



Independent Statistics & Analysis

U.S. Energy Information
Administration

Country Analysis Executive Summary: Malaysia

Last Updated: January 25, 2021

Overview

- Malaysia is the second-largest oil and natural gas producer in Southeast Asia and is the fifth-largest exporter of liquefied natural gas (LNG) in the world, as of 2019. It is strategically located on important routes for seaborne energy trade.¹
- Malaysia's energy industry is an important sector of growth for the economy. The government has focused on increasing hydrocarbon production through upstream investment and exploration as a driver of economic growth, but pursuing this strategy has become increasingly challenging because production has been declining as a result of maturing fields and a lack of developed new fields.
- Mahathir Mohamad resigned as Prime Minister on February 24, 2020, and was replaced by Muhyiddin Yassin, who is backed by a new coalition party called Perikatan Nasional. Mahathir Mohamad's resignation was an unexpected announcement and led to the collapse of his own coalition party, which was formed in partnership with his political rival and former deputy prime minister, Anwar Ibrahim. The recent turn of political events, the increasing fragmentation of political parties, and the sudden slowdown of economic activity as a result of the outbreak of the novel coronavirus (COVID-19) are expected to significantly increase the level of uncertainty in the political landscape and may lead to a more complex business environment for international companies operating in Malaysia.²

Sector organization

Recent updates

- Energy policy in Malaysia is set and overseen by the Economic Planning Unit (EPU) and the Implementation and Coordination Unit (ICU), which both report directly to the Office of the Prime Minister.
- Malaysia's national oil and natural gas company, Petroliam Nasional Berhad (Petronas), holds exclusive ownership rights to all oil and natural gas exploration and production projects in Malaysia, and its Petroleum Management Unit (PMU) is responsible for managing all upstream licensing procedures. Petronas holds stakes in most of the oil and natural gas blocks in Malaysia, and Petronas financial contributions to government revenue in the form of taxes, dividends, and cash payments comprised about 35% of total government revenue in 2019.³
- ExxonMobil, Shell, and ConocoPhillips are the major international oil companies producing the most oil in Malaysia, according to Rystad Energy's production estimates. Murphy Oil

- divested its Malaysian assets through a share repurchase agreement with Thailand's PTT Exploration and Production Public Company Limited (PTTEP) and left the country.⁴ New opportunities for investment in Malaysia's energy sector have attracted other foreign oil independents and national oil companies such as Repsol (Spain), Pertamina (Indonesia), PetroVietnam (Vietnam), and JX Nippon Oil and Gas (Japan).
- The state government of Sarawak introduced a new 5% state tax on its crude oil and natural gas sales and exports beginning in January 2019, which Petronas challenged in a legal dispute with the state government. After the Sarawak High Court ruled in favor of the state government, Petronas sought to appeal the decision, but later it reached an out-of-court settlement with the state government and formally withdrew from legal proceedings in August 2020. The state government of Sabah also enacted a similar 5% state tax, in addition to royalties collected on crude oil and natural gas produced in its jurisdiction that took effect in April 2020.⁵

Petroleum and other liquids

Exploration and production

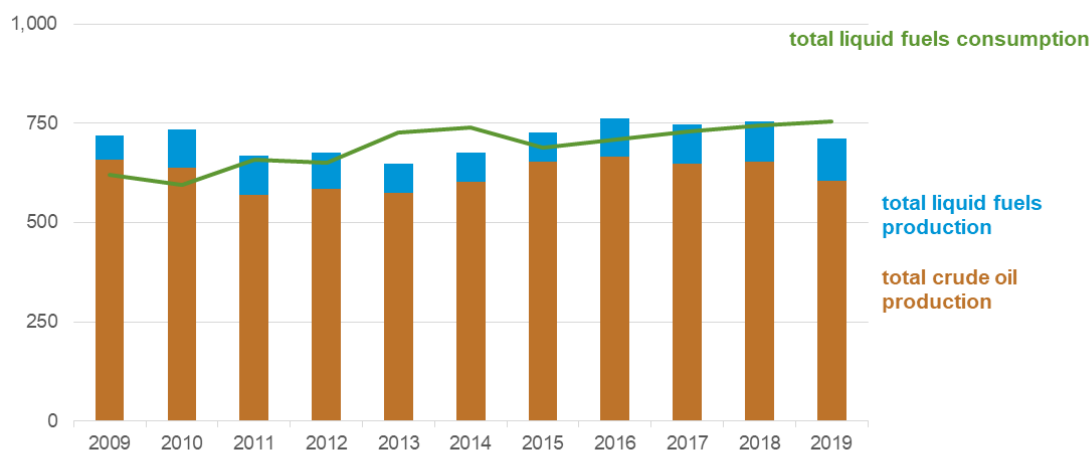
- According to the *Oil & Gas Journal* (OGJ), Malaysia held proved oil reserves of 3.6 billion barrels as of January 2020, the fourth-largest reserves in Asia Pacific after China, India, and Vietnam.⁶ Nearly all of Malaysia's oil comes from offshore fields.
- Malaysia produces a number of different crude oil blends, which are mainly medium to light, sweet blends (Table 1). Malaysia's Tapis blend, which is extracted from the Tapis field located offshore in the Malay Basin, generally commands a relatively strong price premium to other crude oils on the market because it is considered high quality.⁷
- Total liquid fuels production in 2019 was an estimated 712,000 barrels per day (b/d), of which about 600,000 b/d was crude oil. Total liquid fuels production has declined after reaching a high point of 762,000 b/d for the decade in 2016 (Figure 1).⁸ Malaysia's declining production is a result of maturing fields, particularly its larger fields in the shallow waters offshore of Peninsular Malaysia. To offset the decline, Petronas wants to attract new investment for smaller, marginal fields and reverse production declines by using enhanced oil recovery (EOR) techniques.
- In 2020, Malaysia volunteered to cut its crude oil production by 136,000 b/d from May to July 2020 to comply with the April 15 OPEC+ agreement.⁹ The agreement also stipulates that Malaysia cut 109,000 b/d from August to December 2020. OPEC members and select non-OPEC members agreed to reduce their production from a baseline in order to rebalance the crude oil market after demand steeply declined as a result of the global outbreak of the novel coronavirus (COVID-19) in early 2020 and the severe restrictions on movement and economic activity that followed.¹⁰ Crude oil prices fell significantly after the sharp drop in demand caused by the severe global restrictions on movement and economic activity and after negotiations at the March 2020 OPEC+ meeting broke down, which led to a temporary surge in production, primarily from Saudi Arabia and Russia.¹¹

