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Administration

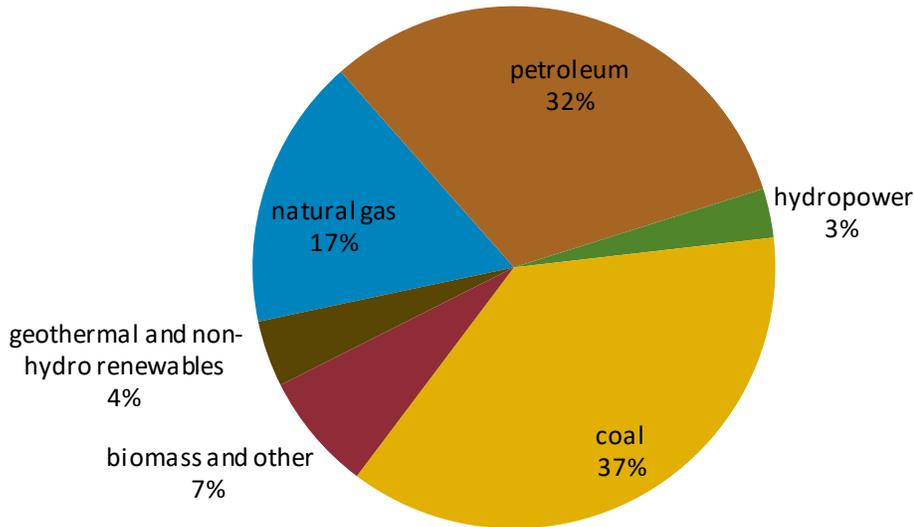
Country Analysis Executive Summary: Indonesia

Last Updated: September 24, 2021

Overview

- Indonesia's 2020 petroleum and other liquids production totaled 887,000 barrels per day (b/d), accounting for approximately 1% of world production.
- In 2020, Indonesia was the world's largest exporter of coal by weight¹ and the seventh-largest exporter of liquefied natural gas (LNG).²
- Indonesia's total primary energy consumption grew by 16% between 2010 and 2020.³ The country's petroleum share, although decreasing since 2018, accounted for the second-highest portion of Indonesia's energy mix at 32% in 2020.⁴ Between 2010 and 2019, use of coal more than doubled. Surpassing natural gas as the less expensive fuel during that time, domestically produced coal became more economically attractive.
- Indonesia's National Energy Policy calls for a reduction of petroleum use to 25% of its primary energy supply while raising the renewable energy mix to 23% by 2025.⁵ This energy mix would be a significant change from its current energy mix (see Fig. 1).
- In 2019, Indonesia became the largest producer of biodiesel in the world.⁶

Figure 1. Total primary energy consumption in Indonesia by fuel type, 2020



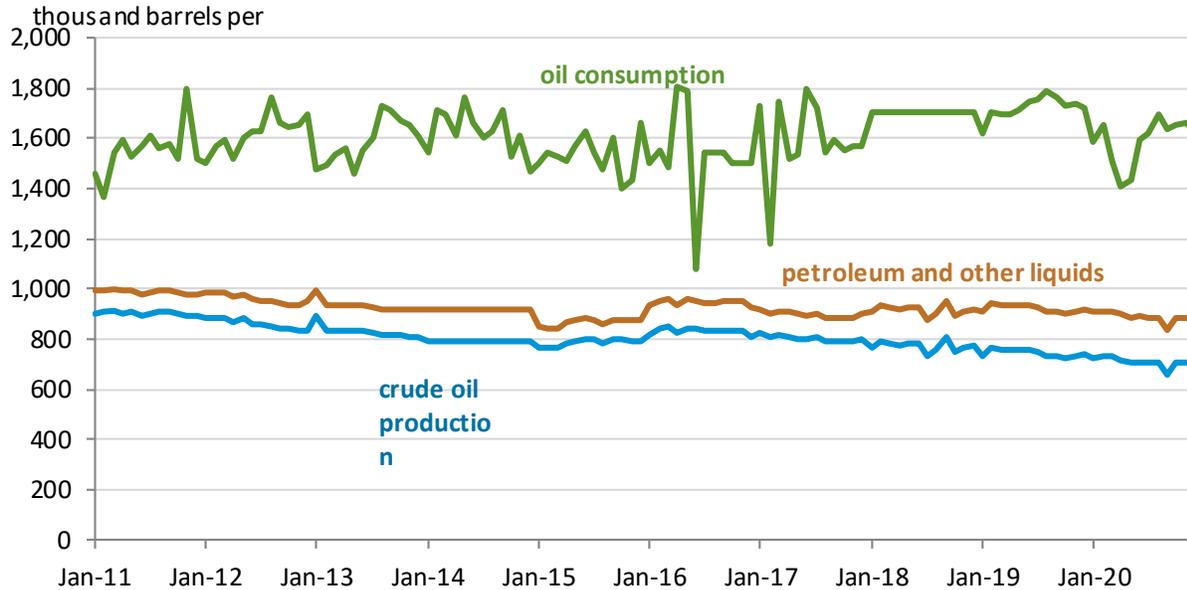
Source: Graph by the U.S. Energy Information Administration, based on data from Indonesia's Ministry of Energy and Mineral Resources

