



Independent Statistics & Analysis

U.S. Energy Information
Administration

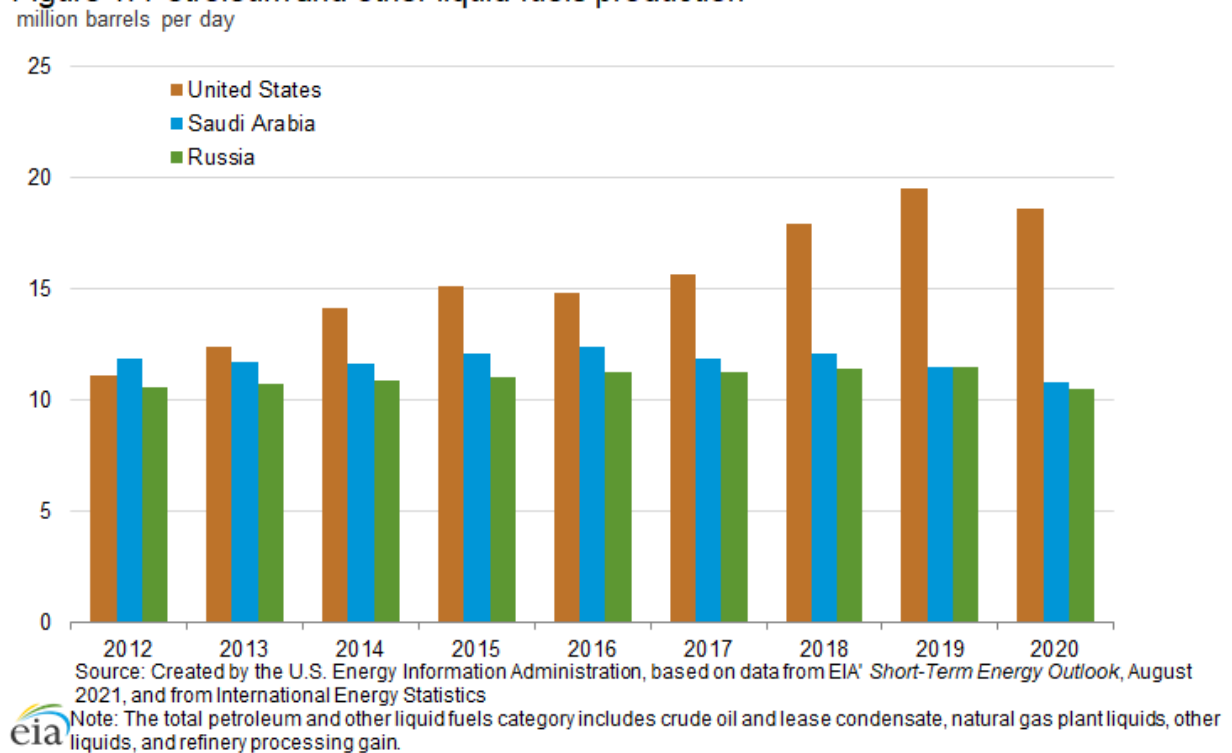
Country Analysis Executive Summary: Saudi Arabia

