



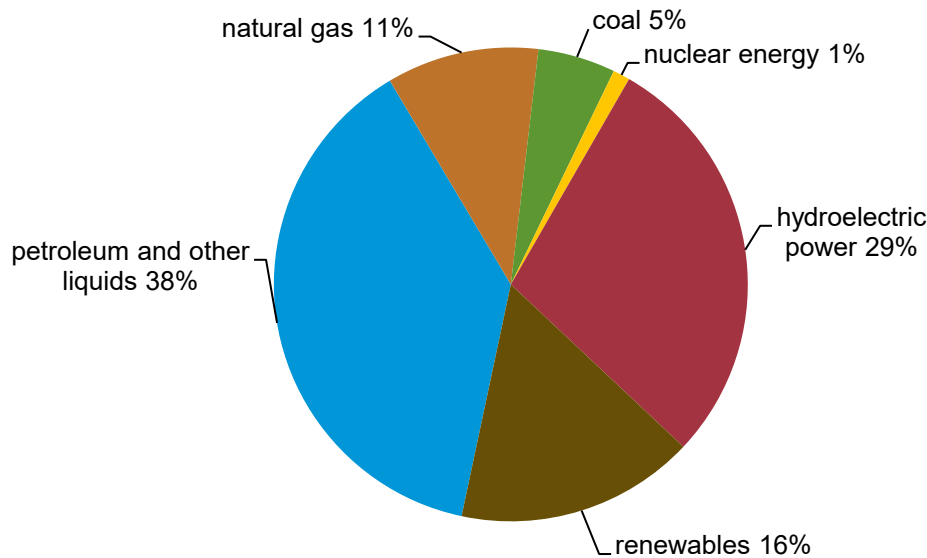
Country Analysis Executive Summary: Brazil

Last Updated: June 14, 2021

Overview

- In 2019, production of petroleum and other liquid fuels in Brazil averaged 3.7 million barrels per day (b/d). That year, Brazil was the eighth-largest producer in the world and the third largest in the Americas behind the United States and [Canada](#).
- Similarly, in 2019, Brazil's economy ranked eighth in total energy consumption globally and ranked third in the Americas, behind the United States' and Canada's economies.¹
- Economic growth in the past decade has caused Brazil's total primary energy use to grow by 8%.² Petroleum and other liquids represented 38% of Brazil's domestic energy consumption in 2019 (Figure 1).

Figure 1. Total primary energy consumption in Brazil by fuel type, 2019



Source: Chart by U.S. Energy Information Administration, based on data from *BP Statistical Review of Energy, 2020*