Petroleum and other liquids

- As of January 2021, Indonesia totaled approximately 2.5 billion barrels of proved crude oil reserves.⁷ According to the Deputy Energy and Mineral Resources Minister, the replacement rate of oil reserves dropped to 50% in 2018 because of declining oil exploration and technology limitations.⁸
- In 2020, Indonesia's petroleum and other liquids production averaged 887,000 barrels per day (b/d). Petroleum and other liquids production declined from a recent high of nearly 1.7 million b/d in 1991.
- In 2021, an Indonesian task force called SKK Migas (which manages upstream oil and natural gas business activities) set a crude oil and condensates production target of 705,000 b/d. Indonesia produced an average of 667,000 b/d of crude oil and condensates during the first five months of 2021, signaling that the country could fall short of its goal. SKK Migas plans include drilling 1,000 development wells per year by 2025. This goal is in response to the government's target to produce 1 million b/d of crude oil and condensate by 2030.⁹
- Declining oil production and rising domestic demand are an increasing challenge for Indonesia (Figure 2). Most of the oil reserves that are in areas operated by Pertamina (which accounts for 47% of Indonesia's production) are in mature fields and require enhanced oil recovery (EOR) techniques.¹⁰ These deposits are currently beyond the technological scope of domestic firms and in some cases require the development of basic infrastructure in remote areas of the country (mainly in the eastern region).
- An uncertain regulatory environment and government measures that offer preferences to the domestic industry have limited foreign investment in extracting these reserves. For example, Domestic Market Obligations (DMOs) require that a minimum 25% of oil production be made available to the Indonesian market.¹¹ This production floor is part of Indonesia's policy to offset

rising oil imports and serve domestic needs. In addition, disputes with international oil companies have limited Indonesia's domestic operations.

Figure 2. Indonesia's petroleum and other liquids production and consumption, 2011–2020



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, July 2021

Refining

- Indonesia's total refinery capacity was an estimated 1.1 million b/d in 2020 at six major refineries and a few smaller facilities (Table 1). The overall utilization rate of these refineries was approximately 73% in 2020.¹² Pertamina owns and operates most of the refining capacity in Indonesia.
- Current refining capacity is insufficient to meet domestic demand, and Indonesia uses imports to meet about half of its domestic petroleum product use. In response to this, Pertamina's plans include spending \$48 billion by 2027 to increase domestic refining capacity to 1.8 million b/d.¹³