Table 1. Selected crude blends from Malaysia

Crude blend	Classification	API gravity	Sulfur content
Kikeh	light, sweet	36.7	0.06
Kimanis	light, sweet	38.6	0.06
Labuan	medium, sweet	29.9	0.03
Miri	medium, sweet	29.8	0.08
Tapis	light, sweet	46.0	0.02

Sources: McKinsey Energy Insights

Figure 1. Total annual liquid fuels production and consumption in Malaysia
thousand barrels per day



Source: U.S. Energy Information Administration

Transport and storage

Pipelines

- Malaysia has a relatively limited oil pipeline network and relies on tankers and trucks to distribute products onshore. An oil product pipeline runs from the Dumai oil refinery in Indonesia to the Melaka oil refinery in Melaka City, Malaysia. An interconnecting oil-products pipeline runs from the Melaka refinery through Shell’s Port Dickson refinery to the Klang Valley airport and to the Klang oil distribution center.

Transit and storage terminals

- Malaysia wants to expand its oil storage capacity because its need for more oil storage is growing because of increasing crude oil trade in the region. Singapore also faces capacity constraints to oil storage, which Malaysia seeks to capitalize on by becoming an alternative provider for oil storage in the region.¹²

- The Pengerang oil storage terminal in Johor completed phase 2 of its construction and increased its crude oil storage capacity to 20.8 million barrels for crude oil and petroleum product storage. It has now begun phase 3 of construction, which it expects to complete by mid-2021 and to add about 2.7 million barrels of storage for clean petroleum products. The Pengerang facility is Malaysia's largest commercial oil storage facility and is owned and operated by a joint venture consisting of Vopak (44%), Dialog Group (46%), and the state government of Johor (10%).¹³
- State-owned Sabah Oil & Gas Development Corporation Sendirian Berhad signed an agreement with Petroventure Energy Sendirian Berhad to construct a crude oil storage and refining facility in Sipitang Oil & Gas Industrial Park in Sabah. The storage facility is expected to be completed in 3–5 years and have a capacity of 11.1 million barrels.¹⁴

Refining and refined oil products

- Malaysia has invested heavily in refining activities during the past two decades and can now meet most of its demand for petroleum products with domestic supplies. Malaysia has about 880,000 barrels per day (b/d) of refining capacity at seven facilities (Table 2).¹⁵
- As part of Malaysia's goal to compete with the oil refining and storage hub in Singapore, Petronas has nearly completed a refining and petrochemicals integrated development project (RAPID) in Johor, located at the southern tip of Peninsular Malaysia. This project has a nameplate capacity of 279,000 b/d and is expected to be fully commissioned by 2021. The project was delayed because of two fires: one in April 2019 at an atmospheric residue desulphurization unit, which led to a shutdown, and another in March 2020 at a diesel hydrotreater unit.¹⁶ The RAPID facility will be the country's first refinery to produce diesel and gasoline that meet the Euro V standard, which lowers carbon dioxide emission levels.¹⁷
- The Pengerang Energy Complex is currently developing a condensate splitter and it expects the project to be complete by 2024. Construction was to begin in 2020, but the start date reportedly has been delayed because of the pandemic (Table 3).¹⁸