Petroleum and other liquids

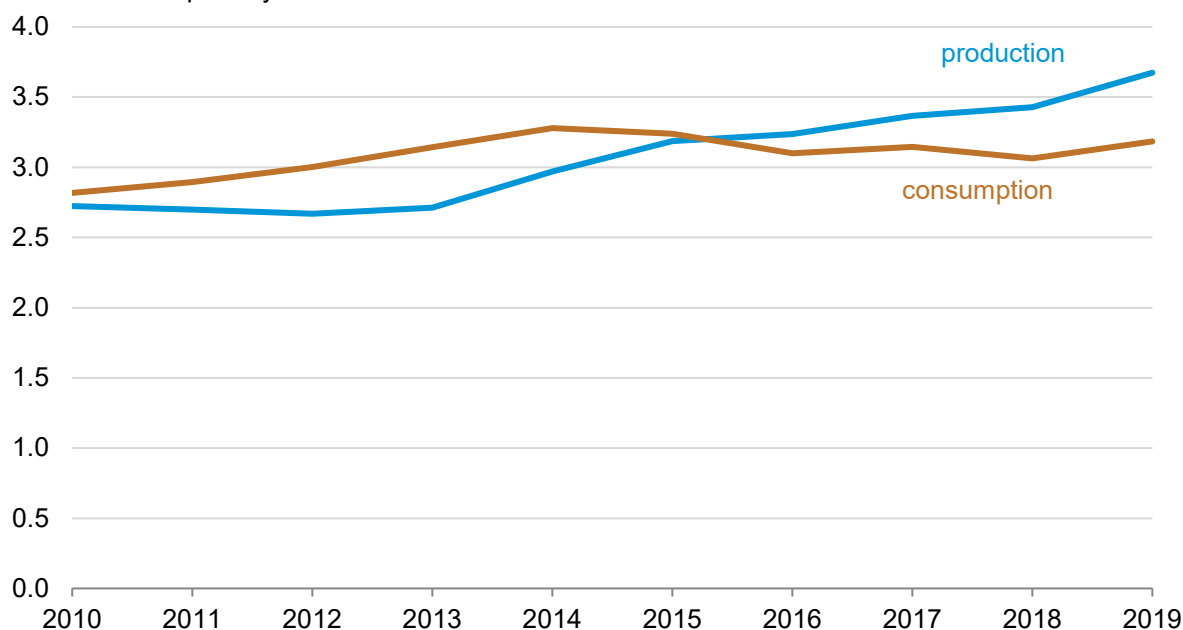
Reserves

- The *Oil & Gas Journal* estimates that as of January 2021, Brazil had 12.7 billion barrels of proved oil reserves, the second-largest oil reserves in South America after [Venezuela](#).³

Production and Consumption

- In 2019, production of petroleum and other liquid fuels in Brazil averaged 3.7 million barrels per day (b/d), up from 3.4 million b/d in 2018, continuing a trend of increasing production. Crude oil and condensate accounted for 2.8 million b/d, and the remainder included biofuels (the majority from ethanol) and natural gas liquids (NGLs) (Figure 2).
- The rising use of transportation fuels drove an increase in total petroleum product consumption, which grew to 3.2 b/d in 2019. For the year, diesel (distillate fuel oil) accounted for 42% of total transportation fuels consumed, gasoline accounted for 25%, and ethanol accounted for 21%. Natural gas, biodiesel, and aviation kerosene accounted for the remainder of the transportation sector's consumption volumes.⁴

Figure 2. Brazil's liquid fuels production and consumption
million barrels per day



Source: U.S. Energy Information Administration, *International Energy Statistics*

- Between 2012 and 2019, crude oil production rose because of pre-salt oil field development. Pre-salt oil production grew by 1.6 million b/d during this time as a result of more favorable government regulation and more efficient drilling, leading to lower breakeven prices for new fields.⁵
- In 2019, production from the pre-salt oil fields accounted for 62% of Brazil's total output, or 1.3 million b/d according to the Agência Nacional do Petróleo, Gás Natural e

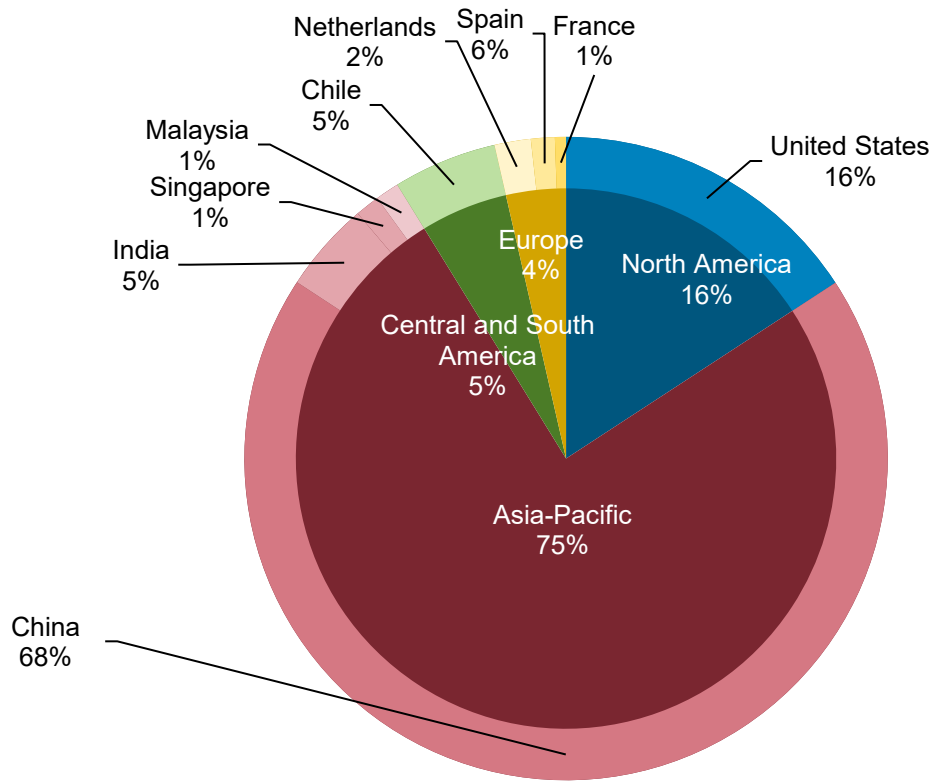
Biocombustíveis (ANP) and the national oil company Petrobras.⁶ Over the last two years, Petrobras has significantly increased its production vessels operating in these pre-salt fields to boost crude oil production because post-salt oil reserves have dwindled and it has overcome previous technological difficulties for drilling in deep-water.