Last Updated: December 2, 2021

Overview

- Saudi Arabia holds 15% of the world's proved oil reserves.¹ It is the largest exporter of crude oil in the world² and maintains the world's largest crude oil production capacity at nearly 12 million barrels per day, including capacity from the Neutral Zone that is shared with Kuwait.³ Saudi Arabia is the largest crude oil producer in OPEC and the second-largest total petroleum liquids producer in the world after the United States (Figure 1).⁴
- Saudi Arabia, one of the key members of the [OPEC+ agreement](#), reduced production in order to rebalance the global oil market, reduce record-high oil inventory levels, and stabilize volatile crude oil prices in 2020 as a result of the economic downturn and restriction measures taken as a result of the global COVID-19 pandemic. Saudi Arabia initially reduced its production by 3.1 million barrels per day (b/d) as part of the OPEC+ agreement that began in April 2020.⁵ Saudi Arabia has increased production each month since February 2021, and, by October 2021, their production returned to an estimated 9.8 million b/d, similar to the level at the beginning of 2020.
- Petroleum exports account for a large share of Saudi Arabia's economy. They accounted for nearly 70% of the country's total exports in terms of value in 2020, and about 53% of the Saudi government's revenues were oil-based.⁶ Real GDP fell by 4.1% in 2020 as a result of the decrease in global oil demand driven by the COVID-19 pandemic and voluntary cuts to oil production to comply with the OPEC+ agreement.⁷ Saudi Arabia's oil revenues fell between 2018 and 2020 because average crude oil prices and oil export volumes declined during this time period. EIA estimates that Saudi Arabia's [net oil export revenues](#) totaled \$202 billion in 2019, compared with \$238 billion (in 2019 dollars) in 2018. We expect that the oil price declines and production cuts in 2020 further reduced Saudi Arabia's net oil export revenues.⁸
- Saudi Arabia consumed an estimated 10 quadrillion British thermal units of total primary energy in 2020, making it the second-largest energy consumer in the Middle East, behind Iran, and the 11th-largest energy consumer in the world. Oil accounted for 62% of the country's energy consumption in 2020, and natural gas accounted for 38%. Natural gas supplies and processing capacity has risen since 2015, but oil production has declined during this period, which has allowed natural gas to replace a significant portion of crude oil burned for power generation. Solar energy and coal contributed only slight amounts to Saudi Arabia's energy consumption.⁹

Figure 1. Petroleum and other liquid fuels production



Petroleum and other liquids

- At the end of 2020, Saudi Arabia held the world's second-largest proved oil reserves, at 259 billion barrels, representing 31% of proved reserves in the Middle East and 15% of global reserves, according to *Oil and Gas Journal*.¹⁰ Saudi Arabia's major fields are located both onshore and offshore in the eastern part of the country.
- Total oil production, which includes crude oil, condensates, and natural gas liquids, in Saudi Arabia has declined since 2018, when output reached 12.1 million b/d (Figure 2). Saudi Arabia produced, on average, 10.8 million b/d of total petroleum liquids in 2020, of which 9.2 million b/d was crude oil and about 1.6 million b/d was non-crude liquids. Saudi Arabia, which holds the world's largest spare crude oil capacity, affects global oil markets by quickly increasing or decreasing its oil production.
- Saudi Arabia's crude oil production in 2020 was 9.2 million b/d, a 10-year low, as a result of its commitment to the April 2020 OPEC+ agreement to curtail oil production. Before the OPEC+ agreement was signed, Saudi Arabia's crude oil production was a record-high 11.6 million b/d in April 2020. Saudi Arabia's defined agreement cuts and an additional voluntary 1.0 million b/d reduction for one month led to crude oil output falling to 7.7 million b/d in June 2020.
- In January 2021, OPEC+ participants raised production by 150,000 b/d,¹¹ but Saudi Arabia volunteered another additional cut of 1.0 million b/d from February through April 2021 because of low global oil demand growth and high global supply inventories that resulted from renewed COVID-19 containment measures. During the first half of 2021, Saudi Arabia's crude oil production fell to an average of 8.5 million b/d. Based on the outcome of the July 2021 OPEC+

meeting, we forecast that Saudi Arabia will gradually increase its production through the second half of 2021.¹²

