is the capital city located on the mainland.

### ENERGY SECTOR

#### ENERGY POLICIES

Malaysia has significant fossil fuel resources. The National Petroleum Policy, which was the very first energy policy introduced in the country, focuses exclusively on the petroleum sector. The National Energy Policy was established in 1979 and it outlines three primary objectives: energy supply, energy utilization and environmental issues. The supply objectives are to ensure security of energy supply, to introduce renewable energy technologies, and to diversify supply of energy. The utilization objectives focus on improvement of energy efficiency at end-users. The environmental objectives aim

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<sup>1</sup> Department of Statistic Malaysia

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to use renewable energy sources in order to minimize adverse effects of energy sector on the environment.

There are several major stakeholders involved in Malaysia's energy policy. The Economic Planning Unit (EPU) of Prime Minister's Department focuses on petroleum energy and privatization of electricity supply. Ministry of Energy, Green Technology, and Water (MESTECC)<sup>2</sup>; is responsible for supply of electricity, energy efficiency, and renewable energy, while Ministry of Rural Development works on rural electrification. The Energy Commission (EC) is a regulatory body in the power and natural gas industry.

The Renewable Energy Act (Act 725) was introduced in 2011 to set the framework for the Feed-in Tariff (FiT) and the RE grid integration. The Sustainable Energy Development Authority Malaysia (SEDA) was the implementing institution of this act. It defines the rules for: the eligibility criteria for feed in tariffs, conditions for renewable energy power purchase agreements, technical and operational requirements as well as payment, duration and regression of the tariffs, etc.

Since 2010, the Malaysian Government has introduced the Green Technology Financing Scheme (GTFS), administered by GreenTech Malaysia to fund green technology related ventures providing easier access to financing from the market. The Scheme was initially set to last through 2015 and was extended first through 2017 and again through 2022. These extensions reflect the Government's commitment to pursuing the development of the green technology sector for the nation's socio-economic growth. The loan guarantee scheme offers a rebate of 2% per annum on interest or profit rates charged by financial institutions while also providing a Government guarantee of 60% for the green cost of the financed amount. The GTFS extension through 2022 includes an addition of MYR 5 billion (USD 1.2 billion) loans that may be approved through the scheme. On top of that, the MYR 3.5 billion (USD 814 million) has already been previously approved.

## ENERGY MIX

The primary energy supply of Malaysia is dominated by fossil fuels (**Figure 1**). Oil and gas accounts for nearly 75% of the primary energy supply, while RE only contributes to around 5.5%.

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<sup>2</sup> MESTECC: Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC)

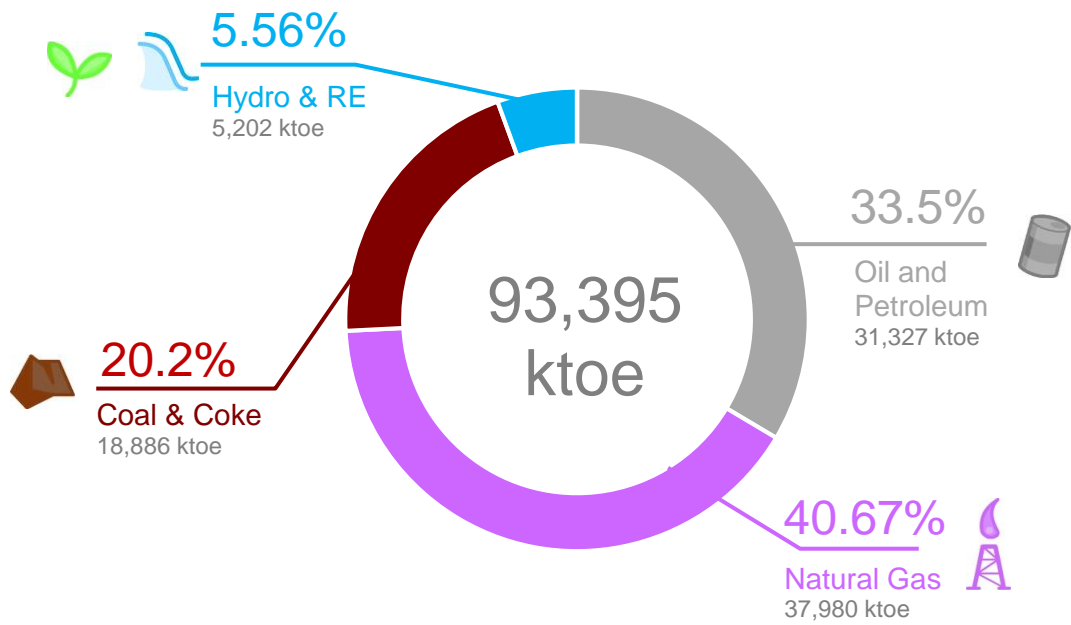


Figure 1: Primary Energy Supply (2016)

Source: ST: Malaysia National Energy Balance 2016

Similarly, the generation of electricity comes mainly from fossil fuels (**Figure 2**). The shares of natural gas and coal are high (39.7% and 46% respectively). The electricity generation from RE sources comes almost exclusively from hydropower (13.3%).