Table 2. Malaysia's existing refineries

Refinery name	Operator	Status	Notes	Nameplate capacity (barrels per day)
Melaka 1 (PSR-1)	Petronas	Operational	Distills sweet crude oil and condensate	88,400
Melaka 2 (PSR-2)	Petronas and ConocoPhillips JV	Operational	Processes sour crude oil grades	158,100
Port Dickson	Malaysia Hengyuan International Ltd. (China)	Operational	Supplies solely domestic market; can accept heavier crude oil grades	135,000
Port Dickson	San Miguel/Petron (Philippines)	Operational		79,100
Kerteh	Petronas	Operational	Processes naphtha condensates through a splitter	112,800
Kemaman	Kemaman Bitumen Company	Operational	Converts heavy crude oils to bitumen	27,900
Pengerang RAPID	Petronas	Under maintenance	Facility shut down in March 2020; restart expected 2021	279,000
Total				880,300

Source: FACTS Global Energy, Petronas

Table 3. Malaysia's planned refineries

Refinery name	Operator	Estimated completion date	Notes	Nameplate capacity (barrels per day)
Tanjung Bin	Vitol	2020	Topping plant; initial completion date of May 2020 postponed	32,600
Pengerang RAPID	Pengerang Energy Complex	2024	Condensate splitter	139,500
Total				172,100

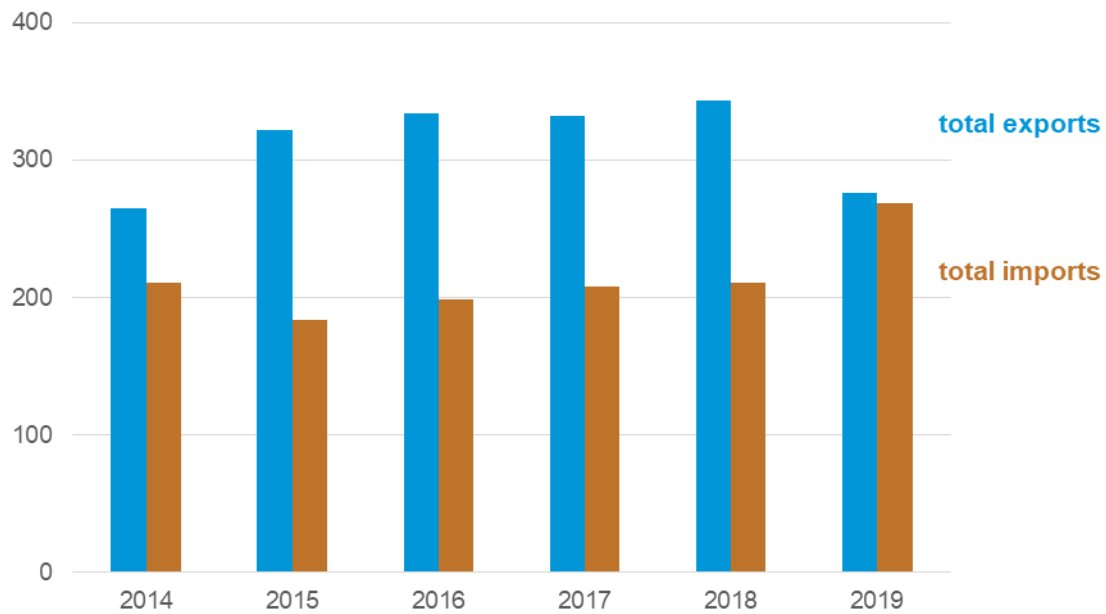
Source: FACTS Global Energy, Petronas

Petroleum and other liquids exports

- In 2019, Malaysia imported nearly 270,000 b/d of crude oil for processing at its oil refineries (Figure 2). Much of Malaysia's oil product trade occurs within Asia, especially with neighboring Singapore. Malaysia exported a 276,000 b/d of crude oil in 2019. Malaysia shipped almost all of its crude oil exports within Asia Pacific, the bulk of which were sent to Australia, India, Thailand, and Singapore (Figure 3).¹⁹

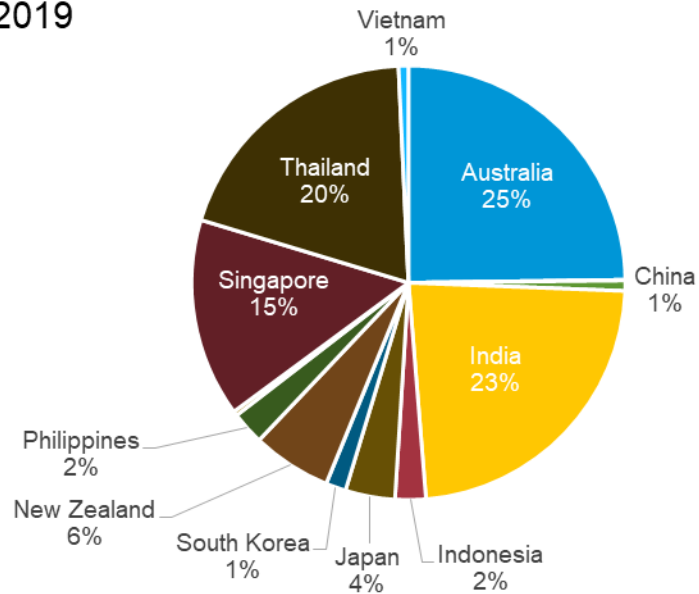
Figure 2. Malaysia's total annual exports and imports of crude oil, 2014–2019

