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Independent Statistics & Analysis

U.S. Energy Information
Administration

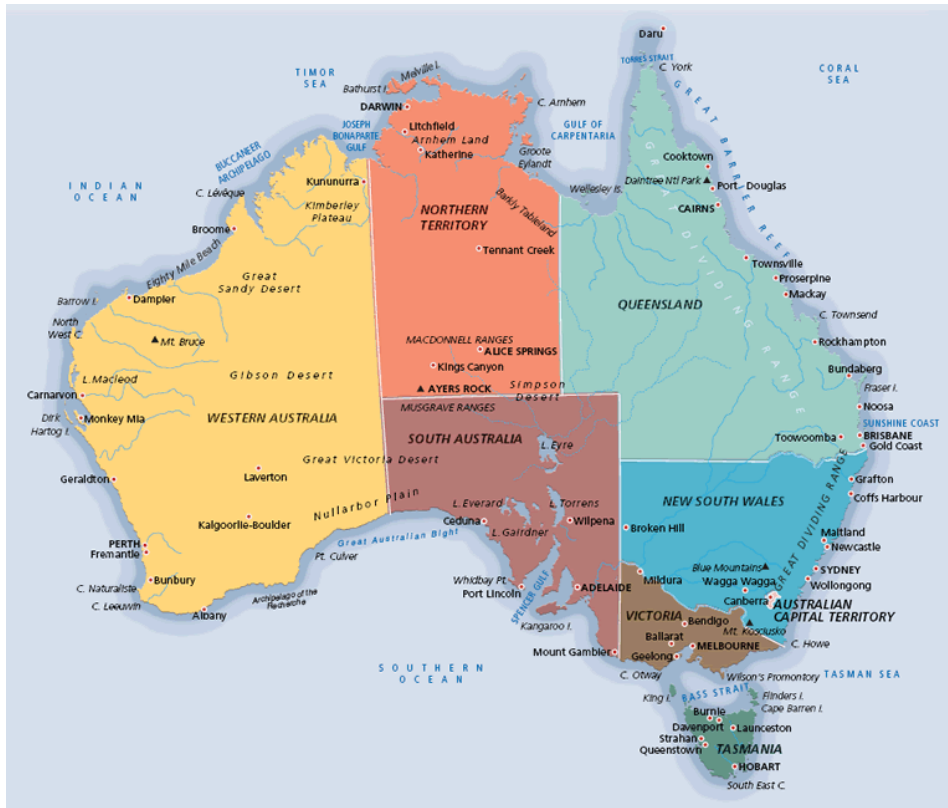
Country Analysis Executive Summary: Australia

Last Updated: March 18, 2022

Overview

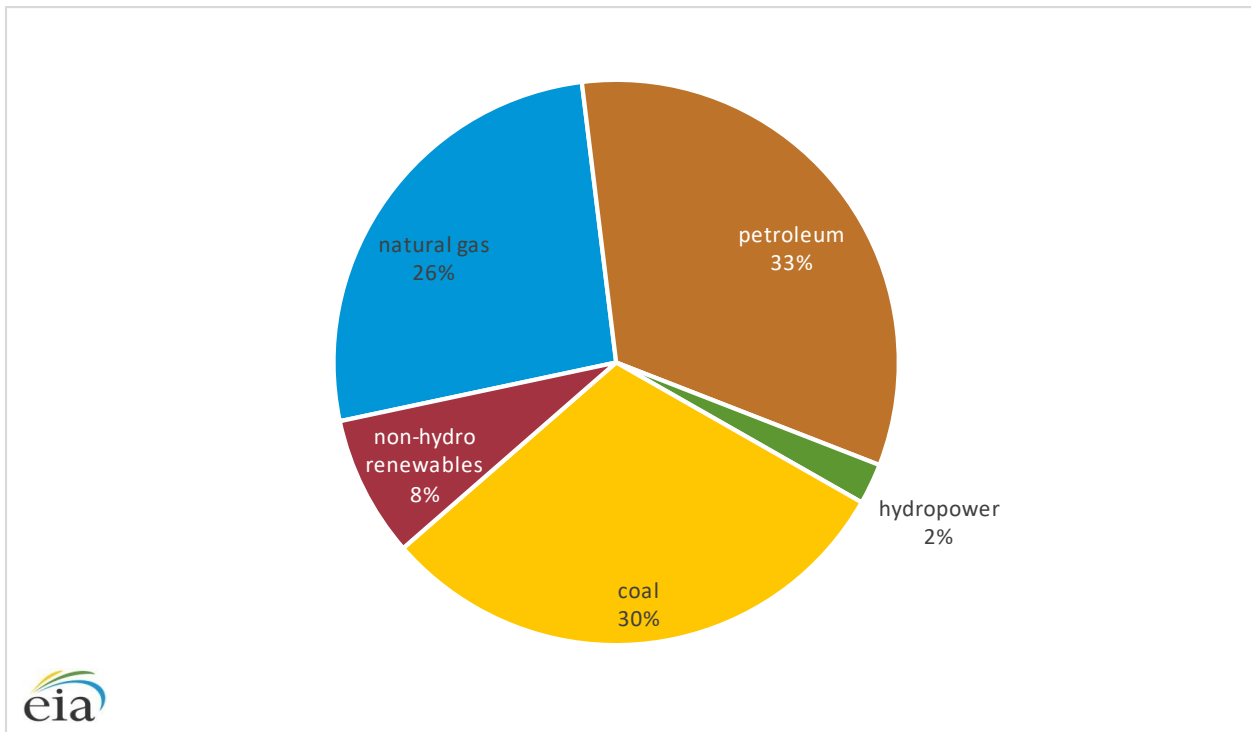
- Australia, a large producer of both coal and liquefied natural gas (LNG), exports the majority of its energy production. Australia's energy exports, excluding uranium, accounted for approximately 81% of its total energy production in 2020.¹
- In 2020, Australia was the world's largest coal exporter based on energy content and the second-largest exporter based on weight, behind Indonesia. It was also the largest exporter of LNG in the world that year.
- Australia does not have any nuclear generation capacity, but it holds the largest uranium reserves in the world.² In 2020, it was the second-largest global uranium producer behind Kazakhstan.³
- In 2020, fossil fuels accounted for approximately 90% of Australia's total energy consumption; petroleum accounted for an estimated 33%, coal accounted for 30%, and natural gas accounted for 26% (Figure 2). The shares for petroleum and coal both decreased in 2020, accounting for the 2% drop in fossil fuel's overall share of energy consumption from 2019.⁴
- Renewable sources, including hydroelectricity, wind, and solar, accounted for 10% of total consumption in 2020. The growth in renewables has been driving the decrease in coal consumption.⁵