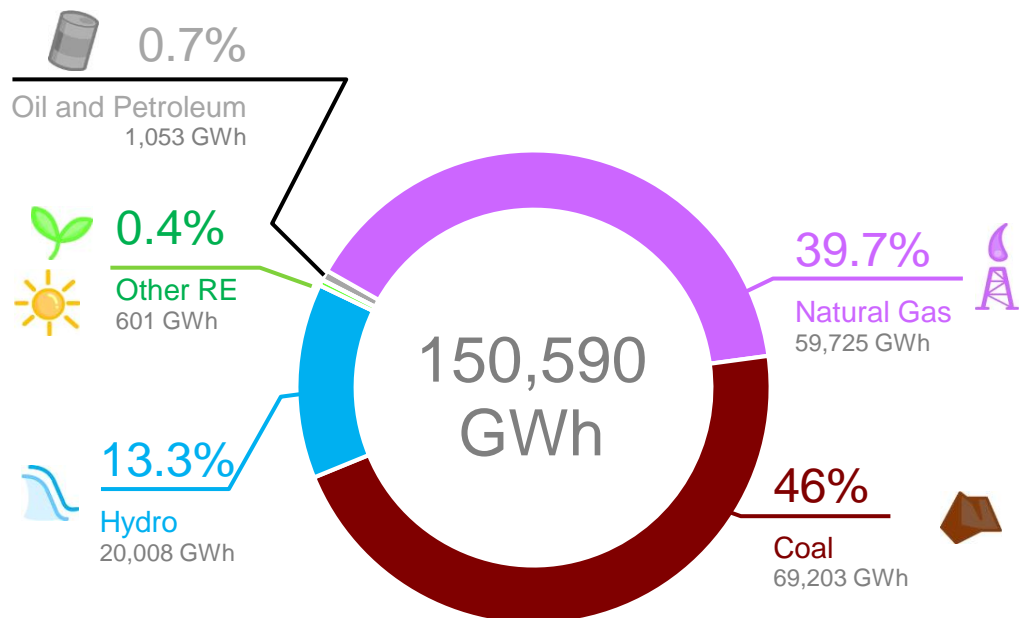


Figure 2: Generation of Electricity by Source (2016)

Source: ST: Malaysia National Energy Balance 2016

### ELECTRICITY TARIFF & ELECTRIFICATION RATE

There are 16 electricity tariff categories in Malaysia that have been set by Tenaga Nasional Berhad (TNB). The tariffs are determined based on the consumer type, voltage level, and other characteristics, as presented in **Figure 3**. These tariffs regulation has been applied since 1 January 2014.