- Saudi Arabia and Kuwait agreed at the end of 2019 to restart production in the Partial Neutral Zone (PNZ) after a five-year shutdown, and as a result, production began in early 2020 at the Wafra and Al-Khafji fields. By April 2021, PNZ oil production rose to an estimated 270,000 b/d.¹³
- Saudi Arabia, the largest oil-consumer in the Middle East, consumed 2.9 million barrels per day (b/d) of petroleum products and crude oil in 2020, down from 3.1 million b/d in 2019, primarily as a result of the global COVID-19 pandemic and accompanying economic and industrial downturns.¹⁴ Consumption of gasoline and jet fuel, the key transportation fuels in Saudi Arabia, decreased considerably. However, the higher consumption of fuel oil for the power sector partially offset the gasoline and jet fuel declines.¹⁵
- The OPEC+ agreement reduced natural gas supply from fields associated with oil production, leading Saudi Arabia's power plants to rely on more fuel oil and crude oil as generation sources, especially during the peak demand season in summer.¹⁶ Overall, fuel oil demand reached a record high in 2020 of 600,000 b/d, according to data from the Joint Oil Development Initiative (JODI).¹⁷
- Crude oil consumption for power generation rose slightly from a 10-year low of 410,000 b/d in 2018 to more than 420,000 b/d in both 2019 and 2020, according to JODI data.¹⁸ In 2020, decreasing global oil demand and significant crude oil production cuts constrained Saudi Arabia's crude oil exports, lowered associated gas production, and increased crude oil and fuel oil consumption for power generation (mainly during the summer). Direct crude oil burn from July through September 2020 averaged 654,000 b/d, up from 545,000 b/d during the same time in 2019.¹⁹ The Saudi government maintains its long-term policy to displace more crude oil and fuel oil with less-polluting sources such as natural gas and renewable energy in its power sector. As the OPEC+ countries gradually reverse their significant production cuts in 2021 from the April 2020 OPEC+ agreement and Saudi Arabia continues to expand its natural gas infrastructure, we expect Saudi Arabia's power sector to reduce its consumption of crude oil for power generation.²⁰

Figure 2. Saudi Arabia's petroleum and other liquid fuels production and consumption
million barrels per day