- Of the US \$46.5 billion in investments in exploration and production planned from 2021 to 2025, Petrobras will allocate 70% to pre-salt assets. Petrobras expects to add up to 13 more offshore floating production storage and offloading vessels (FPSOs) through 2025 to pre-salt fields.⁷ During this period, Petrobras will allocate 36% of its total investments to developing the Búzios field, reportedly the largest offshore field in the world.⁸

Exports and Imports

- Brazil's crude oil exports averaged about 1.6 million b/d in 2019, an increase from the previous year and the largest volume reported by the ANP to date.⁹ Increased growth in pre-salt oil field production drives Brazil's crude oil production over the next decade, and exports of crude oil will likely increase as well. Petrobras plans to increase exports of light (Lula) and medium (Búzios), sweet, low-sulfur crude oil grades that come from pre-salt fields because they are more valuable in the global oil market. As a result, Brazil's crude oil exports will remain more desirable and competitive over the long term than its heavier crude oils.¹⁰
- More than 60% of Brazil's exports (1 million b/d) were destined for China, an 18% increase from 2018¹¹ (Figure 3). Since Petrobras' signed a loan with the Chinese Development Bank in May 2015, exports to China have increased. According to a report by Fitch Solutions, rising exports to Asia to continue to increase in the short-term, given growing commercial ties between the two regions.¹²

Figure 3. Brazil crude oil exports by region and country, 2019



Source: Chart by U.S. Energy Information Administration, based on data from Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (ANP)

Note: Some individual figures do not match the regional total due to rounding.

- The country also imports smaller amounts of lighter grades of crude oil than the heavier grades it produces. Most of Brazil's imports of crude oil come from the Middle East (41%), which produces primarily medium grades. Crude oil from [Saudi Arabia](#) accounted for 35% of Brazil's total crude oil imports in 2019.¹³
- Brazil continues to import petroleum products to meet rising domestic demand, to compensate for its fuel price subsidies, and to supplement its underinvestment in the refining sector. In 2019, imports of petroleum products averaged 589,000 b/d, up 5% from the previous year.¹⁴ Most of these petroleum products (426,000 b/d) came from the United States.