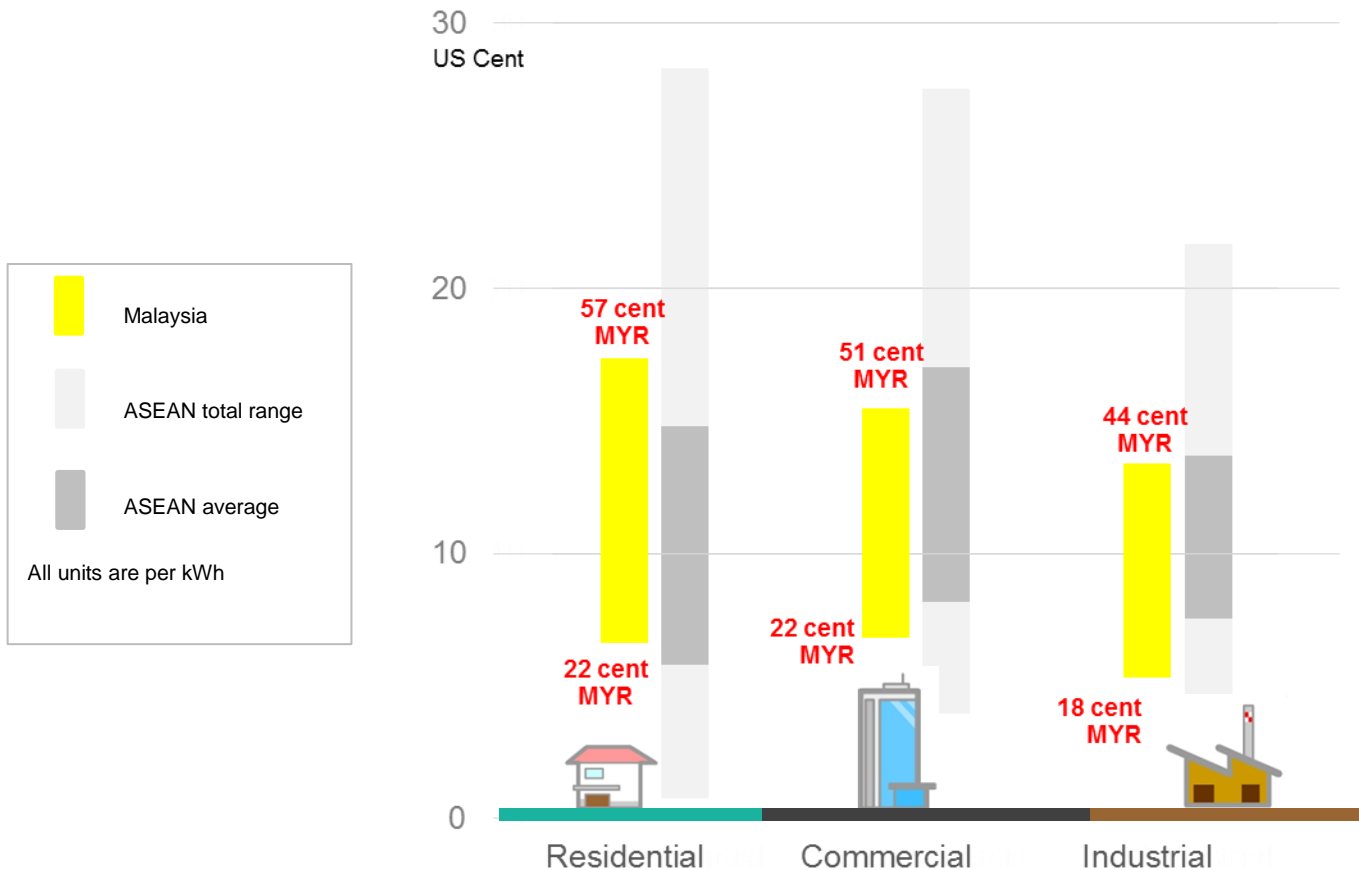


Figure 3: Electricity tariffs in Malaysia

Source: Electric Utility Company (Tenaga Nasional Berhad – TNB) (March 2014)

Notes: The conversion rate from Malaysian Ringgit (MYR) to USD is 0.24 (as of December 2018).

The tariffs are divided in three consumption sectors. The determination of the electricity tariff for the residential sector consists of nine steps. Consumers with a higher consumption levels pay a higher tariff. Above the monthly consumption of 900 kWh, the tariff remains constant at 17 USD cent /kWh. This is the highest tariff among all sectors. In contrast, the electricity tariff for commercial sector depends on the voltage level (low or medium) i.e. connection to a higher voltage level is charged with a lower tariff. The electricity tariff for industrial sector depends on the voltage level (low, medium, or high). There are two systems of tariffs for the medium-voltage level (both commercial and industrial consumers)– one that considers the time-of-use (peak/off-peak usage), and the second, which does not include this factor. For high

voltage level, only time-of-use tariff system applies. There is also a possibility to request a special reduced tariff from TNB.

According to Malaysia National Energy Balance 2015, the electrification rate is 99.8% for Peninsula and 93% in Sabah & Sarawak.

## RENEWABLE ENERGY SECTOR

### RENEWABLE ENERGY TARGETS

The National Renewable Energy Policy and Action Plan (NREPAP) is the most recent development of energy policy that focuses directly on the renewable energy sector. It defines five strategic thrusts for development of renewable energy: increase RE contribution in the national power generation mix, facilitate the growth of the RE industry, ensure reasonable RE generation costs, conserve the environment for future generations, and enhance awareness on the role and importance of RE. In 2018 MESTECC has set a new RE Target for Malaysia to achieve 20% RE capacity in 2025 as reported in MESTECC Initiatives 2019

Malaysia's renewable energy targets are outlined in the NREPAP which is a long-term plan for renewable energy development (**Figure 4**). Mini-hydropower is expected to reach its maximum capacity by 2020. The biomass and biogas are predicted to grow until their peaks are reached in 2028. Until then, biomass will be the renewable energy source with the highest installed capacity. The overall mix of installed capacity will significantly change afterward, as solar is expected to grow constantly beyond 2025, while other sources will have reached their limit by then. By 2050, solar energy is likely to cover the biggest share of installed capacity of RE.