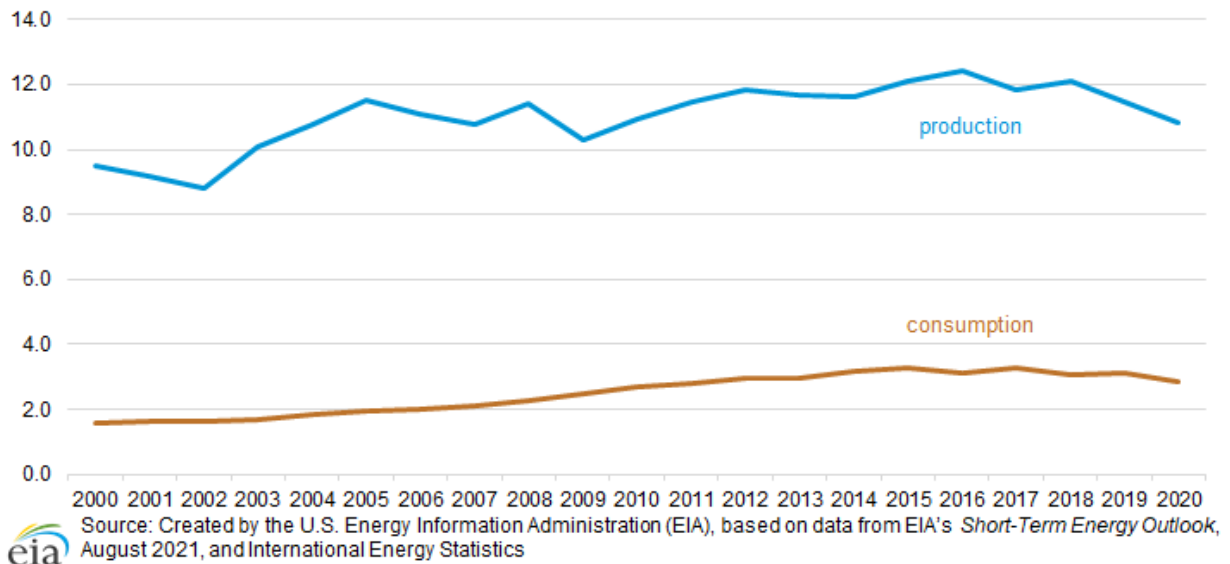
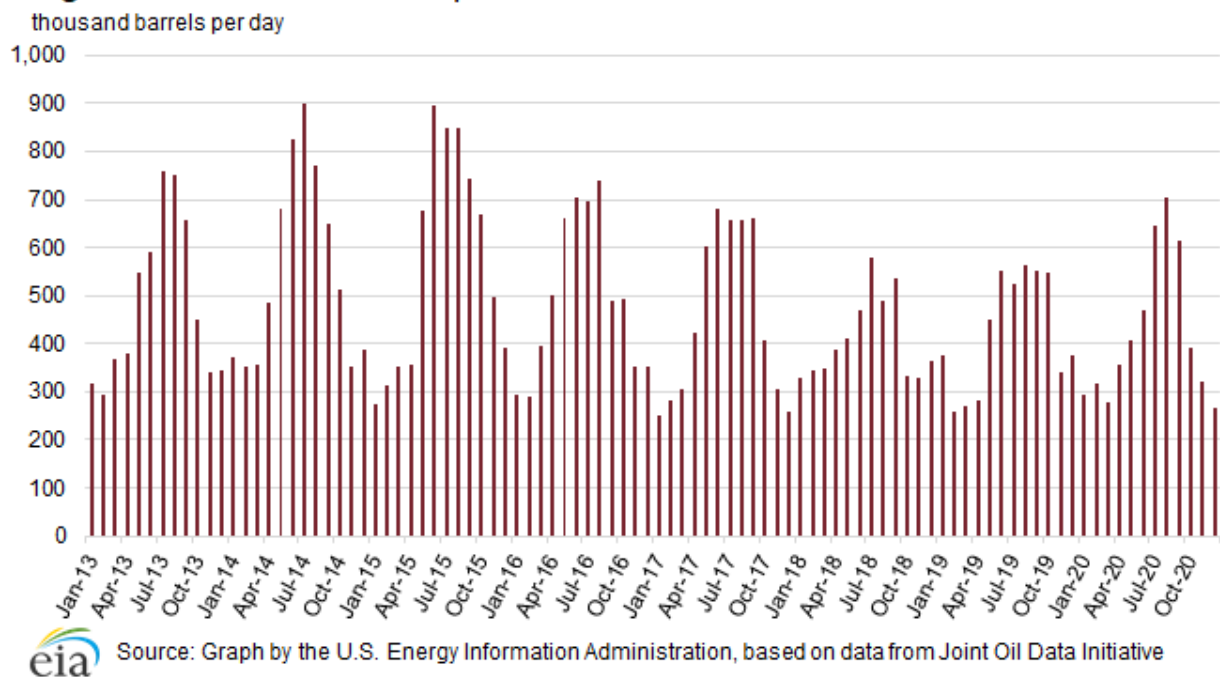


Figure 3. Crude oil used at power stations in Saudi Arabia
thousand barrels per day