Table 1. Oil refineries in Indonesia, 2020

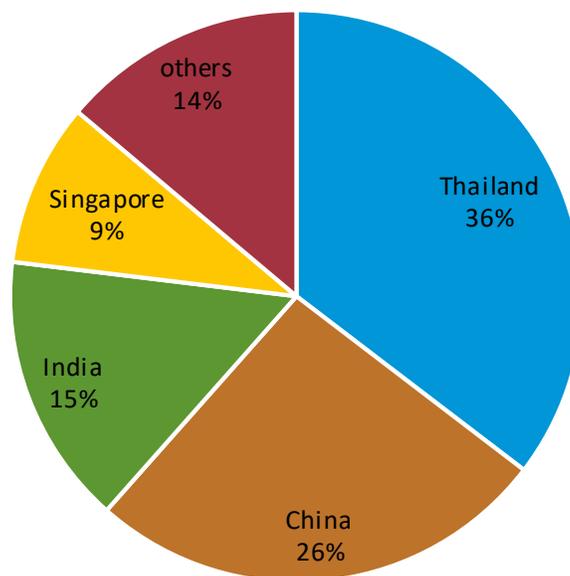
Refinery	Nameplate crude distillation capacity (thousand barrels per day)
PT Pertamina-Balikpapan	247
PT Pertamina-Balongan	125
PT Pertamina-Cepu	3
PT Pertamina-Cilacap	348
PT Pertamina-Dumai	120
PT Pertamina-Musi	118
PT Pertamina-Sungai	50

Source: Oil & Gas Journal – 2020 Worldwide Refining Survey

Trade

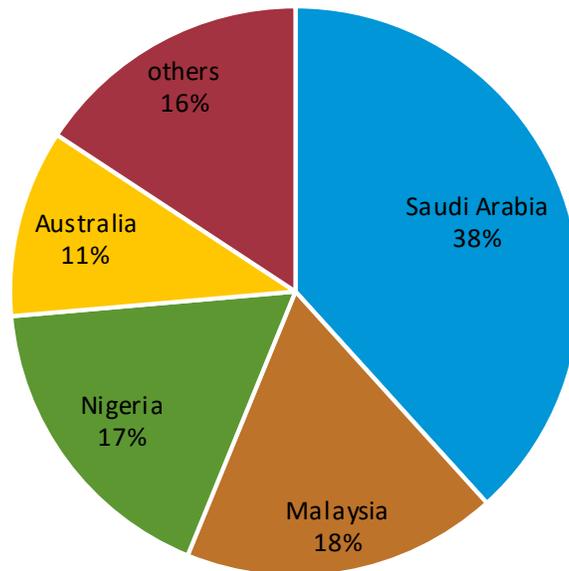
- Indonesia does not have any international oil pipelines and only a few domestic pipelines, so maritime trade is an important part of its petroleum market. Most petroleum trade is in the form of imports, chiefly motor gasoline and diesel for Indonesia's transportation sector. Indonesia exports a small amount of fuel oil each year. Although Indonesia both imports and exports crude oil, it is a net crude oil importer as a result of growing domestic demand for petroleum products and crude oil use in electric power generation (Figures 3 and 4).
- In 2020, Indonesia imported more than 236,000 b/d of crude oil. Approximately 38% of Indonesia's crude oil imports came from Saudi Arabia. Other significant suppliers included Malaysia (18%), Nigeria (17%), and Australia (11%) (Figure 4).¹⁴

Figure 3. Indonesia's crude oil and condensate exports by destination, 2020



Source: Graph by the U.S. Energy Information Administration, based on tanker liftings data from ClipperData, LLC

Figure 4. Indonesia's crude oil and condensate imports by source, 2020



Source: Graph by the U.S. Energy Information Administration, based on tanker discharge data from ClipperData, LLC