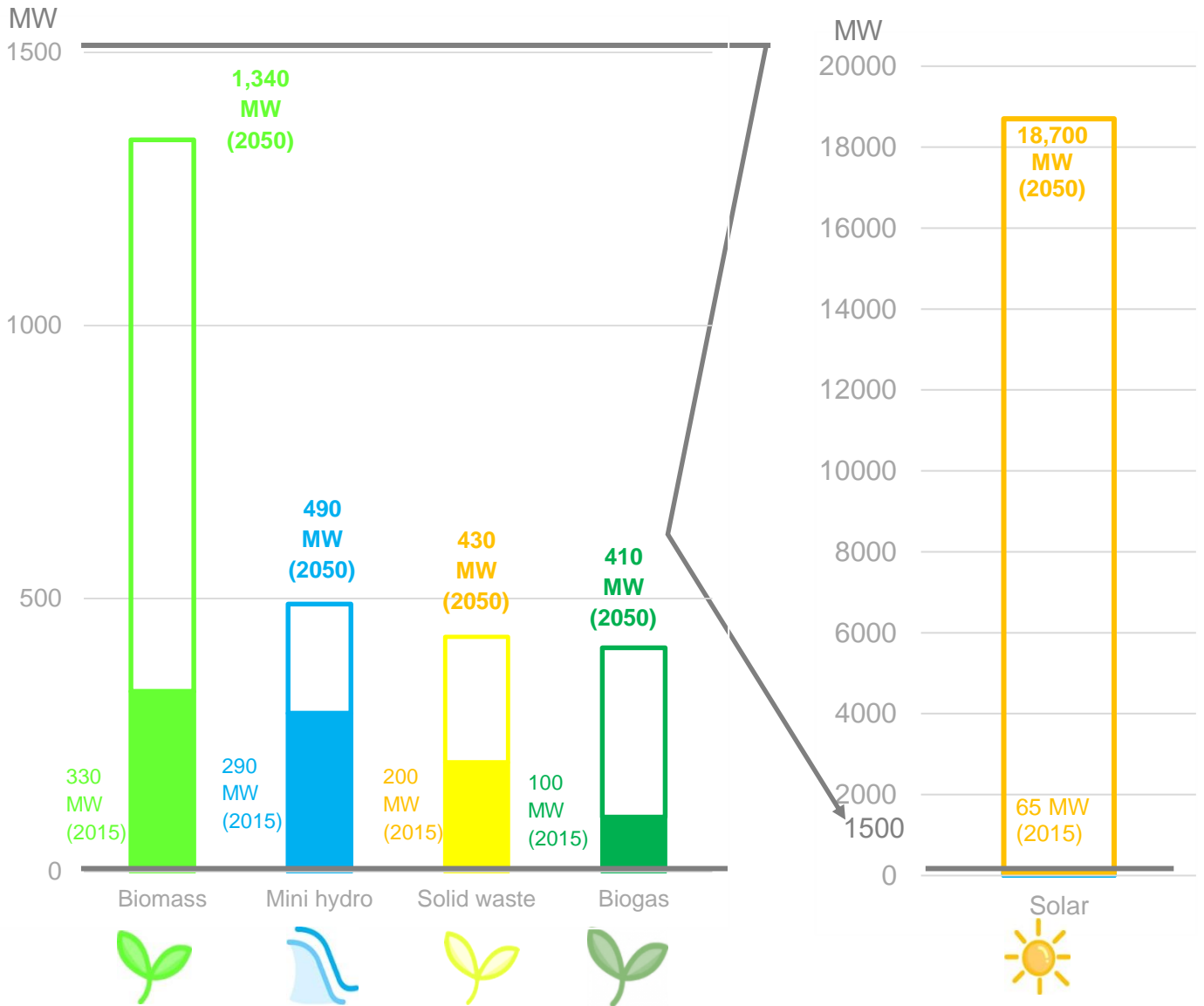


Figure 4: Renewable Energy Targets (until 2050)

Source: RE-SSN (2016)