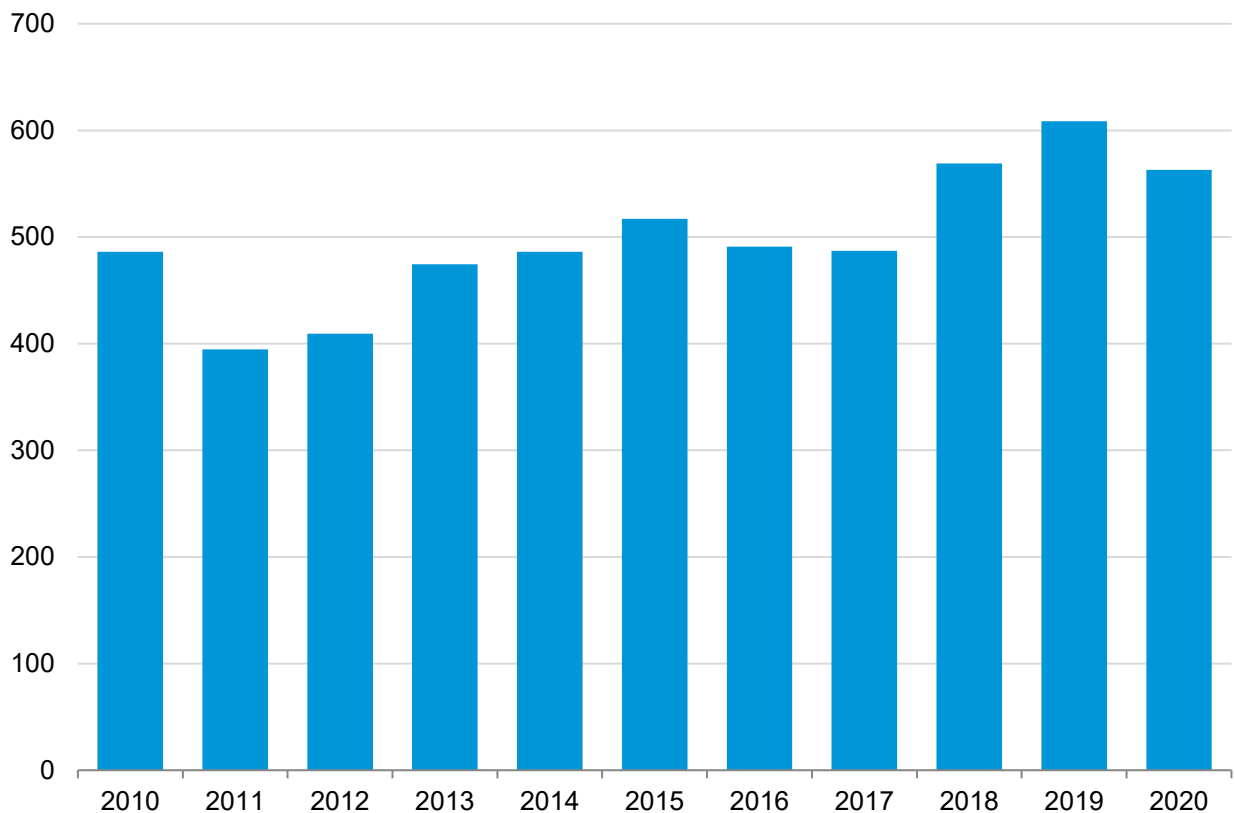
Biofuels

- Biofuels (which includes fuel ethanol and biodiesel) production in 2019 averaged 641,000 b/d. Brazil is the second-largest producer of ethanol in the world after the United States.
- Total fuel ethanol production rose to 541,000 b/d in 2019, the largest annual volume in history (Figure 4). Ethanol production was high because of the larger-than-expected sugarcane crop and low international sugar prices, which encouraged cane millers to

produce ethanol for fuel instead of sugar. Ethanol is mainly used for fuel in Brazil. Sugarcane is the main source of feedstock for ethanol production in Brazil, followed by corn.

- The COVID-19 pandemic has particularly affected the global biofuels sector. We expect that global biofuel production in 2020 declined by 12% from the global record in 2019,¹⁵ the first year annual production fell in two decades. The decrease was driven by both lower transport fuel demand and lower fossil fuel prices that weakened the economic attractiveness of biofuels. In 2020, we estimate that Brazil's ethanol production had one of its largest year-on-year drops in output since 2011.

Figure 4. Brazil's ethanol production
thousand barrels per day



Source: Chart by U.S. Energy Information Administration, based on data from the Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (ANP)

Note: 2020 production is estimated.

- In 2019, Brazil's ethanol exports averaged approximately 33,000 b/d.¹⁶ Brazil shipped most of its ethanol exports (13,000 b/d) to the United States in 2019. Most Brazilian ethanol enters the United States through California because of the fuel's favorable treatment compared with domestic corn ethanol under California's Low Carbon Fuel Standard (LCFS). According to the LCFS scoring system, Brazil's sugarcane ethanol emits less carbon dioxide than U.S. corn ethanol sources, which incentivizes demand for the fuel in California despite available domestically sourced ethanol supply.