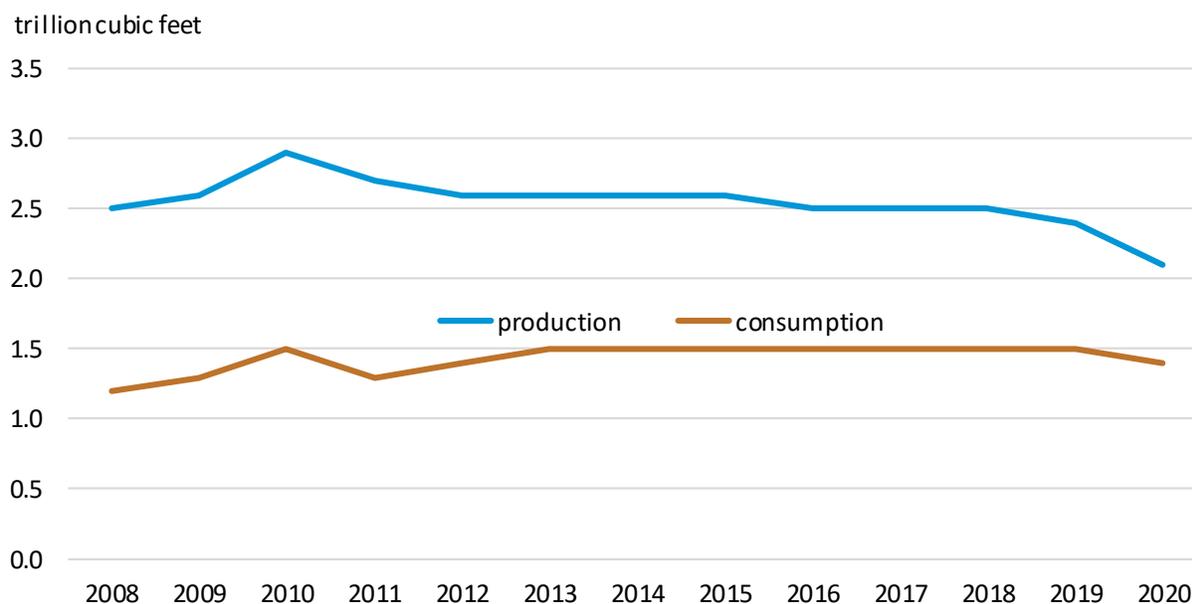
Natural gas

- Indonesia's proved natural gas reserves totaled 49.7 trillion cubic feet (Tcf) in 2021, down more than 50% from 100.4 Tcf in 2019. Its reserves are the third largest in the Asia-Pacific region, after China and Australia.¹⁵

Exploration and production

- EIA estimates Indonesia produced 2.2 Tcf of dry natural gas in 2020, mostly from offshore fields not associated with crude oil production. Production had remained relatively stable, fluctuating between 2.5 Tcf and 2.6 Tcf from 2014 to 2018, until it decreased to 2.3 Tcf in 2019.
- Because of the lack of infrastructure to produce associated natural gas, more than 66 billion cubic feet (Bcf) of natural gas was flared in 2020, placing Indonesia among the top 20 global producers of flared natural gas in 2020.¹⁶
- Indonesia's government promotes exploration of coal bed methane (CBM) and shale gas, in addition to conventional crude oil and natural gas. The Ministry of Energy and Mineral Resources estimated that CBM reserves totaled 453 Tcf in 2019. Although resources are significant, production has been lower than anticipated because of regulatory hurdles and environmental issues.

Figure 5. Indonesia's dry natural gas production and consumption, 2008-2020



Source: U.S. Energy Information Administration

Consumption and distribution

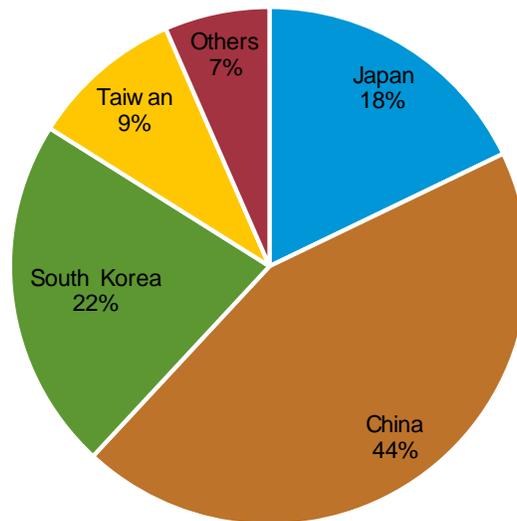
- In 2020, Indonesia used almost 1.5 Tcf of natural gas, or slightly less than two-thirds of its total gas production.¹⁷
- A DMO requires 25% of natural gas output from production-sharing contracts in Indonesia to supply the domestic market.¹⁸
- State-owned Perusahaan Gas Negara (PGN) controls 93% of all national downstream infrastructure, operating more than 6,318 miles of natural gas transmission and distribution pipelines.¹⁹