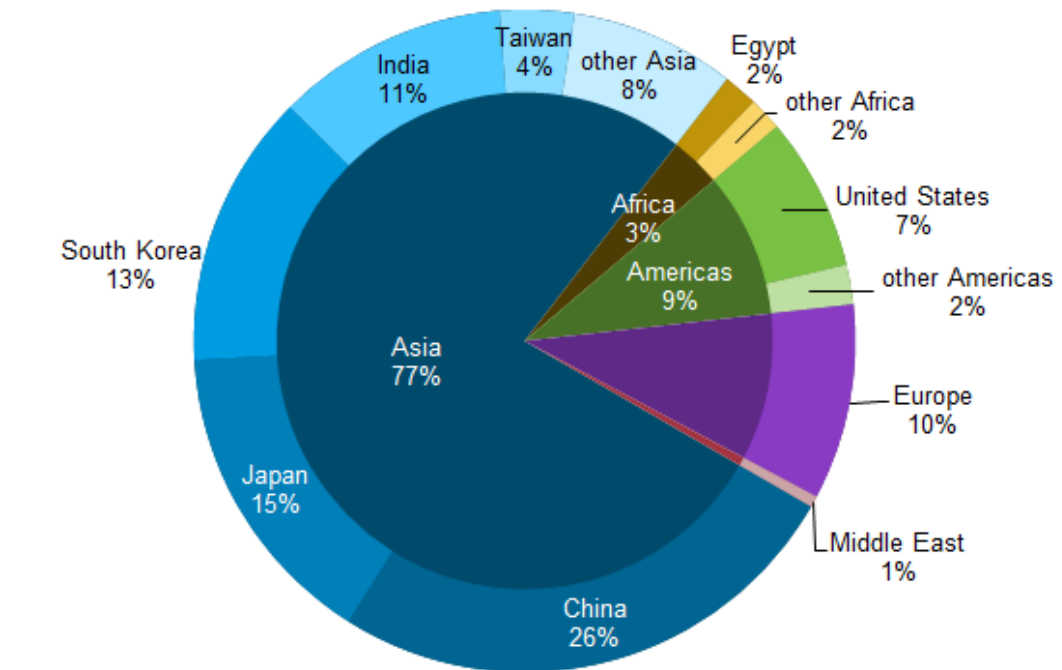
Exports

- Saudi Arabia exported an estimated 6.6 million b/d of crude oil in 2020, down nearly 300,000 b/d from 2019, according to Global Trade Tracker (GTT). A 570,000 b/d decline in petroleum production combined with a decline in global demand caused exports to drop in 2020.²¹
- Asia received an estimated 77% of Saudi Arabia's crude oil exports (Figure 4) in 2020 and more than one-third of its refined petroleum products (Figure 5). Asia's oil demand and refining

capacity grew significantly in the past decade, and it increased its share of Saudi Arabia's crude oil exports during that time. Other regions that import Saudi Arabia's crude oil include Europe (10%), the Americas (9%), Africa (3%), and other Middle Eastern countries (1%).²²

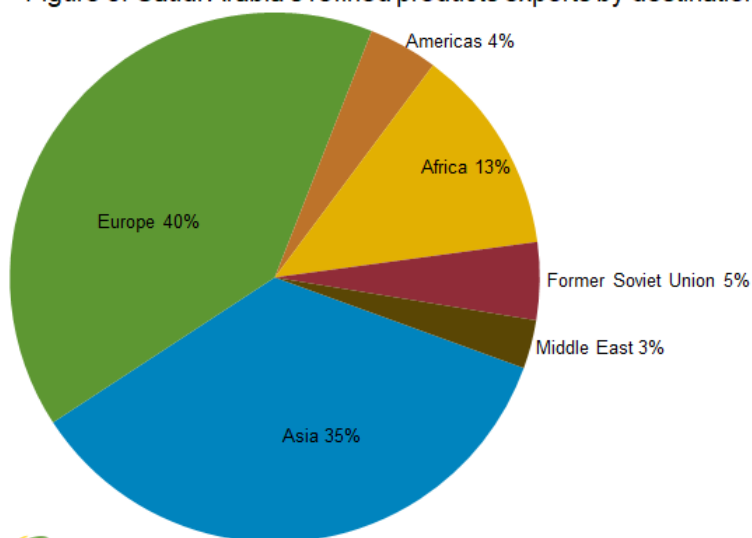
- The United States imported an average of 0.5 million b/d of total petroleum liquids from Saudi Arabia in 2020, most of which was crude oil. U.S. crude oil imports from Saudi Arabia have been generally declining since 2012 as U.S. produces more of its own crude oil and imports more crude oil from Canada.²³
- In 2020, Saudi Arabia exported nearly 900,000 b/d of petroleum products, and most of these exports went to Europe and Asia, according to GTT (Figure 5).