- Although Brazil is a major ethanol producer, the country imported more than 22,000 b/d of ethanol in 2019. For the past several years, virtually all ethanol imports have been used for fuel and have been imported from the United States. Brazil primarily produces fuel ethanol from sugarcane. As a result, Brazil produces most of its fuel ethanol during the sugarcane harvest period (May through October). Brazil's imports of U.S. fuel ethanol typically peak in between harvest seasons. In recent years during these inter-harvest periods U.S. ethanol is often priced cheaper than Brazilian sugarcane ethanol, even with a 20% tariff in place on U.S. ethanol volumes.
- Brazil also produces biodiesel. In 2019, biodiesel production rose to a record high of over 100,000 b/d, more than doubling since 2010. Biodiesel production grew in 2019 because of increased diesel consumption and Brazil's requirement that diesel must contain 12% biodiesel. Almost three-quarters of biodiesel is produced from soybean oil.¹⁷
- Brazil does not export significant amounts of biodiesel. In general, biodiesel exports are low because biodiesel is not price competitive compared with diesel. Biodiesel imports are nearly zero.

Natural Gas

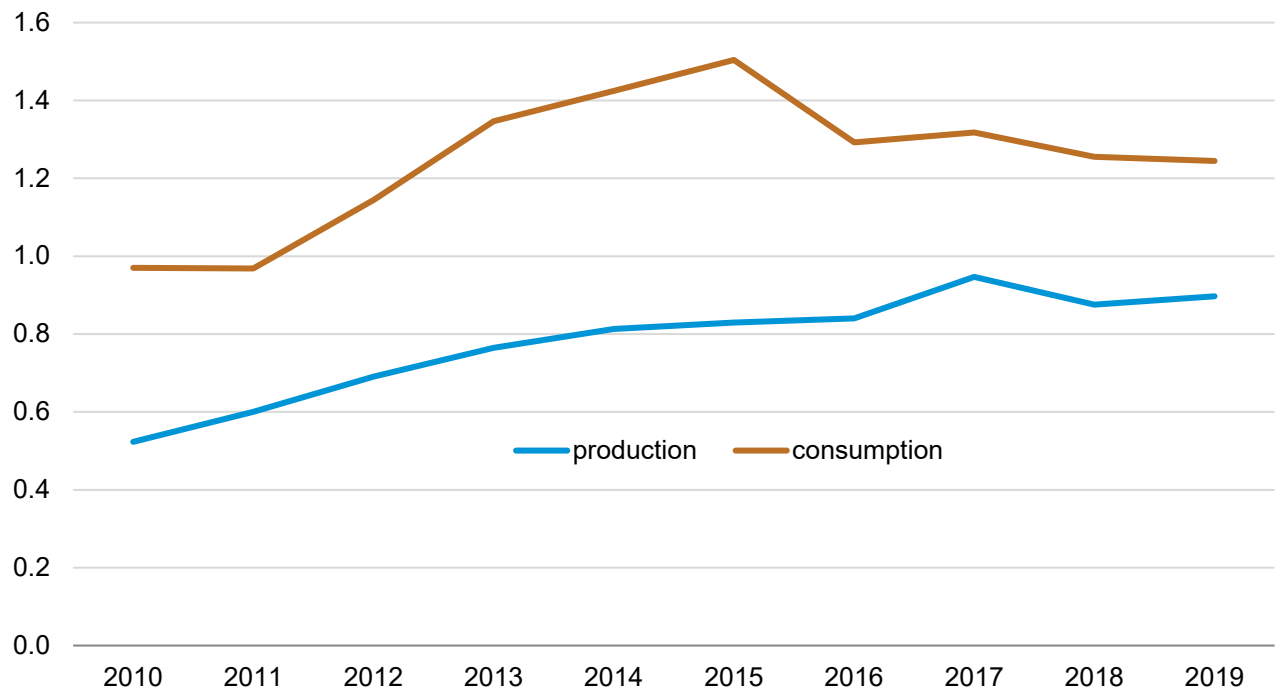
Reserves

- The *Oil & Gas Journal* estimates Brazil had 12 trillion cubic feet (Tcf) of proved natural gas reserves at the beginning of 2020, the third largest amount in South America after Venezuela and [Argentina](#).¹⁸