thousand barrels per day



Source: U.S. Energy Information Administration and Global Trade Tracker

Figure 3. Total crude oil and condensate exports from Malaysia by country, 2019



Source: U.S. Energy Information Administration and Global Trade Tracker

Natural gas

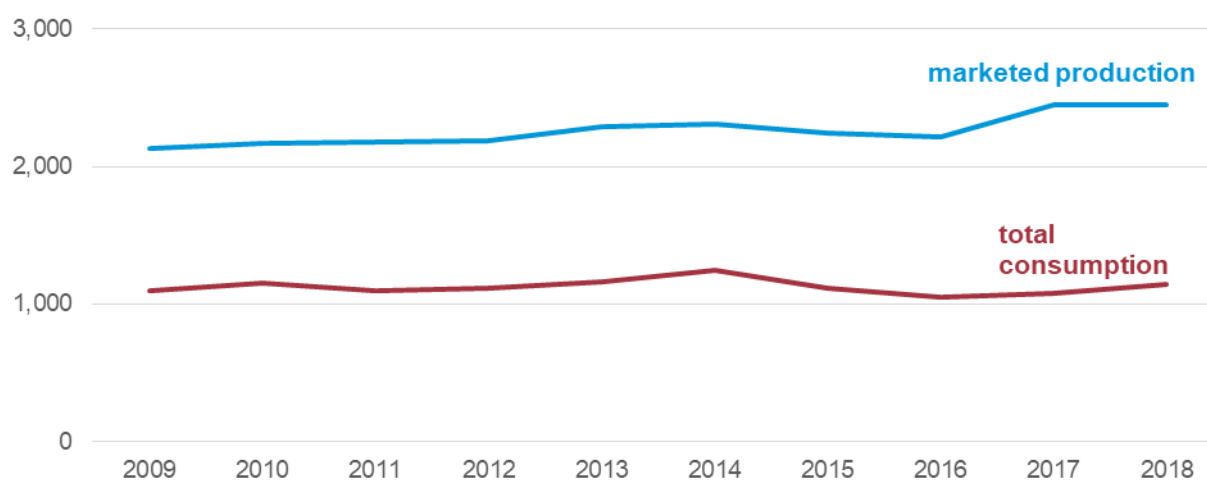
Sector organization

- Malaysia is one of the world's largest natural gas producers and exporters. Petronas is the dominant player in the natural gas sector. It has historically held a monopoly on all upstream natural gas developments because of its role as the national oil company and as a regulator for upstream activity. It also plays a leading role in midstream and downstream activities and in the liquefied natural gas trade. Petroleum Sarawak Berhad (Petros), Sarawak's state-owned oil and natural gas company, was established in March 2018 and was declared to have equal status with Petronas by the Chief Minister of Sarawak. In February 2020, Petros signed a domestic natural gas agreement with Petronas and took control over the sale, distribution, and supply of natural gas in Sarawak. Petros and Petronas are reportedly still in a dispute over their regulatory roles in Sarawak's oil and natural gas sector.²⁰
- Shell is one of the largest natural gas producers operating in Malaysia after Petronas and is a key player in the development of deepwater fields in Malaysia. Other international companies that have sizeable upstream investments in Malaysia's natural gas fields include ExxonMobil, JX Nippon Oil & Gas, PTT Exploration and Production Public Company Limited (PTTEP), and Pertamina.²¹
- The 2016 amendment to the Gas Supply Act came into force in January 2017, providing Malaysia's Energy Commission with enhanced regulatory oversight over the midstream and downstream segments of the natural gas industry. The amendment aims to further liberalize the country's natural gas market by introducing more competitive end-user natural gas pricing mechanisms and by allowing third party access to existing natural gas infrastructure.²²

Exploration and production

- According to the *OGJ*, Malaysia holds 41.8 trillion cubic feet (Tcf) of proved natural gas reserves as of January 2020.²³
- Malaysia's marketed dry natural gas production has risen during the past decade, reaching 2.5 Tcf in 2018. The increase since 2016 has been the result of projects that have come online in the past few years. Meanwhile, domestic natural gas consumption has remained mostly flat because coal has become increasingly economically competitive to natural gas as a feedstock for power generation (Figure 4).
- In 2014, the power sector accounted for 49% of natural gas consumption, and the industrial sector accounted for 50%, according to Malaysian government statistics. The remaining use was from the residential, commercial, and transportation sectors.²⁴

Figure 4. Annual natural gas production and consumption in Malaysia
billion cubic feet



 Source: U.S. Energy Information Administration

Transport and storage

Pipelines

- Malaysia has one of the most extensive natural gas pipeline networks in Asia, totaling about 1,530 miles. Much of the natural gas pipeline network is located in Peninsular Malaysia and is known as the Peninsular Gas Utilization (PGU) pipeline network. The PGU network transports natural gas after processing to Petrona's customers in the power and non-power sectors. Major pipelines in Sabah and Sarawak transport natural gas from their offshore fields to power plants for power generation or to LNG terminals for export.²⁵
- The Association of South East Asian Nations (ASEAN) has been promoting the development of a Trans-ASEAN Gas Pipeline system (TAGP), which aims to link ASEAN's major natural gas production and consumption centers through a network of natural gas pipelines. It is unclear whether this project will be completed given the growth of LNG terminals and of LNG trade as an alternative to pipeline natural gas in the region.²⁶