Figure 4. Saudi Arabia's crude oil exports by destination, 2020



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

Figure 5. Saudi Arabia's refined products exports by destination, 2020



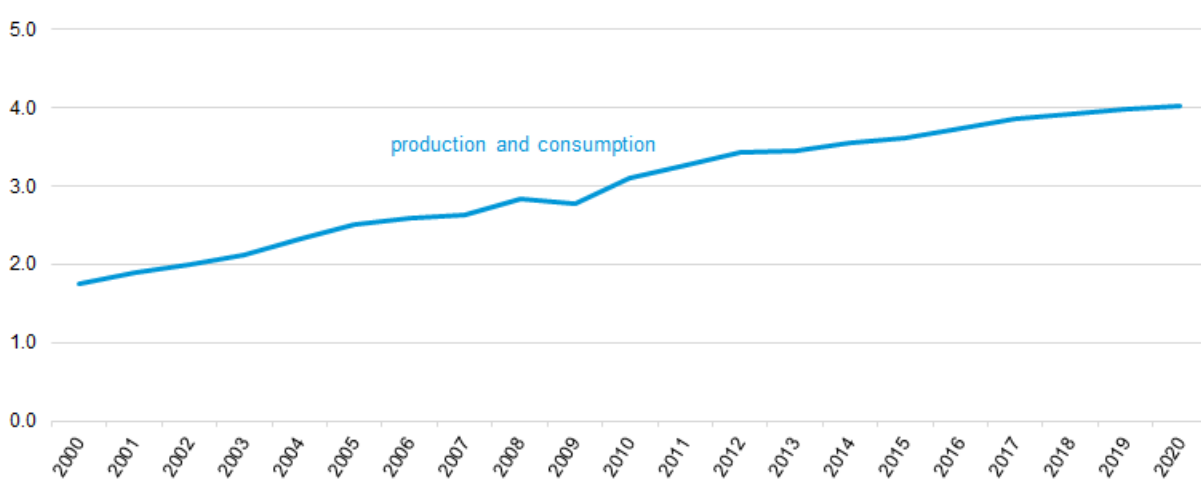
Source: Graph by the U.S. Energy Information Administration, based on data from Global Trade Tracker

Natural gas

- Saudi Arabia (including the Neutral Zone) had proved natural gas reserves of 333 trillion cubic feet (Tcf) as of January 2021, the sixth largest in the world behind Russia, Iran, Qatar, the United States, and Turkmenistan.²⁴
- Saudi Arabia's dry natural gas production exceeded 4 Tcf for the first time in 2020, marking a 30% increase since 2010 (Figure 6).²⁵ The mix of natural gas from fields associated with crude oil production (associated gas) and natural gas from fields not associated with oil production (nonassociated gas) shifted during this period. The rapid development of nonassociated gas fields, especially since 2015, bolstered growth in total domestic natural gas production. However, growth in total natural gas production began to slow in 2017 because of declining associated gas production.²⁶ Associated gas, which accounted for more than 80% of Saudi Arabia's natural gas production in 2016, provided about half of the country's natural gas production in 2020 (Figure 7).²⁷
- Saudi Aramco commissioned the Fadhili natural gas processing plant in 2019, which began processing natural gas from nonassociated fields in the eastern region.²⁸ Growth in Saudi Arabia's natural gas supply in the next few years will hinge on the return of some associated gas production that was shut in during Saudi Arabia's crude oil production cuts and the continued growth of nonassociated gas production.
- Saudi Arabia vented or flared approximately 80 billion cubic feet (Bcf) of natural gas, about 2% of its dry natural gas production, in 2020.²⁹ Aramco's widespread natural gas infrastructure can capture, process, and transport most of the country's associated gas production, reducing the need for flaring. Saudi Arabia intends to eliminate flaring by 2030 as a part of the World Bank's zero flaring initiative.³⁰