Production and Consumption

- In 2019, dry natural gas production in Brazil averaged 897 billion cubic feet (Bcf), rising by 2% compared with 2018 levels. Natural gas production is increasing because of the development of Brazil's vast offshore reserves.
- Currently, Petrobras prioritizes crude oil production over natural gas production. Most natural gas is reinjected for enhanced oil recovery in the pre-salt fields (Figure 5). This strategy and the lack of necessary investment in midstream infrastructure to connect offshore fields with the coast could lead to a decrease in dry natural gas production over the short term.
- Brazil's natural gas consumption averaged 1.2 Tcf in 2019, a slight decrease from 2018 (Figure 5). Natural gas accounted for 11% of all energy use in 2019.¹⁹ Although natural gas consumption in Brazil has continued to grow, the rate of increase has slowed since 2015. Between 2012 and 2015, natural gas consumption increased rapidly because natural gas-fired electric power generation increased.
- In April 2021, President Bolsonaro signed into law the New Gas Law, a new regulatory framework for the natural gas sector. The natural gas market law aims to open the natural gas market to competition, spur investments, and increase competitiveness in the sector.

Figure 5. Brazil's dry natural gas production and consumption
trillion cubic feet



Source: U.S. Energy Information Administration, *International Energy Statistics*

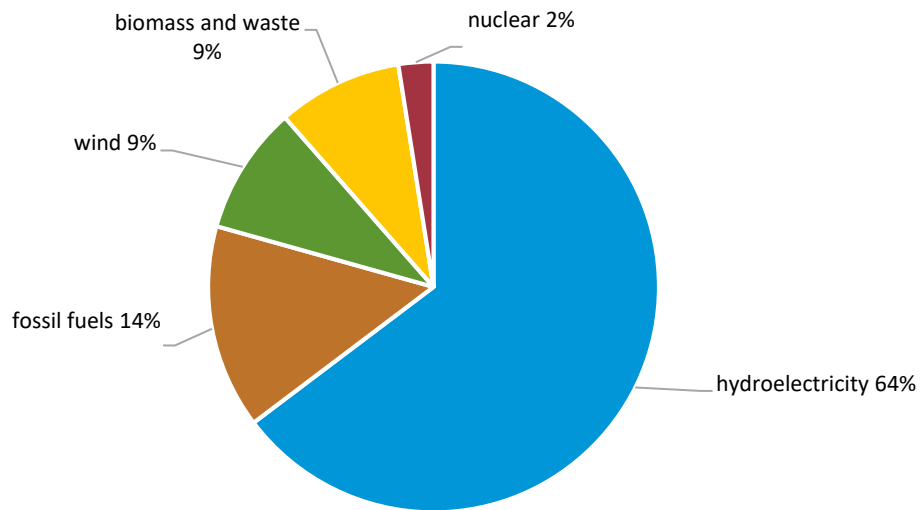
Imports

- Brazil currently relies on imports to meet its natural gas consumption demands beyond what it produces domestically because the country is focused on increasing crude oil production in the pre-salt layers. Brazil's gross imports of natural gas totaled 343 Bcf in 2019, a decrease from 2018 levels. Most (69%) of the natural gas imports came via pipeline from Bolivia, and the remainder was liquefied natural gas (LNG) primarily from the United States, Trinidad and Tobago, and [Nigeria](#). Brazil began importing natural gas via pipeline in 1999 and began importing LNG in 2008. ²⁰

Electricity

- Electric power generation was 615 billion kilowatthours (kWh) in 2019 (Figure 6). About 83% of total generation came from renewable sources.