LNG

- Malaysia currently has a geographic disparity between natural gas supply and demand; Peninsular Malaysia demands more natural gas to fuel the power and industrial sectors, while the eastern states of Sarawak and Sabah, located on Borneo Island, produce natural gas. To meet natural gas needs in Peninsular Malaysia, Petronas has developed two regasification terminals to secure supply from the global natural gas market (Table 4). Both terminals are connected to the major natural gas pipeline network, which transports natural gas for domestic use and for export to Singapore, and have begun providing commercial LNG bunkering services, as part of the Malaysian government's intent to become a regional LNG bunkering hub.²⁷
- PFLNG Dua, Malaysia's second floating LNG (FLNG) unit, was completed in March 2020, adding 72 billion cubic feet (Bcf) to the country's total liquefaction capacity, and is expected to come online by the end of 2020 (Table 5).²⁸

- A cross-border project with Brunei to develop oil and natural gas fields along Malaysia's and Brunei's maritime boundary and within their Commercial Arrangement Area (CAA) was scrapped in February 2020. Disagreements over the revenue split between the two governments and the current administration's relatively tougher stance on the issue with Brunei led to the halt in further discussions over upstream development between the two governments. Several natural gas-rich fields that were to supply Brunei's LNG refinery had been considered for development.²⁹

Table 4. Malaysia's regasification terminals

Regasification terminal location	Shareholders	Notes	Regasification capacity (billion cubic feet per year)
Sungai Udang, Melaka	Petronas 100%	Onshore	183
Pengarang, Johor	Petronas 65%; Dialog Group 25%; Johor state government 10%	Onshore	168
Total			351

Sources: PETRONAS Gas Berhad company website, www.hydrocarbons-technology.com, International Gas Union Annual Report

Table 5. Malaysia's liquefaction terminals

Project name	Ownership	Start date	Capacity (billion cubic feet per year)
Petronas LNG (MLNG Satu)—three trains	Petronas 90%; Mitsubishi 5%; Sarawak state government 5%	Operational	389
Petronas LNG (MLNG Dua)—three trains	Petronas 80%; Diamond Gas 10%; Sarawak state government 10%	Operational	461
Petronas LNG (MLNG Tiga)—two trains	Petronas 60%; JX Nippon 10%; Diamond Gas 5%; Sarawak state government 25%	Operational	326
Petronas LNG Train 9 (MLNG 9)	Petronas 70%; JX Nippon 10%; PTT LNG Global Holding 10%; Sarawak state government 10%	Operational	172
Petronas FLNG 1 (PFLNG Satu)	Petronas 100%	Operational	58
Petronas FLNG 2 (PFLNG Dua)	Murphy Oil 80%; Petronas 20%	Dec-20	72
Total			1,478

Source: Petronas and Shell company websites, www.offshore-technology.com, www.mechademy.com

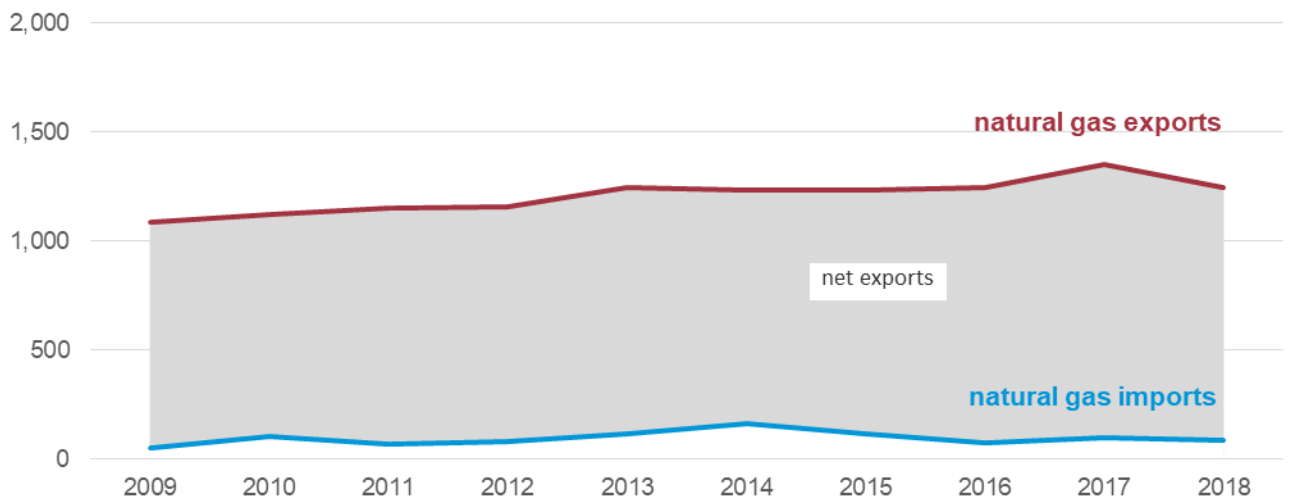
Natural gas exports

- Most of Malaysia's LNG is sold through medium- or long-term supply contracts with traders or utilities in key importing countries in the Asia-Pacific region. Malaysia also has sold LNG

cargoes to Petronas LNG Limited, a trading company based in Malaysia, which ships spot LNG cargoes to many locations around the world.