Liquefied natural gas

- After accounting for more than a third of global LNG exports in the 1990s, Indonesia's share of the global market in 2020 was 4.4%.²⁰ In 2020, Indonesia exported approximately 593 Bcf of LNG, up from 582 Bcf in 2019. With exports of LNG destined to South Korea, Japan, and China, Indonesia is mostly a regional supplier (Figure 6). It has lost market share in the last several years to other LNG producers including Qatar, Malaysia, Australia, and the United States. Indonesia was the world's seventh-largest exporter of LNG in 2020.²¹
- Indonesia has three liquefaction plants with a combined liquefaction capacity of 1 Tcf per year.²² The Tangguh LNG Trains 3 is expected to come online in 2022 adding 182 Bcf of production capacity. The Sengkang LNG Train 1 is expected online in late 2021 with 24 Bcf.
- Indonesia currently has over 400 Bcf in regasification capacity. It is home to the first LNG-to-power floating storage and regasification unit (FSRU) that began operating in 2020. The small-scale unit has a capacity of 494 thousand cubic feet, and it is run by PT Sulawesi Regas Satu as part of an agreement to deploy five power plants in Indonesia with a total capacity of 1 gigawatt (GW).²³

- PT Jawa Satu Regasification project (Jawa 1) is an LNG FSRU. It has a storage capacity of 6 million cubic feet and a regasification capacity of 115 Bcf per year. A 1.76 GW combined-cycled natural gas power plant in West Java will be part of the project. It will be deployed 9 miles offshore in the Cilamaya Sea, east of Jakarta. The power plant is expected to be running by the end of 2021.²⁴
- PGN expects construction of a small-scale regasification facility, located at the Teluk Lamong port, to be completed in 2021. The facility will have a regasification capacity of 14 Bcf per year.²⁵