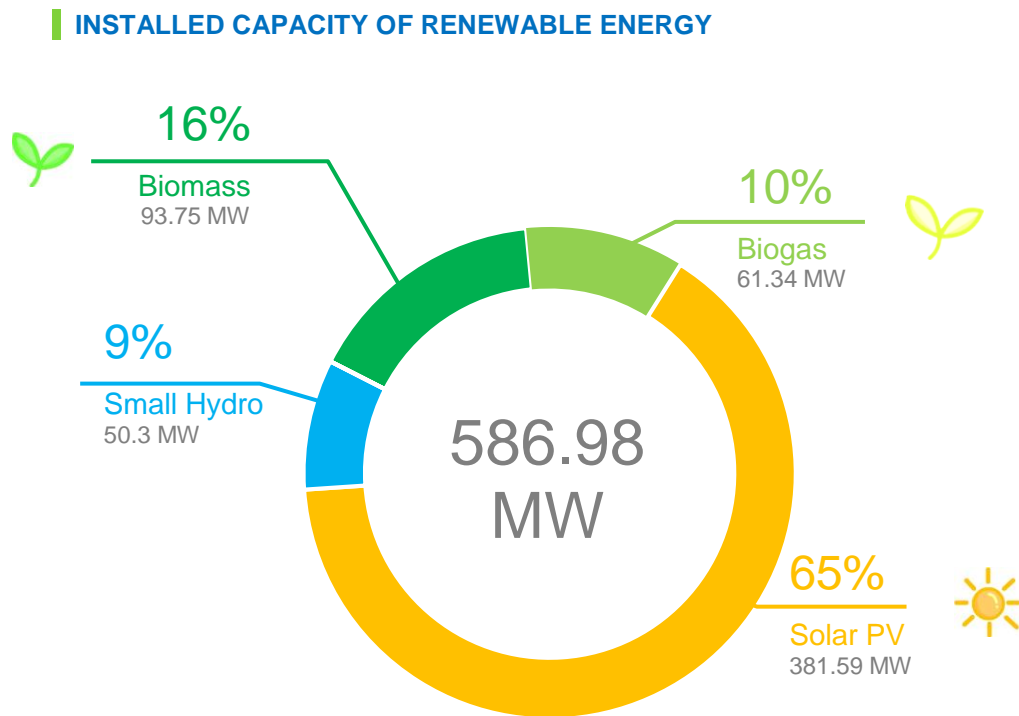


Figure 5: Installed capacity of renewable energy sources (2018)

Source: SEDA website [Accessed December 2018]

The total RE installed capacity in Malaysia is 586.98 MW in 2018 (as of December). Biomass (include solid waste 12.85 MW installed capacity) has the second highest installed capacity, amounting to around 93.75 MW (**Figure 5**). There are very high demands from the private sector to develop solar PV projects, hence the share of solar PV accounts to 65%. Only small hydropower (SHP) with installed capacity of up to 18 MW is considered as RE source in Malaysia. At the moment, the shared of SHP in installed capacity is only 9%. Future development of SHP will be limited to some extent as potential sites in the Peninsular Malaysia have been almost completely exploited.

### RENEWABLE ENERGY GENERATION

The total power generation from RE sources in Malaysia is 878,348 MWh in 2018. Solar is the dominant sources for energy generation from renewable energy sources with the share of around 45%. Biomass also plays an important role with the share of 24% that includes the electricity generated from solid waste of around 4,102 MWh or 0.5% from the total power generation in 2018. (**Figure 6**).

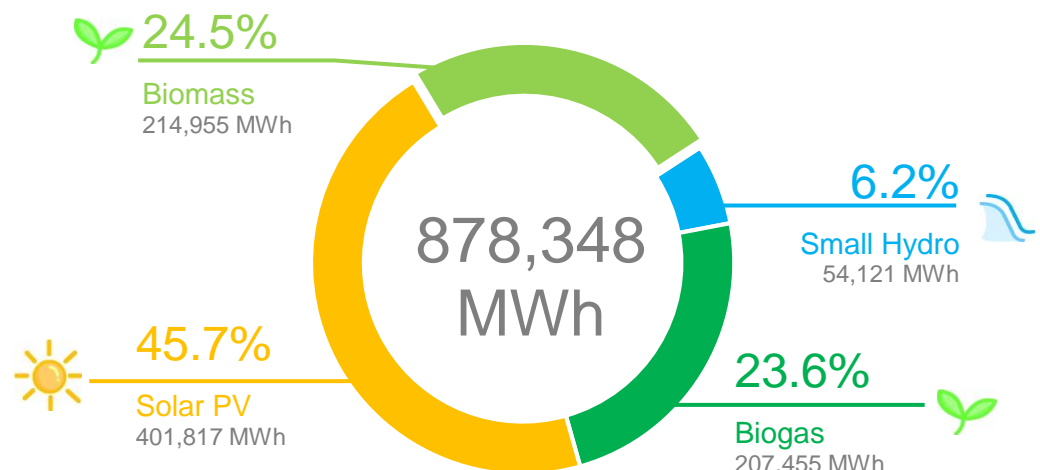


Figure 6: Share of RE sources in the total energy generation (2018)

Source: SEDA website [Accessed December 2018]

## RENEWABLE ENERGY MARKET

The Government of Malaysia has introduced several mechanisms to encourage renewable energy development. There is a possibility to obtain grants or soft loans for renewable energy project. Other incentives are also offered such as tax exemptions, development of renewable energy pricing system, determination of interconnection procedure and metering policy, etc.