Figure 1. Map of Australia



Source: University of Nebraska, Omaha

Figure 2. Total primary energy consumption in Australia by fuel type, 2020

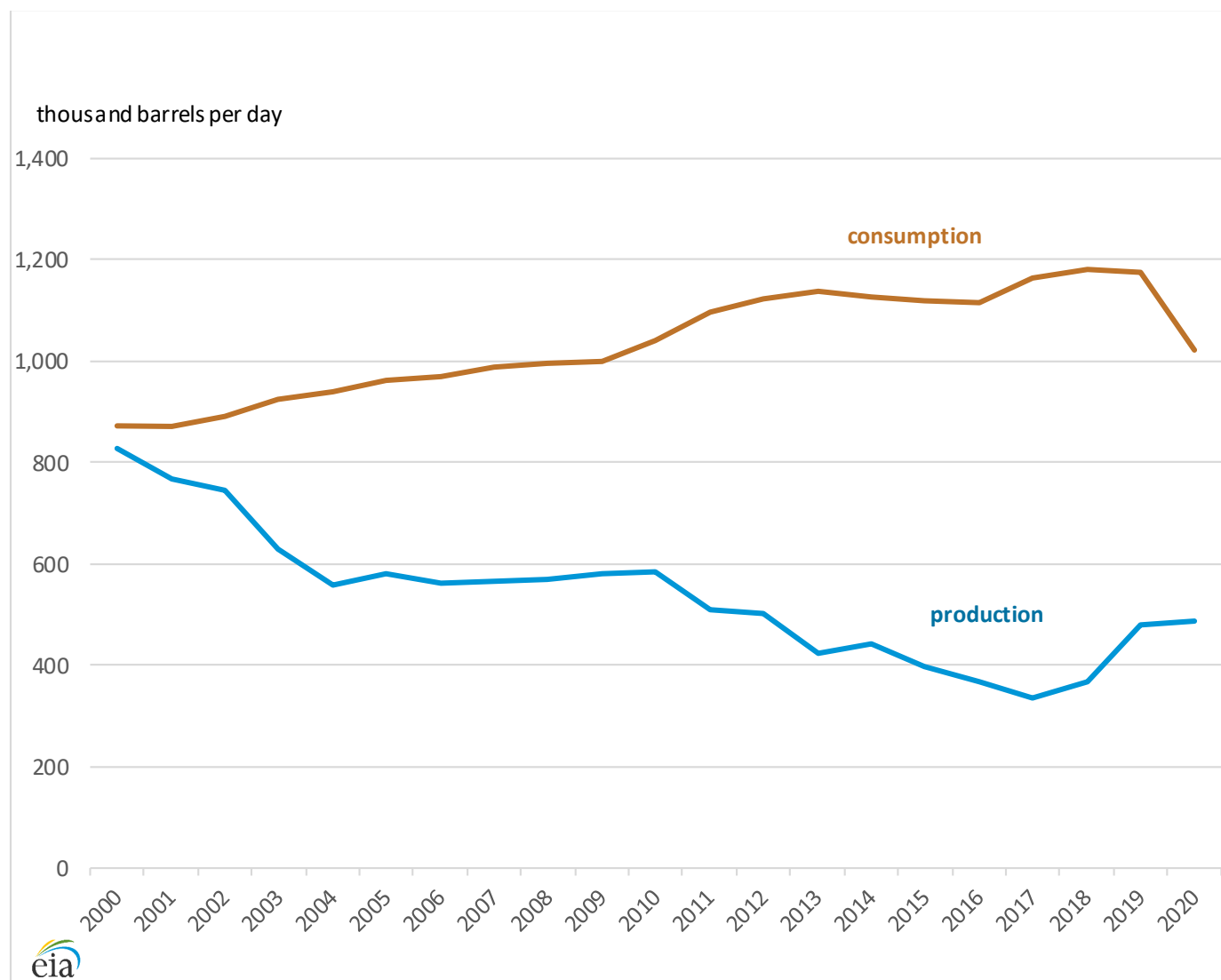


Source: Graph by the U.S. Energy Information Administration, based on data from BP Statistical Review of World Energy 2021

Petroleum and Other Liquids

- Australia's proved oil reserves were 2.4 billion barrels at the end of 2021.⁶ Most of their reserves are located off the coasts of the states of Western Australia (Carnarvon and Browse basins), Victoria (Gippsland basin), and the Northern Territory (Bonaparte basin).
- Although Australia has significant undiscovered unconventional oil resources, exploration for these resources is still too early in its stages to assess the production potential.⁷

Figure 3. Australia's petroleum and other liquids production and consumption, 2000–2020



Source: Graph by the U.S. Energy Information Administration, *Short-Term Energy Outlook*, December 2021

Exploration and production

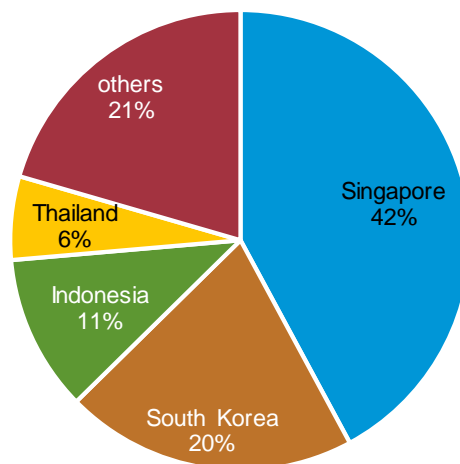
- Australia's petroleum and other liquids production, which includes crude oil, condensates, natural gas liquids, and refining gain, peaked at 828,000 barrels per day (b/d) in 2000. Production fell from its peak in 2000 because new development projects had not been able to offset production declines in mature fields.⁸ After overall declining through 2017, production started to increase in 2018. Petroleum and other liquids production increased from 336,000 b/d in 2017 to an estimated 475,000 b/d in 2020 (Figure 3).⁹

- Petroleum and other liquids production was approximately 461,000 b/d in 2021, of which 26% was crude oil, 46% condensates, and 24% natural gas liquids. The remaining 4% were other liquids and refining gain.¹⁰