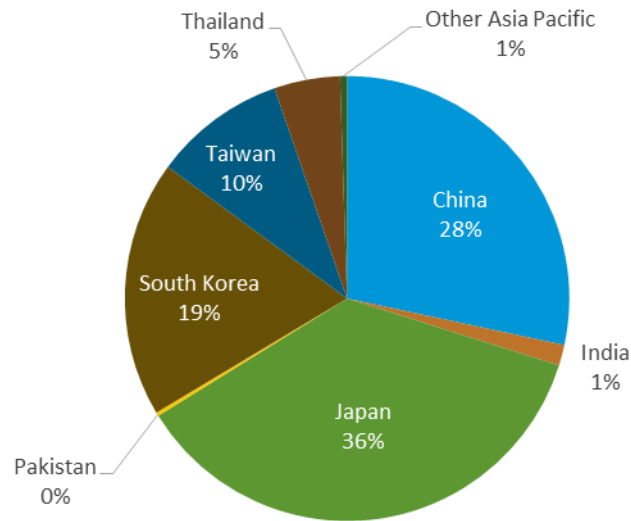
- Malaysia's total natural gas exports have steadily increased during the past decade, reaching a peak of 1.4 Tcf in 2017. Imports declined after reaching a high point of 164 Bcf for the decade in 2014 (Figure 5).³⁰
- In 2019, Malaysia was the fifth-largest LNG exporter in the world, and it shipped about 1.2 Tcf of LNG and accounted for 7% of LNG exports worldwide, according to latest estimates provided by BP's *2020 Statistical Review of World Energy*. Major importers of Malaysia's LNG in 2019 were all in the Asia Pacific region, and Japan, China, and South Korea were the three largest importers (Figure 6).³¹

Figure 5. Malaysia's annual natural gas imports and exports, 2009–2018
billion cubic feet



eia Source: U.S. Energy Information Administration

Figure 6. Malaysia's total liquefied natural gas exports by country, 2019

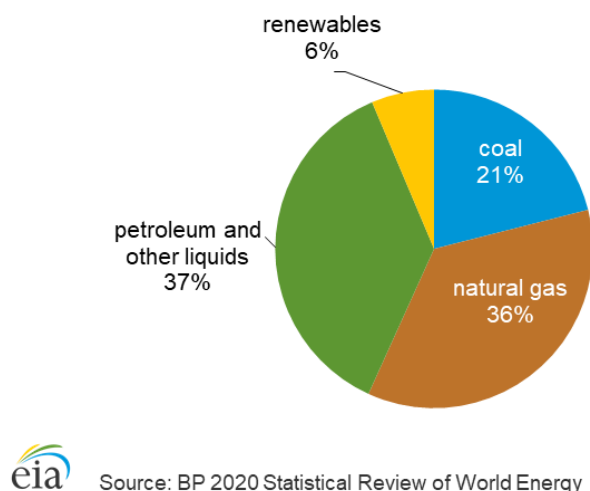


Source: BP 2020 Statistical Review of World Energy

Energy consumption

- Petroleum and other liquids and natural gas are the primary energy sources consumed in Malaysia, with estimated shares of 37% and 36%, respectively, in 2019. Coal meets about 21% of the country's energy consumption. Renewable energy accounts for 6% of total consumption (Figure 7).³²