Figure 6. Power generation supply, 2019



Source: U.S. Energy Information Administration, *International Energy Statistics*

- [Brazil is the second-largest producer of hydroelectric power in the world](#) after China. Hydroelectric generation is the dominant source of electric power generation in Brazil at 64% of total electric generation.
- In 2019, the hydroelectric share of total power generation decreased as a result of lower imports from Paraguay at the Itaipu hydroelectric dam.²¹ Imports dropped in part because 2019 was one of the driest years since the beginning of the dam's operation. In addition, because Paraguay's electricity consumption has grown, it needs more hydroelectricity from the Itaipu dam, which in turn decreases Brazil's imports from the dam. Under the terms of the 1973 treaty between Brazil and Paraguay, any of Paraguay's share of energy from the dam (which sits on the borders of the two countries) that it does not use must be ceded to Brazil and not sold to any other countries. Brazil compensates Paraguay for the imports.²² This share of imports from the Itaipu dam to Brazil is counted in its national hydroelectric generation total.
- Solar power generation almost doubled between 2018 and 2019, from 3.5 GWh to 6.7 GWh. Although it accounts for a small share of total power generation, solar power generation has substantially increased year over year since 2017. The increase in solar generation is the result of rapid growth in the distributed generation market as the cost of solar power has become more competitive with other renewable sources and continued growth and improvement in the transmission and distribution infrastructure system.²³
- In its latest 10-year plan, Brazil's government forecasts that renewable sources will account for most of the additions to installed power capacity expansion by 2030. The largest forecasted addition will come from distributed generation, mostly from solar power generation.²⁴

Notes

- Data presented in the text are the most recent available as of June 2021.

- Data are EIA estimates unless otherwise noted.

¹ BP [Statistical Review of World Energy, 2020](#).

² BP [Statistical Review of World Energy, 2020](#).

³ [Oil & Gas Journal](#), 2021 Worldwide Reserves, 2020.

⁴ Empresa de Pesquisa Energética (EPE), "[Brazilian Energy Balance 2020](#)," page 29 (May 2020).

⁵ Agência Nacional do Petróleo, Gás Natural e Biocombustíveis (ANP), "[Oil, Natural Gas, and Biofuels Statistical Yearbook 2020](#)" Table 1.3 (October 2020).

⁶ ANP, "[Oil, Natural Gas, and Biofuels Statistical Yearbook 2020](#)," Table 1.3 (October 2020); Petrobras, "[Management Report 2019](#)," page 6.

⁷ Petrobras, "[Management Report 2020](#)," page 29.

⁸ Petrobras, "[Management Report 2020](#)," page 7.

⁹ ANP, "[Oil, Natural Gas, and Biofuels Statistical Yearbook 2020](#)" Table 2.49 (October 2020).

¹⁰ Petrobras, "[Management Report 2020](#)," page 13.

¹¹ ANP, "[Oil, Natural Gas, and Biofuels Statistical Yearbook 2020](#)" Table 2.49 (October 2020).

¹² Petrobras, "[Petrobras Overview](#)," page 34. (September 2020); Fitch Solutions, "Brazil: Oil & Gas Report" 2021.

¹³ ANP, "[Oil, Natural Gas, and Biofuels Statistical Yearbook 2020](#)" Table 2.48 (October 2020).

¹⁴ ANP, "[Oil, Natural Gas, and Biofuels Statistical Yearbook 2020](#)" Table 2.51 (October 2020).

¹⁵ International Energy Agency, "[Renewables 2020](#)," November 2020.

¹⁶ ANP, "[Oil, Natural Gas, and Biofuels Statistical Yearbook 2020](#)" Table 4.5 (October 2020).

¹⁷ US Department of Agriculture, "[Brazil Biofuels Annual Report 2019](#)" (August 2019).

¹⁸ [Oil & Gas Journal](#), 2021 Worldwide Reserves, 2020.

¹⁹ BP [Statistical Review of World Energy, 2020](#).

²⁰ ANP, "[Oil, Natural Gas, and Biofuels Statistical Yearbook 2020](#)" Table 2.57. (October 2020).

²¹ Ministério de Minas e Energia (MME), "[Resenha Energética Brasileira: Exercício de 2020](#)," page 7 (May 2020).

²² Power Technology, "[The Itaipu Hydroelectric Dam Project, Brazil](#)" (Accessed May 4, 2021).

²³ Fitch Solutions, "Brazil: Power Report" 2021.

²⁴ MME and EPE, "[Plano Decenal De Expansão De Energia 2030](#)" (February 2021).