- New projects coming online in the North West Shelf are partly driving the increased production of crude oil and condensate. In 2018, projects in the Northern Carnarvon Basin and Browse Basin increased oil and condensates production by 18% and increased natural gas liquids production by 32%, compared with 2017.¹¹
- The Greater Enfield project in Northern Carnarvon was approved in 2016 and started production in 2019. The project consists of 12 development fields, and it adds approximately 41,000 b/d of production plus reserves of 69 million barrels of oil equivalent (BOE).¹²
- The Prelude floating LNG project in the Browse Basin started production at the end of 2018. Although the majority of its production is natural gas, it produces 47,600 b/d of condensate and 12,700 b/d of liquefied petroleum gas (LPG).¹³ The Ichthys Field, also located in the Browse Basin, started production in 2018. According to the project's largest interest holder Inpex Corp., it has a production capacity of 48,000 b/d of LPG and 100,000 b/d of condensate.¹⁴
- Australia does not have any new projects coming online for a few years. The earliest is the Barossa Project, which Santos expects to come online in 2025.¹⁵ We expect that Australia's petroleum production will remain relatively unchanged through 2023.

Consumption

- Australia has consumed more petroleum and other liquids than it has domestically produced for several decades. In 2020, consumption exceeded production by 547,000 b/d.¹⁶
- Australia's petroleum consumption decreased in 2020 to slightly more than 1 million b/d from 1.2 million b/d in 2019.¹⁷ This decrease resulted from the drop in passenger and air transportation at the start of the global COVID-19 pandemic.¹⁸ In 2020, the share of petroleum relative to total energy consumed in Australia fell by 3%.