Figure 6. Indonesian LNG exports by destination, 2020



 Source: Graph by U.S. EIA, based on data from BP Statistics

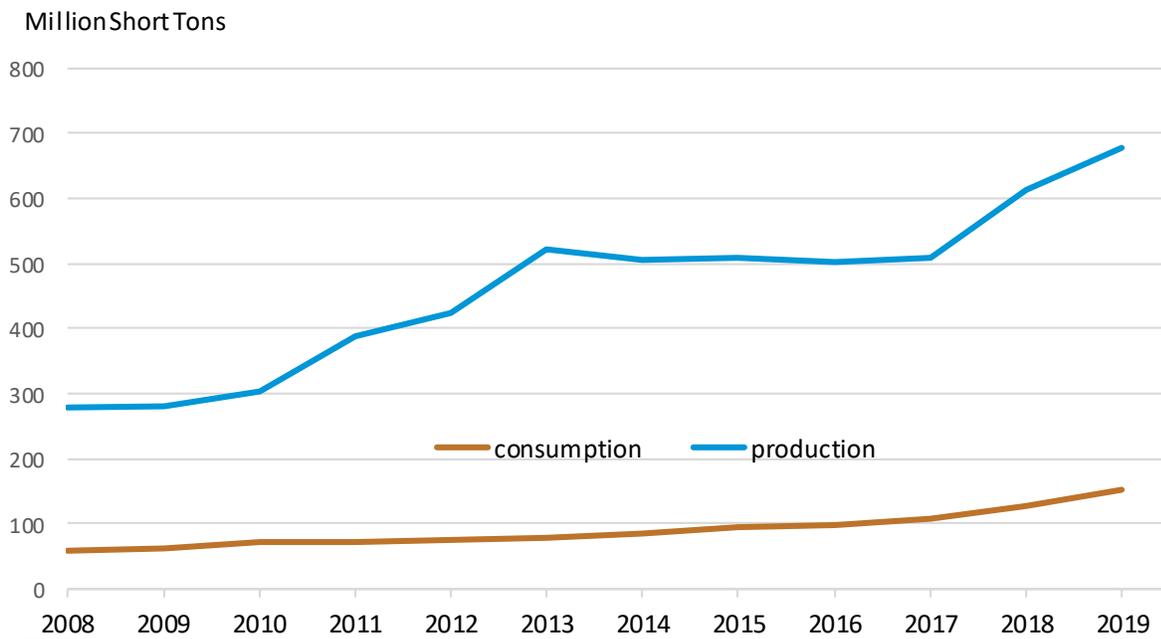
Coal

- Indonesia plays a large role in world coal markets, particularly as a regional supplier to Asian markets. It has been one of the largest exporters of thermal coal, typically used in power plants, since 1995. In 2018, it surpassed Australia as the world's largest exporter of coal by weight.²⁶
- Indonesia's coal production reached a record of 679 million short tons in 2019, which was approximately a 12% year-over-year increase (Figure 7). The high production led to a price decrease, causing the government to impose a production limit of 606 million short tons in 2020.²⁷
- A DMO specifies that a certain share of production must be sold domestically at a specified price. In 2020, the rate set by the Energy and Mineral Resources Ministry was 25% of each mining company's production at a selling price of \$70 per ton.²⁸
- In 2020, the Indonesian Coal Mining Association asked to temporarily suspend the DMO requirement because of a drop in domestic demand.²⁹
- Perusahaan Listrik Negara (PLN) has unofficial plans that outline a retirement timeline for coal-powered plants in an effort to reach carbon neutrality by 2060.³⁰ The first phase sees the closure of three power plants with a combined capacity of 1.1 GW in 2030. The second phase includes

the closure of its conventional coal plants at 9 GW capacity by 2035. Supercritical plants at 10 GW will be retired by 2040 in a third phase, and the final phase of ultra-supercritical plants will be offline in 2056.³¹

- PLN has committed to stop building new coal power plants after 2023. However, before this deadline, another 35 GW and the Fast Track Program addition of 7 GW of coal-fired capacity will be completed. Any additional power generation is planned to come from renewable power sources.³²
- PLN began using biomass for co-firing with coal in 17 power plants after a study of approximately 114 power plants was completed in 2020. The expected biomass generation capacity is 189 MW.³³

Figure 7. Indonesia's coal production and consumption, 2008-2019



eia Source: U.S. Energy Information Administration

Exploration and production

- Indonesia had 42.8 billion short tons of recoverable coal at the end of 2020, located primarily in South Sumatra, East Kalimantan, and South Kalimantan.³⁴ The Ministry of Energy and Mineral Resources expects reserves to increase as a result of the amendment of Law No. 4, which requires producers to submit the details of their exploratory findings to renew or transfer mining permits.³⁵
- Coal production grew by approximately 105% over the past decade from 303 million short tons in 2010 to 621 million short tons in 2020.³⁶ This increase was the result of a sharp growth in demand, particularly in Asia where China and India are the top export destinations for Indonesia's coal. Use of coal has more than doubled in the past decade in Southeast Asia as

demand reached 366 million short tons in 2019, of which Indonesia accounted for 153 million short tons, or 42%.³⁷

- Cokal’s Bumi Barito Mineral project is located in the Kalimantan province, and the company expects to produce 2.2 million short tons per year of high-grade metallurgical coal.³⁸ Operations will likely start in late 2021.³⁹