Figure 7. Primary energy consumption in Malaysia, 2019



Electricity

Sector Organization

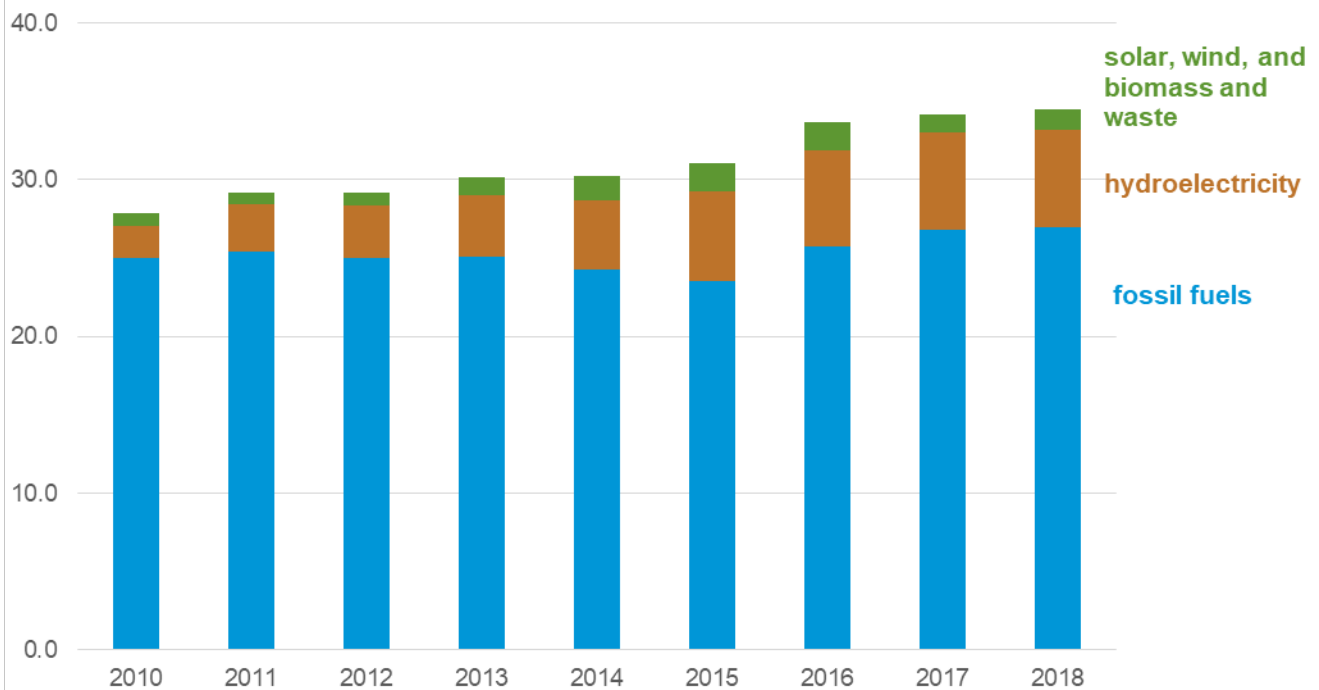
- Peninsular Malaysia (Tenaga Nasional Berhad [TNB]), Sabah (Sabah Electricity Sendirian Berhad [SESB]), and Sarawak (Sarawak Energy Berhad [SEB]) power utilities hold a monopoly in the transmission and distribution sectors. These companies are the largest stakeholders in power generation. Yet, sizeable private ownership through independent power producers (IPPs) generate most of the country's electricity.
- Malaysia's three main power transmission grids are located in Peninsular Malaysia, Sarawak, and Sabah. The National Grid in Peninsular Malaysia, the largest of the three, is interconnected with Thailand's and Singapore's electricity grids. SEB also exports electricity through a transmission line that connects with West Kalimantan in Indonesia.³³
- The Malaysian government approved a new 10-year plan to reform the country's power sector. The Malaysian Electricity Supply Industry 2.0 (MESI 2.0) aims to liberalize the power industry and promote the use of renewable energy for power generation. MESI 2.0 plans to allow for more competitive electricity tariff pricing by shifting from power purchasing agreements (PPAs) with fixed long-term tenures to capacity auctions. The plan would also allow IPPs to source their own fuel.³⁴

Power Generation and Capacity

- Malaysia's electricity demand, met mostly by natural gas and coal, continues to expand rapidly. This growth coupled with insufficient natural gas supply in high-demand centers is driving the country to diversify its power generation fuel mix and to add electricity capacity to avoid future power shortages. According to the Energy Commission of Malaysia, the industrial sector was the primary source of power demand and accounted for about 49% of the total in 2017. Commercial and residential demand were 30% and 21%, respectively. Transportation and agriculture accounted for less than 1% of power demand.³⁵

- Total installed generation capacity at the end of 2018 was about 34 gigawatts (GW), located mostly in Peninsular Malaysia.³⁶ Fossil fuels, primarily coal and natural gas, accounted for about 78% of Malaysia's installed capacity at the end of 2018 and 83% of the country's electricity output in 2018 (Figures 8 and 9).³⁷
- Malaysia's economic development and population growth have resulted in substantially higher electricity demand during the past decade. The country's net electricity generation was about 160 gigawatthours (GWh) in 2018 (Figure 9).³⁸ The high-demand centers, particularly in Peninsular Malaysia, are facing shortages of natural gas and a need for greater generation capacity. Sarawak and Sabah in Borneo also require more energy to meet the demands of their growing infrastructure and industrial sectors.
- Tightness of natural gas supply in Malaysia caused by the state's production declines as well as higher natural gas prices has resulted in increased use of coal-fired generation. The recent regulatory trend towards liberalizing the natural gas market aims to make natural gas pricing more competitive, however, and is expected to enable natural gas to regain a larger share of power generation feedstock, albeit in the longer term.³⁹