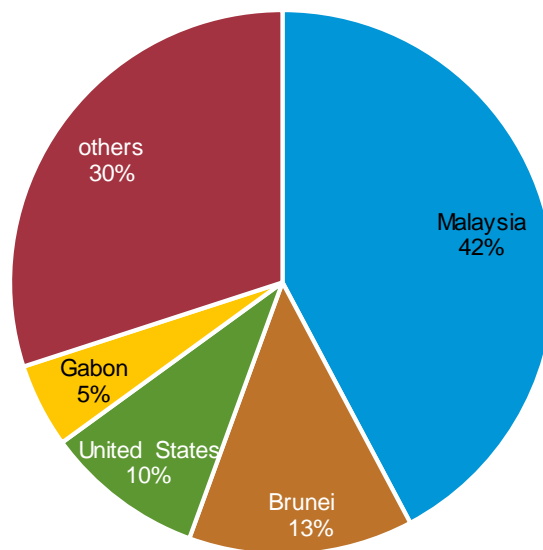
Figure 4. Australia's crude oil and condensate exports by destination, 2021



Trade

- Australia became a net exporter of crude oil in 2020 for the first time since 1991 when their exports totaled 252,000 b/d and exceeded imports (237,000 b/d) by 15,000 b/d.¹⁹ Crude oil imports decreased because of reduced demand in both 2020 and 2021. In 2021 imports decreased by 23% from 2020, this is a decline of 58,000 b/d.
- Australia has historically imported oil and refined petroleum product because consumption tends to be higher than domestic production. The country produces mainly light, sweet crude oil, which needs to be blended with heavy crude oils before it can be processed. Because oil production happens mostly on the North West Shelf, it is more cost effective to export crude oil and import petroleum products than to ship the oil to refineries on Australia's eastern coast.²⁰
- Australia's crude oil exports were destined mainly for the Asia-Pacific region; Singapore (42%), South Korea (20%), Indonesia (11%), and Thailand (6%) received the most volumes in 2021 (Figure 4).²¹
- Australia's crude oil imports came mainly from Malaysia (42%) and Brunei (13%) in 2021 (Figure 5).²²

Figure 5. Australia's crude oil and condensate imports by source, 2021



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

Refining

- Australia had two refineries as of August 2021, with a total refining capacity of 229,000 b/d, operated by the Vitol Group and Ampol Ltd (Table 1).²³ The Altona refinery, operated by ExxonMobil, started its decommission in early 2021 and shutdown in August. The facility is

being converted into the Mobil Melbourne Terminal, which will be one of the largest fuel import and storage facilities in Australia.²⁴

- Since 2013, five refineries, with a total capacity of 557,000 b/d, closed in Australia (Table 2).
- Refinery runs decreased by 68,000 b/d in 2021 because the Kwinana refinery closed²⁵ in March²⁶ and the Altona refinery closed in August.²⁷ With these closures, refinery capacity in Australia has decreased by 570,000 b/d since 2013.²⁸
- Australia passed the Fuel Security Bill in June of 2021. The bill provides approximately US \$1.8 billion in funding to keep the two remaining refineries operational until 2027.²⁹ The bill provides funds for refinery upgrades as well as production payments for refiners making specific types of transport fuel when margins drop below AU \$7.30 a barrel.³⁰

Table 1. Oil refineries in Australia, 2021

Refinery	Nameplate refining capacity (thousand barrels per day)
Lytton	109
Geelong	120
Total	229

Source: Table by the U.S. Energy Information Administration, based on data from BP Statistics and Reuters

Table 2. Australia's oil refineries that have closed since 2013

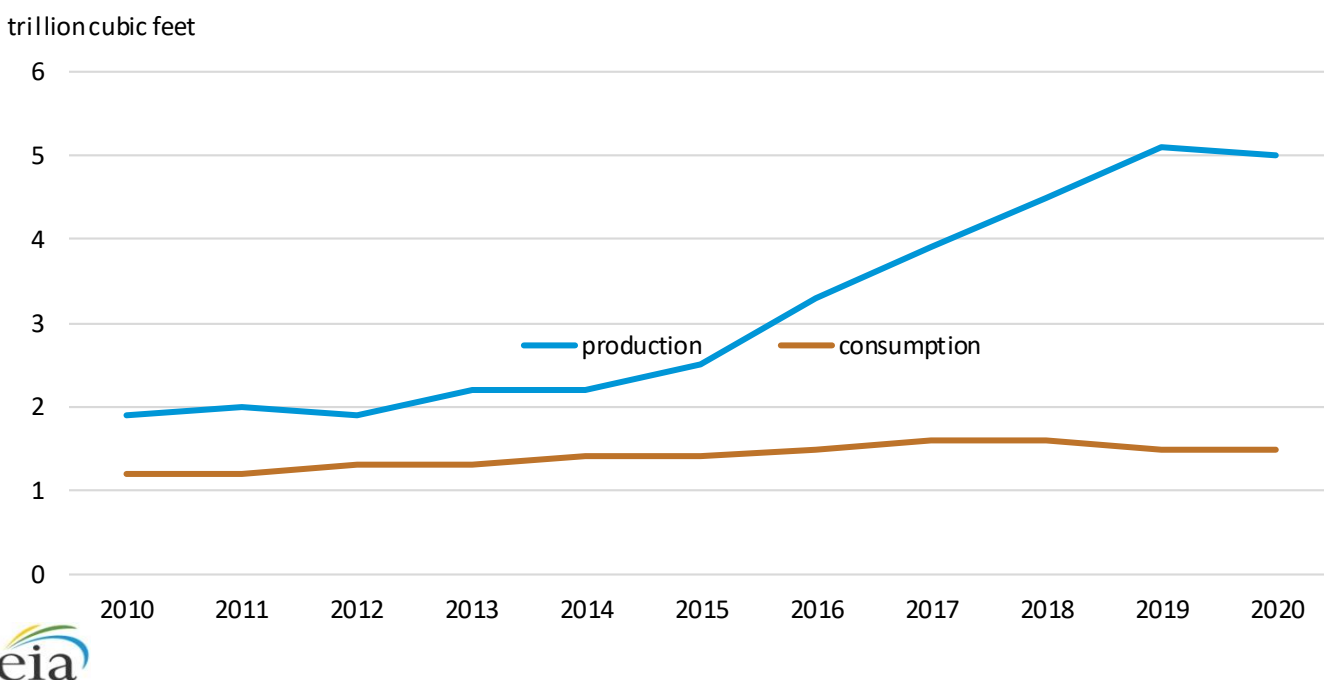
Refinery	Capacity (thousand barrels per day)	Closure year
Altona	109	2021
Kwiwana	146	2021
Bulwer Island	102	2015
Kurnel	135	2014
Clyde	85	2013
Total	577	