The renewable energy sector in Malaysia is regulated by the government through the introduction of Feed-in Tariff (FiT) license, technical requirements for grid connection, and FiT quotas. The FiT scheme in Malaysia covers biomass, biogas, small hydro, and solar photovoltaic (**Figure 7**). The rates depend on type of technology, installed capacity, and commencement date. Additional bonus FiT can be obtained in case the installed system meets special SEDA's criteria. For example, a project which uses domestic manufactured or assembled solar photovoltaic modules can get a bonus. The renewable energy power plant that start its operation later will be subject to a lower FiT because mostly the cost of investment and production is lower than previous years. Therefore, The FiT in Malaysia is applying the regression rate in order to encourage technological cost reductions. However, after commercial operation date (COD), the FiT will not decrease anymore until it is reviewed by the authority every three years.

In October 2018, The Sustainable Energy Development Authority (SEDA) Malaysia has revoked non-performing Feed-in Tariff (FiT) projects in total of 155.7256 MW and will release a total quota of 114.5682 MW. The quota for small hydro category will be set to 5,682 MW expected to achieve commercial operations by 2020 and 2021. The quota allocated for biogas is 30 MW whereas for biomass is 10 MW for 2021.



In addition to the current FiT mechanism, a new instrument termed as Net Energy Metering (NEM) has been implemented. The objective of NEM is to promote and encourage more renewable energy generation, by prioritizing internal consumption before any excess electricity generated is fed to the grid. The introduction of NEM is to achieve the stipulated non-large-hydro renewable energy targets. Unlike FiT, only excess electricity generated from the solar PV system will be sold to the grid. As a result, it will incentivize efficient electricity consumption since the return on investment for the facility is associated with electricity savings (amount of electricity sold to the grid). Under the NEM, the capacity limits for residential are 12 kW (single phase) and 72 kW (three phase), and 1 MW for non-residential (subject to terms and conditions). NEM will be applicable to solar PV rooftop installations power generation to achieve a cumulative solar capacity of 500 MW by 2020.

MESTECC introduced a new scheme under a widened supply agreement for renewable energy (SARE) programme. With this concept, users will have zero upfront cost to install photovoltaic (PV) panels, and payment for the monthly leasing fee or solar energy usage can be made to the solar company involved via TNB bills. The users will immediately start earning benefits in the form of lower electricity bills. Essentially, the solar leasing company is selling you power at a reduced rate, generated from the newly installed solar panels. Savings vary from 5%- 25% on monthly electricity bills.