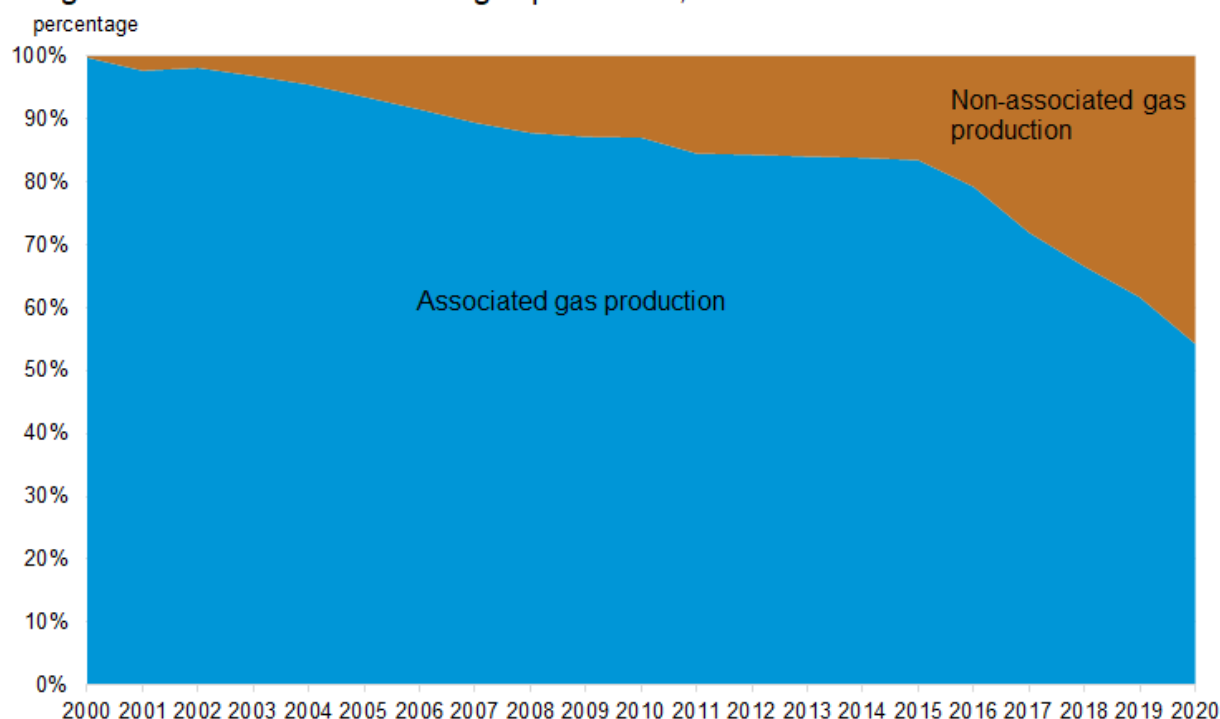
- Saudi Arabia does not import or export natural gas, and all natural gas consumption is met by domestic production. The power sector and industrial sector, primarily petrochemicals, consume most of the natural gas produced in Saudi Arabia.³¹ The Saudi government plans to replace crude oil, fuel oil, and diesel with natural gas and renewable energy for power generation by 2030, which would likely increase natural gas demand and investment for natural gas supply in the next several years. However, this target will be difficult to reach given the country's limited progress in phasing out crude oil, fuel oil, and diesel fuel to date.
- Natural gas consumption in Saudi Arabia varies by region. The eastern and central regions consumed natural gas for 97% and 72% of their power generation, respectively, in 2019. However, the western and southern regions consumed petroleum liquids for almost all of their power generation because they lack sufficient natural gas pipeline capacity from the eastern fields, where most of the country's production is located.³² Expanding the natural gas pipeline and processing capacities to the western and southern regions could help meet more natural gas demand in those regions and reduce oil burning in the power sector.³³

Figure 6. Saudi Arabia's dry natural gas production and consumption, 2000-2020



Source: Created by the U.S. Energy Information Administration, based on data from International Energy Statistics
 Note: All natural gas consumption is met with domestic production.