Source: Table by the U.S. Energy Information Administration, based on data from ExxonMobil, Ampol, and Viva Energy

Natural Gas

- Australia's proved natural gas reserves were 114 trillion cubic feet (Tcf) as of January 2022.³¹
- Coalbed methane (CBM) reserves were an estimated 29.8 Tcf, or 30% of total gas reserves, in 2019.³² The majority of CBM reserves are located in Queensland, and New South Wales contains the rest.
- Unconventional gas reserves, not including CBM, were approximately 12.5 Tcf in 2019.³³

Figure 6. Australia's dry natural gas production and consumption, 2010–2020



Source: Graph by the U.S. Energy Information Administration

Exploration and production

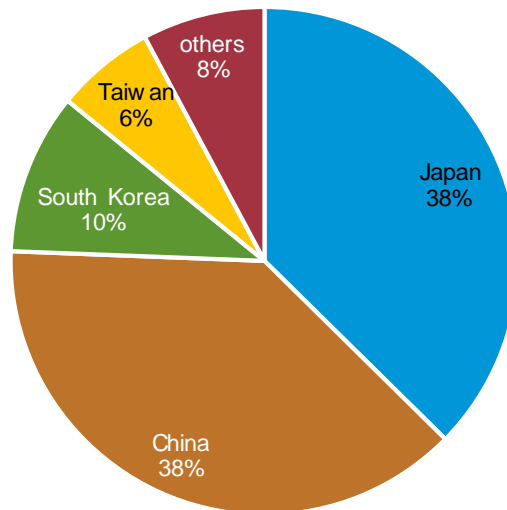
- Natural gas production in Australia was approximately 5 Tcf in 2020, nearly doubling since 2015 (Figure 6).³⁴
- Between 2015 and 2020, nine new LNG liquefaction facilities with a total liquefaction capacity of 2.8 Tcf per year began operating.³⁵ The Northwest Shelf accounted for 65% of natural gas production, and the Bowen Basin and Surat Basin made up 26% in 2019.³⁶
- The Bayu-Undan natural gas field, which supplies the Darwin LNG plant, will not produce natural gas after 2023,³⁷ according to the field's operator Santos.³⁸ The Barossa natural gas field, which is under development and is located offshore of the Northern Territory, will replace the Bayu-Undan field in supplying Darwin LNG.³⁹
- The Leigh Creek Energy Project, located in the Telford Basin, was a coal gasification demonstration that showed the potential for producing synthesis gas, or *syngas*. Syngas is a mixture of carbon monoxide, carbon dioxide, and hydrogen that is produced from a carbon-based fuel, in this case coal. The gasification process converts coal in its solid form into a gaseous one. Leigh Creek Energy estimates the syngas reserves for this project are 1 Tcf.⁴⁰
- According to Australia's 2021 National Gas Infrastructure Plan, domestic and export demand will likely exceed current natural gas supply by 2030, and the country will need at least one new basin to supply its government-projected demand.⁴¹

Consumption

- Australia consumed slightly less than 1.5 Tcf of natural gas in 2020 after remaining relatively flat between 2017 and 2020.⁴²

- In 2019, electricity generation consumed approximately 36% of Australia’s natural gas consumption. When on-site electricity generation was included, mining accounted for 32% of natural gas consumption, 28% for LNG plants and 24% for manufacturing.⁴³

Figure 7. Australia’s liquefied natural gas exports by destination, 2020



Source: Graph by the U.S. Energy Information Administration, based on data from BP Statistics