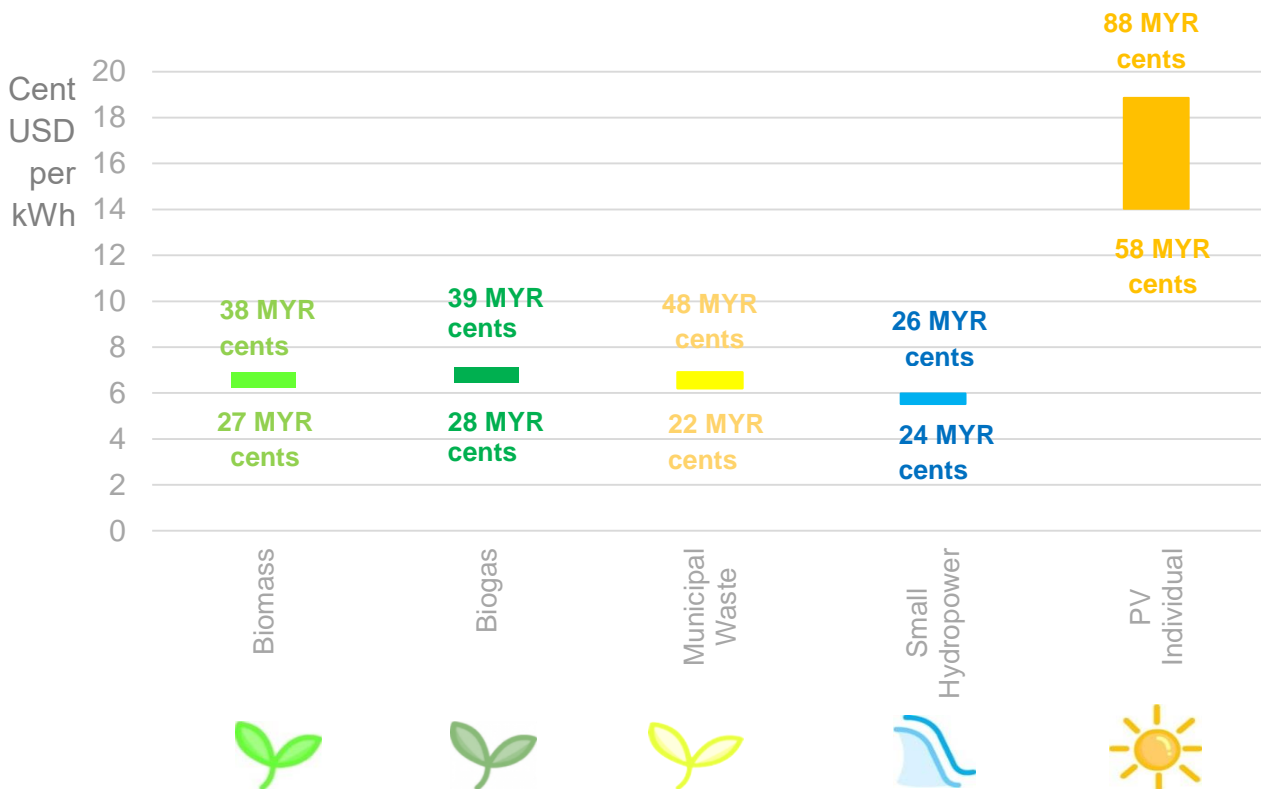


Figure 7: FiT in Malaysia as per 28 January 2019

Source: SEDA portal [Accessed January 2019]

Note: The conversion rate from Malaysian Ringgit (MYR) to US Dollar (USD) is 0.24 (as of September 2018).

## ENERGY EFFICIENCY AND CONSERVATION (EE&C) SECTOR

### EE&C TARGET

Malaysia has defined energy saving target under the National EE Action Plan (2016). The country aims to reduce its electricity consumption by 8% compared to Business as Usual (BAU scenario) across residential, commercial and industrial sectors over a 10-year period 2016 to 2025.

### EE&C POLICY

Since 1970s, EE&C has been part of Malaysia's policies as when the National Petroleum Policy included elements to increase efficiency within the sector. Further EE&C elements have been included as part of the National Energy Policy (1979), the National RE Policy Action plan (2010) and the National EE Action Plan (2016). In 2015, Malaysian Government released the 11th Malaysia Plan 2016-2020, which aims to promote wellbeing and development in the country. As part of this plan, the Government highlights its intention to promote the adoption of EE technologies across the transport, buildings, products and services sectors. It also sets the target of having at least 20% of green procurement by 2020.

The eleventh (11th) Malaysia Plan 2016-2020 include steps and actions for energy efficiency in the building sector. It targets to achieve the following:

- 700 registered electrical energy managers
- Extend Energy Performance Contracting to other government buildings
- Adopt energy efficient designs to new government building
- Retrofit 100 government buildings
- Register 70 Energy Service Companies
- Target 100 companies to implement ISO 50001

### EE&C POTENTIAL

According to The GTMP 2017 published by KeTTHA (now MESTECC), the industry sector of Malaysia was the largest energy user that accounted for 44% of the final power energy consumption in 2014. The commercial sector was at the second rank with the share of 33%, followed by the domestic and residential sectors with a share of 21%.

The potential of energy efficiency in the industrial sector is significant. The energy audits conducted during the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP) have found that potential energy savings in major industries in Malaysia can be from as low as 2% (for a glass company which was already very efficient) to 52% (for wood companies).

The highest potential energy saved had been found in the cement industry, which at 32.7% of the annual energy consumption of almost 15 million GJ could yield a savings of 4.9 million GJ. The focus on industrial energy efficiency improvement should be on the adaption of energy-efficient equipment and processes, better management of energy at plant and organizational levels and human capacity development.

## EE&C ACTIVITIES AND INVESTMENTS

Malaysia has been promoting EE&C initiatives in the region since the early 2000s. In the period of 2000-2010, the Malaysian Government and other international stakeholders including UNDP and DANIDA funded several initiatives aiming to build capacities and promote EE&C in the industry and building sectors. In 2010, the government introduced the Green Technology Financing Scheme (GTFS), which has been one of the main financing instruments in the country, EPCF, which uses government guarantees to make projects more bankable and attractive to investors; it has also implemented the SAVE program, which used rebates as a cost-effective mechanism to promote the adoption of efficient technologies within households. The effective and efficient implementation of Malaysia National Energy Efficiency Action Plan (NEEAP) programs requires an average governmental budget allocation of USD 31.2 million per annual which will cover the cost for administration and incentive. The public expenditure on NEEAP, a total USD 312 million will be leveraged by private sector investments. Overall of USD 2,885 million by private investments will be disbursed within ten years over the plan. From this investment amount, the largest share will be spent on the adaptation of energy efficient technologies.

The public and private expenditure on the Malaysia NEEAP is amounting to a total of USD 3,197 million, will result in a total direct monetary saving of USD 4,388 million. The direct monetary benefit is the total value of total electricity saved by NEEAP is calculated based on 2014 electricity tariff. The other indirect benefits such as capacity savings and GHG reductions, those are not included in the direct monetary benefit.