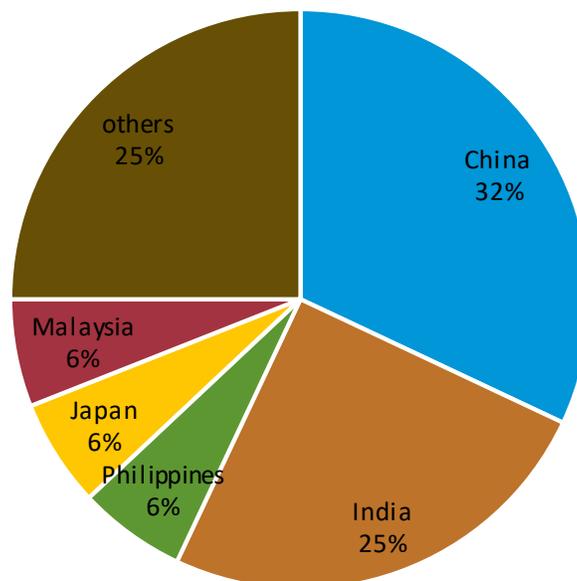
Consumption

- Indonesia’s use of coal increased to 153 million short tons in 2019. As of 2021, the country totaled 87 coal power plants with a combined generation capacity of approximately 21 GW.⁴⁰ Use of coal for electric power generation accounted for approximately 68% of total coal use in 2019,⁴¹ and Indonesia’s government expects this share to increase in the next few years as a result of additions to coal-fired generation capacity.⁴²
- Indonesia’s long-term goals for coal are unclear. The government amended older policies to help promote the coal industry, and it expects a number of coal plants to be built over the next few years.

Trade

- In 2019, Indonesia was the world’s largest exporter of thermal coal at 506 million short tons; nearly 75% of output was exported. Indonesia supplied 32% of the world’s coal exports (502 million short tons) in 2019, including 41% of global thermal coal trade.⁴³
- In 2020, the majority of Indonesia’s coal exports went to Asia (Figure 8), especially China (32% of total coal exports), India (25%), the Philippines (6%), Japan (6%), and Malaysia (6%).

Figure 8. Indonesia's coal exports by destination, 2020



Source: Graph by the U.S. Energy Information Administration, based on data from Global Trade Tracker

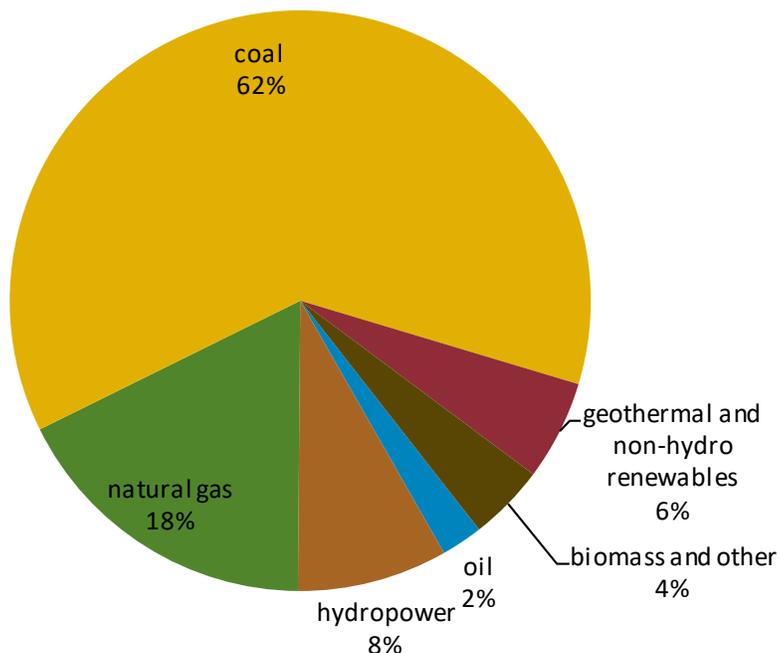
Electricity

- Indonesia's government, in its 2014 National Energy Policy, set a target to provide every household in the country access to electricity by 2020. Over the past decade, the percentage of the population with access to electricity rose from approximately 67% in 2010 to over 99% in 2020. The government aims to achieve 100% in 2021. Although access to electricity has grown, connection quality has remained a challenge, and power outages are common.⁴⁴ Eastern Indonesia does not have the high electrification rates as the western area of the country; for example, Papua and West Papua in eastern Indonesia are the only provinces with electrification rates below 60% (Papua at 22.7% and West Papua at 44.2%).⁴⁵ These areas are more remote which creates logistical problems that need to be overcome before electrification can take place.
- From 2017 to 2019, PLN initiated a program that installed solar powered lights in villages that were not expected to be connected to the grid within two to three years from the program's completion in 2019.⁴⁶