Liquefied natural gas

- In 2020, Australia passed Qatar to become the largest LNG exporter, at 3.7 Tcf,⁴⁴ or 0.1 Tcf more than in 2019.⁴⁵
- Australia exports LNG almost exclusively to markets in Asia (Figure 7).⁴⁶ Australia is the largest supplier of LNG for the world’s largest importers, supplying 43% of China’s LNG imports and 39% of Japan’s LNG imports in 2020. China was the second-largest LNG importer in the world, at 3.4 Tcf, and Japan ranked first, at 3.6 Tcf, that year.⁴⁷
- At the beginning of 2021, Australia had 15 existing LNG liquefaction facilities with a total capacity of almost 4 Tcf per year.⁴⁸
- Australia intends to add 6.6 Bcf per day of additional LNG capacity.⁴⁹ However, the prospective projects are facing supply challenges because Australia’s natural gas production has declined. This limitation has forced producers to focus on meeting supply needs for existing facilities over building new ones.⁵⁰
- The US \$12 billion Scarborough LNG project is a joint venture between Woodside Petroleum and BHP Group. Woodside expects the project to produce 384 Bcf when its second train comes online in 2026. It will be supplied by the Scarborough gas field, which has reserves of 11.1 Tcf.⁵¹
- Because most of Australia’s natural gas production occurs in the northwest, Australia’s government is not expecting production in the south to keep up with demand in the area, according to the 2021 National Gas Infrastructure Plan. Import terminals are considered important in minimizing the risk of a supply shortage.⁵² Port Kembla LNG in New South Wales

will be Australia's first LNG import terminal. Hoegh LNG expects the terminal to be operational by 2023.⁵³

Table 3. Liquefied natural gas liquefaction plants in Australia, 2021

Refinery	Liquefaction capacity (billion cubic feet per year)	Year online
North West Shelf LNG T1-T2	240	1989
North West Shelf LNG T3	120	1992
North West Shelf LNG T3	221	2004
Darwin LNG T1	178	2006
North West Shelf LNG T5	221	2008
Pluto LNG T1	235	2012
GLNG T1	187	2015
Queensland Curtis LNG T1-T2	408	2015
GLNG T2	187	2016
Australian Pacific LNG T1-T2	432	2016
Gorgon LNG T1-T2	499	2016
Wheatstone LNG T1	214	2017
Wheatstone LNG T2	214	2018
Ichthys LNG T1-T2	427	2019
Prelude FLNG	173	2019
Total	3,956	

Source: Table by the U.S. Energy Information Administration, based on data from IGU 2021 World LNG Report

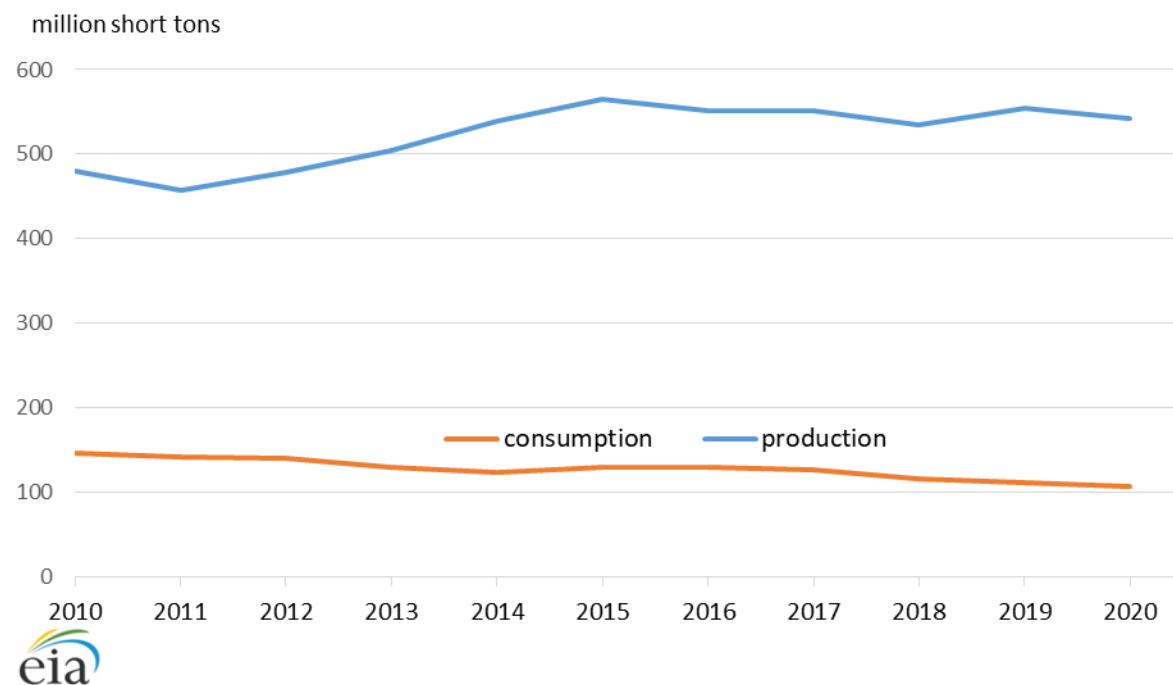
Pipelines

- Australia has over 24,233 miles (39,000 kilometers) of natural gas transmission pipelines.⁵⁴
- The Northeast Gas Interconnector started operation in 2019. The 387-mile (622-kilometer) onshore pipeline is a joint venture of China's State Grid Corporation and Singapore Power, operated by Jemena.⁵⁵