The Malaysia National Energy Efficiency Action Plan contains 17 specific energy efficiency programs covering three sectors to be implemented over a ten years period. The programs can be grouped into five key initiatives as shown by **Table 1**.

Table 1: Malaysia National Energy Efficiency Action Plan

Source: National Energy Efficiency Action Plan 2014

Key Initiative	Description	Programs	Savings in 10 years (GWh)
Energy Rating and Labelling	<ul style="list-style-type: none"> <li>Star energy rating of appliances and mandatory labelling.</li> <li>Promotion of 5 stars appliances</li> <li>Rebates to purchase 5 stars rated appliances</li> </ul>	Refrigerators	2,079
		Air-conditioners	5,983
		Ceiling and Stand Fans	645
Minimum Energy Performance Standards (MEPS)	<ul style="list-style-type: none"> <li>Promotion of MEPS</li> </ul>	Compact Fluorescent Lamps	3,056
		High Efficiency Motors	934
	<ul style="list-style-type: none"> <li>Support for energy</li> </ul>	Large Commercial Facilities	1,565
		Large Industrial Facilities	8,384

Energy Audits in Buildings and Industries	audits in commercial, industrial and government facilities • Implementation of low-cost measures and process optimization	Large Government Facilities	927
		Medium Commercial Facilities	306
		Medium Industrial Facilities	539
Energy Management in Buildings and Industries	• Mandatory energy management systems audits in commercial, industrial and government facilities • Implementation of no cost measures and process optimization	Large Commercial Facilities	1,363
		Large Industrial Facilities	15,937
		Large Government Facilities	1,112
		Medium Commercial Facilities	681
		Medium Industrial Facilities	1,201
Rebate scheme for standard measures	• Rebates to prescribed technologies and programs	Chillers, HVAC variable speed drives, pumps, lighting, insulation etc.	4,950

The key agencies involved in energy efficiency include the following: The Energy Section of Economic Planning Unit (EPU) of the Prime Minister's Department, the Ministry of Energy, Green Technology and Water (MEGTW), the Energy Commission (EC), and the Sustainable Energy Development Authority (SEDA Malaysia).

## REFERENCE SOURCES

- 1 Suruhanjaya Tenaga Energy Commission, n.d. *National Energy Balance 2016*. Putrajaya, Malaysia.
- 2 KeTTHA, n.d. *Handbook on the Malaysian feed-in tariff for the promotion of renewable energy*. Putrajaya, Malaysia
- 3 Reegle, n.d. *Energy Profile Malaysia*. [online] Reegle. Available at <<http://www.reegle.info/countries/malaysia-energy-profile/MY>> [Accessed November 2016]
- 4 n.a., 2016. *Renewable Energy in Malaysia. 23<sup>rd</sup> annual meeting of renewable energy sub-sector network of the ASEAN energy cooperation*. Iloilo City, Manila. 7 April 2016.
- 5 PNMB, 2011. *Laws of Malaysia Act 725: Renewable Energy Act 2011*. 23 May 2011
- 6 IEA. 2015. *World Energy Outlook 2015*. Paris, France. [online] Available at <<http://www.iea.org/publications/freepublications/publication/WEO2015.pdf>> [Accessed December 2017]
- 7 SEDA, FiT Dashboard, Sustainable Energy Development Authority Portal. [online] Available at < <http://seda.gov.my/>> [Accessed December 2017]
- 8 Suruhan Tenaga Energy Commission. 2016. *Malaysia Energy Statistics*. [pdf] [Online] Available at: <<http://www.st.gov.my/index.php/en/all-publications/item/735-malaysia-energy-statistics-handbook-2016>> [Accessed November 2017]
- 9 Kementerian Tenaga Teknologi Hijau Dan Air. 2014. *National Energy Efficiency Action Plan*. [pdf] [Online] Available at: <<http://www.kettha.gov.my/kettha/portal/document/files/NEEAP%20For%20Comments%20Final%20January%202014.pdf>> [Accessed November 2017]
- 10 Putrajaya, Malaysia: Unit Perancang Ekonomi, Jabatan Perdana Menteri. *Rancangan Malaysia Kesebelas: Penggunaan Tenaga yang Mampan bagi Menyokong Pertumbuhan*.
- 11 ASEAN Centre for Energy. 2016. *ASEAN Renewable Energy Policies*. Jakarta
- 12 ASEAN Centre for Energy. 2018. *Financing Energy Efficiency in the ASEAN Region*. Jakarta
- 13 ASEAN Centre for Energy. 2018. *Green Building and Energy Efficiency & Conservation Codes in ASEAN*. Jakarta