Figure 8. Malaysia's electricity capacity by fuel type, 2009–2018
gigawatts




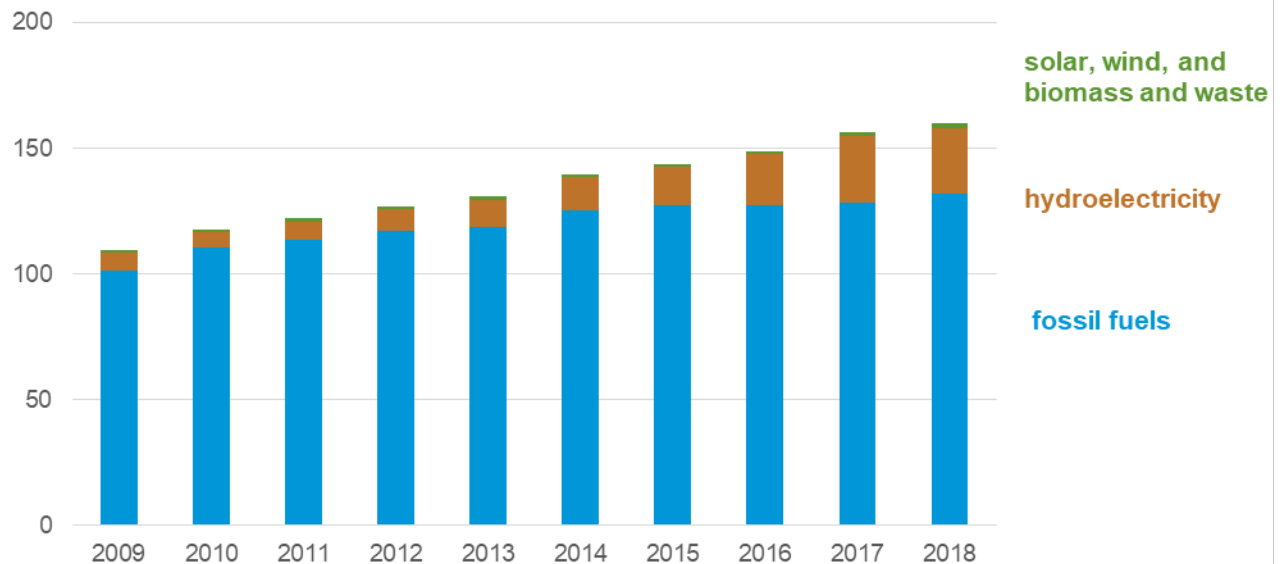
 Source: U.S. Energy Information Administration

Figure 9. Malaysia's net electricity generation by fuel type, 2009–2018
gigawatthours



Source: U.S. Energy Information Administration

Coal

- Coal, which accounted for 43% of power generation in 2018, has become much more economically competitive with natural gas for power generation. Fuel switching from natural gas to coal gained traction in Peninsula Malaysia during the past few years, prompting utilities and power companies to develop more coal-fired capacity in the country.⁴⁰
- Malaysia produced about 3 million short tons of coal in 2018, or about 8% of its total coal consumption. The country has limited domestic coal reserves; latest estimates of proven reserves indicate about 200 million short tons in 2017. Nearly all of its domestic coal reserves are located in Sarawak, and Malaysia relies heavily on imports for coal.⁴¹ Most of Malaysia's coal imports come from Indonesia and Australia, and Malaysia imported approximately 38 million short tons in 2019.⁴²
- Sarawak Energy's 600-megawatt (MW) Balingian coal-fired power plant was due to come online in the third quarter of 2019, but the utility has not reported on the plant's construction progress or its start date. The Jimah East project is a 2-GW two-unit, ultra-super critical coal-fired power plant that is located in Port Dickson. The project is owned and operated by a joint venture between Tenaga Nasional Berhad (70%), Mitsui (15%), and Chugoku Electric Power (15%). Construction began in 2016, and the plant began operating in December 2019.⁴³

Renewable Energy Sources

- The Ministry of Energy, Science, Technology, Environment, and Climate Change (MESTECC) devises policy related to electricity, renewable energy, and energy efficiency in Malaysia.

The government has begun prioritizing clean energy and aims to achieve a capacity mix of 25% in renewables by 2025 in order to reduce its greenhouse emissions and to diversify its power fuel mix.⁴⁴ The Malaysian government launched its fourth round of the Large Scale Solar PV (LSSPV) tender for 1 gigawatt (GW) in May 2020 to attract more development in solar energy, particularly from local market players.⁴⁵

- Malaysia is significantly expanding its use of hydroelectricity, which accounted for 18% of Malaysia's total installed capacity and 17% of electricity generation in 2017.⁴⁶ In 2017, hydroelectricity represented about 75% of Sarawak's power generation, which came from three hydroelectric plants: Batang Ai (108 MW), Bakun (2,400 MW), and Murum (944 MW). Sarawak Energy, an energy development and power utility company, plans to construct the 1,285-MW Baleh Dam by 2025.⁴⁷

Notes

- In response to stakeholder feedback, the U.S. Energy Information Administration has revised the format of the *Country Analysis Briefs*. As of December 2018, updated briefs are available in two complementary formats: the Country Analysis Executive Summary provides an overview of recent developments in a country's energy sector and the Background Reference provides historical context. Archived versions will remain available in the original format.
- Data presented in the text are the most recent available as of January 25, 2021.
- Data are EIA estimates unless otherwise noted.

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