Coal

- Australia was the world's second-largest coal exporter by weight behind Indonesia, and first by energy content in 2020. Coal is the country's most abundant energy resource,⁵⁶ and coal ranks as the second-largest export commodity from Australia in terms of revenue.⁵⁷
- Australia exported about US \$69.6 billion worth of coal (both metallurgical and thermal coal used for electricity generation and other industries) in 2018, according to the latest data available.⁵⁸
- In 2020, Australia held 166 billion short tons (Bst) of recoverable coal reserves, the third-largest in the world behind the United States and Russia.⁵⁹
- The Australian government estimates recoverable proved and probable reserves to be 193 Bst at the end of 2019; slightly more than half comes from black coal and the remainder from brown coal.⁶⁰

Figure 8. Australia's coal production and consumption, 2010–2020

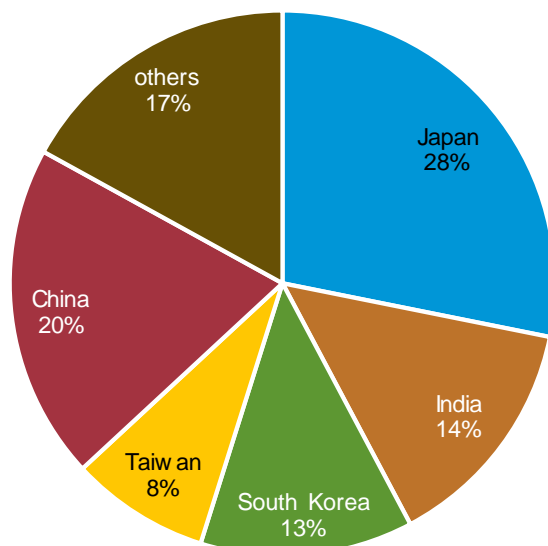


Source: Graph by the U.S. Energy Information Administration

Production and consumption

- Australia's coal production rose steadily from 2000 until it peaked in 2015 at 574 million short tons (MMst) (Figure 9). In 2020, the country produced an estimated 553 MMst of coal.⁶¹
- The Hydrogen Energy Supply Chain pilot project in Victoria is the world's first trial to show the effectiveness of producing hydrogen from brown coal. The resulting hydrogen is transported to Japan. The project started production in March 2021.⁶²
- The Leigh Creek Energy Demonstration Project, completed in 2019, successfully used coal to produce syngas from the Telford Basin's 1.03 Tcf of natural gas reserves.⁶³ Leigh Creek Energy is working on the Leigh Creek Urea Project, which is the commercialization of the demonstration project. Once implemented, the project will produce syngas from deep and stranded coal reserves that will power a 5-megawatt (MW) power plant. Leigh Creek Energy expects the project to be constructed by March 2022. In subsequent phases, the plant will produce 1 million tons of nitrogen-based fertilizer. Other plans include the construction of a larger power plant and the production of urea fertilizer.⁶⁴
- Most of Australia's coal is exported (446 Mst in 2020), and domestic demand accounted for less than one-quarter (107 Mst in 2020) of total production.⁶⁵
- Coal plays a major role in meeting domestic energy needs, accounting for approximately 54% of Australia's electricity generation in 2020, according to government statistics.⁶⁶ In the past several years, Australia has focused on substituting some coal-fired generation with natural gas-fired power and renewable power. Coal consumption for electricity generation has decreased by 18% since 2016 as a result.⁶⁷