Generation

- Indonesia had an estimated 63.3 gigawatts (GW) of installed generation capacity and generated 275 terawatt-hours (TWh) of electricity in 2020, according to Indonesia's Ministry of Energy and Mineral Resources as well as PLN data.⁴⁷ In 2020, about 82% of the power generation came from fossil fuel sources (62% coal, 18% natural gas, and 2% oil), 6% came from hydroelectric, 6% came from non-hydro renewable energy, and 4% came from other sources such as biomass (Figure 9).⁴⁸ Geothermal accounts for the majority (96%) of non-hydro renewable energy.⁴⁹
- Most of Indonesia's electricity is used by residential customers (46%), followed by industrial (30%) and commercial (18%) users.⁵⁰

Figure 9. Indonesia's net electricity generation by fuel, 2020



Source: Indonesia's Ministry of Energy and Mineral Resources

Geothermal, biofuels, and other renewables

- According to the Ministry of Energy and Mineral Resources, the draft of the National Electricity Supply Plan (RUPTL) for 2021 to 2030 increases the renewable energy mix to at least 48% from the 30% target in the 2019–2028 plan.⁵¹
- According to PLN, renewable energy installed capacity was 8 GW at the end of 2020. Hydro and geothermal plants made up the majority of the installed capacity.⁵²
- Indonesia is the second-largest geothermal electric power generator in the world, second only to the United States. The Ministry of Energy and Mineral Resources has estimated that Indonesia potentially has about 24 GW of geothermal resources and about 2.1 GW of installed geothermal capacity.⁵³ According to the 2021–2030 National Electricity Supply Plan, geothermal capacity additions are expected to be 1.2 GW by 2025 and 2.4 GW by 2030. These targets are significantly lower than in the 2019–2028 National Electricity Supply Plan.⁵⁴
- Hydropower made up about 8% of the total generation capacity in 2020, and its installed capacity has grown slowly with 2.2 GW added in the past decade.⁵⁵
- Indonesia quickly ramped up biodiesel production between 2009 and 2020 to become the largest producer and consumer of biodiesel in the world. It produced 146 thousand barrels per day (kbpd) in 2020 and consumed 145 kbpd barrels.⁵⁶ The government continues to support biodiesel as part of its commitment to reduce greenhouse gas emissions by either 29% (business-as-usual scenario) or 41% (with international assistance) by 2030. Biodiesel is also blended with diesel or distillate fuel, which could result in lower oil imports and help improve

energy security.⁵⁷ On a smaller scale, Indonesia also produced 1.2 million barrels of ethanol in 2020, of which molasses was the main feedstock.⁵⁸

- The government required a biodiesel blending rate of 30% in 2020, the highest rate for any country. The government is already considering increasing to a 40% blend rate and is running tests to explore that possibility.⁵⁹
- In 2020, biomass and waste (which include firewood and charcoal) made up approximately 4% of total primary energy consumption, and its share has declined since at least 2009.⁶⁰
- Although wind power and solar power have the potential to grow in Indonesia, wind and solar make up a relatively small share of electric power generation. Indonesia has an estimated 9.5 GW of potential for wind power generation, according to the [Asian Wind Energy Association](#),⁶¹ but installed capacity in 2020 was 154 MW. Similarly, the Ministry of Energy and Mineral Resources estimates that the country's potential for solar power is 2.5 GW, but installed capacity stood at 14 MW in 2020.⁶²

Notes

- Data presented in the text are the most recent available as of September 22, 2021.
- Data are EIA estimates unless otherwise noted.

Endnotes



¹ Global Trade Tracker. Accessed August 19, 2021.

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- ²⁷ International Energy agency, "Coal 2020: Analysis and Forecast to 2025". Pg. 36, 43
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- ⁴⁸ Ministry of Energy and Mineral Resources, *Handbook of Energy & Economic Statistics of Indonesia 2020*, pg. 90-95

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- ⁴⁹ PT Perusahaan Listrik Negara. "PLN Laporan Tahunan Annual Report 2020," Pg. 185
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