Figure 9. Australia's coal exports by destination, 2020

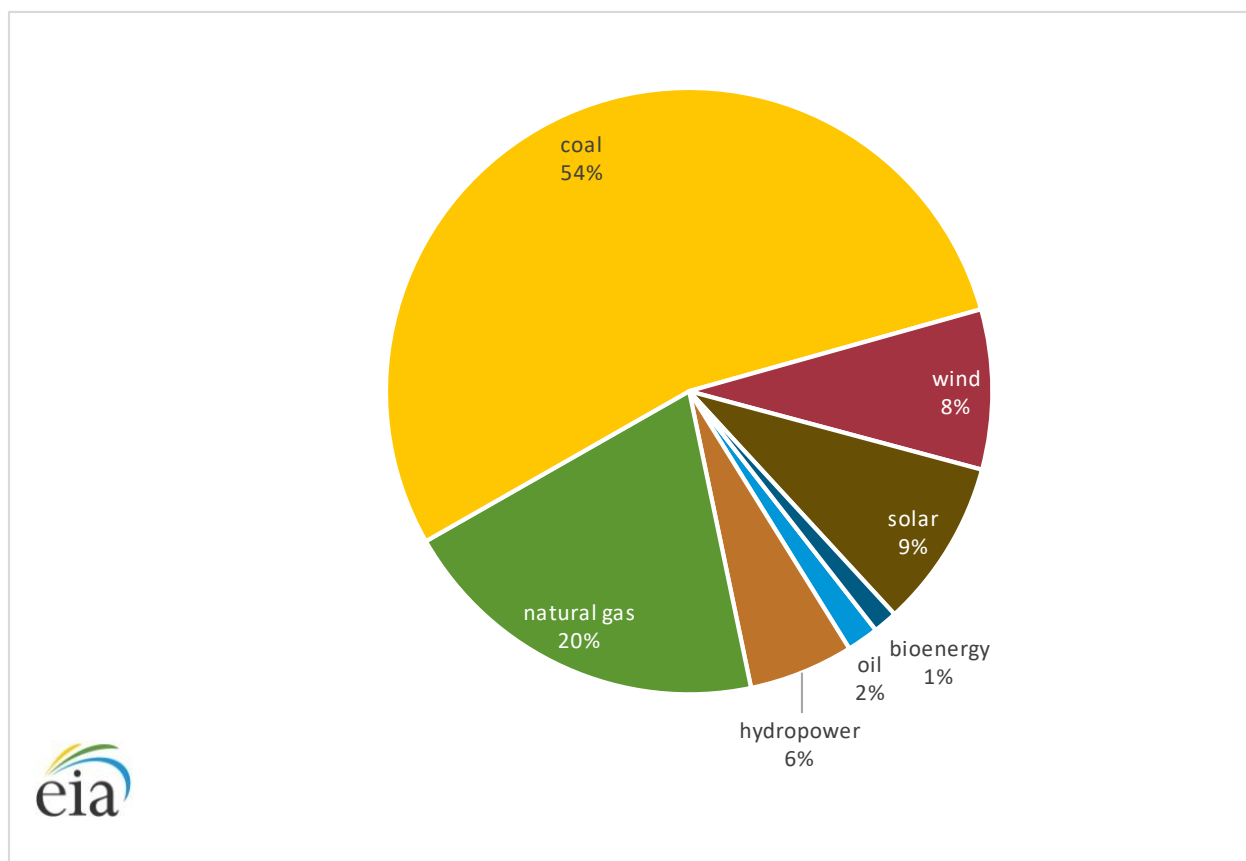


Source: Graph by the U.S. Energy Information Administration, based on data from Global Trade Tracker

Exports

- Australia remained the second-highest coal exporter on a weight basis in 2020 behind Indonesia. Total coal exports (almost 430 MMst in 2020) were only slightly lower than the 2019 total (433 MMst).⁶⁸
- Most of Australia's coal exports go to countries in Asia. Japan (28%), China (20%), India (14%), and South Korea (13%) import most of Australia's coal (Figure 9).⁶⁹
- China, Australia's second-largest importer of coal for the past several years, accounted for 20% of the country's coal exports in 2020. However, coal exports to China dropped to virtually zero in 2021. Tension between Australia and China had been rising since 2018 when Australia banned China's Huawei from their 5G cellular networks. In late 2020, after Australia called for an inquiry into the origins of COVID-19, China initiated trade restrictions on some Australian exports, including beef, barley, wine, and seafood.⁷⁰ China also placed an unofficial ban on coal from Australia. This unofficial ban left shipments of an estimated 1.1 MMst of coal from Australia stranded in China. As of the end of 2021, only small amounts of the stranded coal have been released into China.⁷¹

Figure 10. Australia's net electricity generation by fuel, 2020



Source: Graph by the U.S. Energy Information Administration with data from Australia's Department of Industry, Innovation and Science

Electricity

- Electricity generation in 2020 decreased approximately 3% from 250 terawatt-hours (TWh) in 2019, to 243 TWh.⁷²
- Fossil fuels supplied about 76% of Australia's electric generation in 2020, decreasing approximately 3% from 2019. Coal made up the majority of electricity generation (Figure 10). Black coal (41%) and brown coal (13%) accounted for 54% of total generation. Natural gas-fired generation supplied 20% of total electricity generation.⁷³
- Renewable sources, such as wind, bioenergy, and solar, have rapidly grown from less than 1% of total electricity generation in 2000 to more than 19% in 2020. Solar contributed the largest share of generation from renewables (9%), surpassing hydroelectricity as Australia's largest source of renewable energy.⁷⁴
- Wind energy, the second-largest renewable source for electricity, has grown substantially in the past decade and accounted for 8.5% of total electricity generation in 2020.⁷⁵
- Hydroelectricity, accounting for 6% of total electricity generation in 2020, is available in the states of Tasmania, Victoria, and New South Wales.⁷⁶
- Australia hosts several battery storage projects in various stages of completion. These projects aim to make the national grid more efficient at both the transmission and distribution levels.⁷⁷ Currently, the largest operating battery is the Victorian Big Battery in Geelong.⁷⁸ The 300-MW

grid-scale lithium-ion battery storage system came online at the end of 2021 and stores enough energy to power over 1 million homes for up to 30 minutes.⁷⁹

- In 2021, Australia released its National Hydrogen Strategy, which outlines its potential in the market. Currently, Australia has plans for green hydrogen projects with 69 gigawatts of proposed total capacity.⁸⁰

Notes

- Data presented in the text are the most recent available as of March 4, 2022.
- Data are EIA estimates unless otherwise noted.

Endnotes

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