Figure 7. Saudi Arabia's natural gas production, 2000–2020



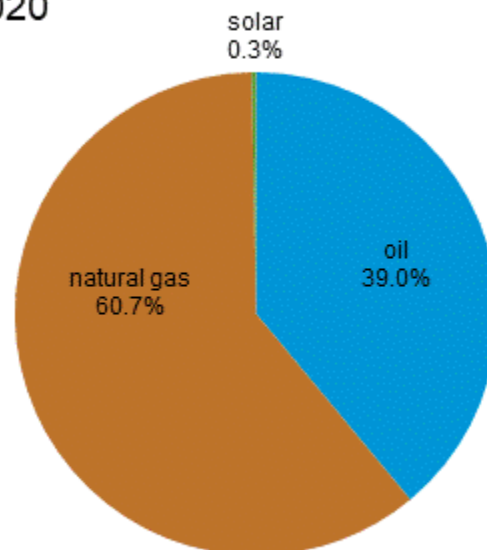
Source: Graph by the U.S. Energy Information Administration, based on data from Rystad Energy UCube

Electricity

- Saudi Arabia generated more electric power in the Middle East than any other country, with an estimated 362 terawatt-hours in 2019, which was about the same as in 2018.³⁴ After increasing at an average annual rate of 6% between 2000 and 2015, growth in power generation declined significantly because population growth slowed, GDP growth slowed, energy efficiency and demand-side management measures were implemented, and electricity prices increased between 2016 and 2018.³⁵ Power generation declined by 1% in 2020, according to data from *BP Statistical Review of World Energy 2021*, as a result of the economic slowdown from the COVID-19 pandemic.³⁶ Residential power use rose because of the COVID-19-related lockdowns and restrictions, but electricity sales to the commercial and government sectors fell.³⁷
- Saudi Arabia fueled nearly all of its electricity generation with natural gas (61%) and crude oil (39%) in 2020, although the Saudi government plans to diversify fuels consumed for electricity output to increase available crude oil for export and to reduce its carbon emissions (Figure 8). The share of natural gas rose substantially over the past decade from 42% of total power generation in 2010 because of expanded natural gas-fired generation capacity that is supported by higher production.³⁸ In 2019 and 2020, growth in natural gas production slowed substantially, which encouraged crude oil use in the power sector, particularly during the peak summer season. The Saudi government intends to replace most of the crude oil burn and diesel-fired power generators with natural gas and heavy fuel oil in the next few years.³⁹

- Although solar generation accounted for an insignificant share of total power generation, several utility-scale solar projects are under development.⁴⁰ The Saudi government aims to develop electricity plants powered by solar and wind energy during the next decade, but building these plants will depend on their cost competitiveness against fossil fuels, energy pricing policies set by the Saudi government, and sufficient investment in project development. Some regions of the country are remote and not connected to the natural gas system, and the Saudi government plans to replace some of the oil used for power generation with renewables (mostly solar).⁴¹
- Saudi Arabia recently began developing large-scale renewable energy projects through its National Renewable Energy Program of Saudi Arabia (NREP) to meet its ambitious renewable energy goals. ACWA Power, a developer of power generation and water desalination plants, connected the 300-megawatt (MW) Sakaka solar power plant (the country's first utility-scale renewable energy project) to the electric grid in November 2019.⁴² The 400-MW Dumat Al Jandal wind farm, Saudi Arabia's first commercial wind project, came online in August 2021.⁴³ In April 2021, Saudi Arabia signed power purchase agreements for seven solar projects with a combined capacity of 3 gigawatts. These projects are slated to come online during the next few years.⁴⁴

Figure 8. Saudi Arabia's electric power generation by fuel, 2020



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

Notes

- Data presented in the text are the most recent available as of December 2, 2021.
 - Data are EIA estimates unless otherwise noted.
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¹ *Oil & Gas Journal*, “Worldwide look at reserves and production” (December 7, 2020).

² *BP Statistical Review of World Energy 2021*.

³ *Oil & Gas Journal*, “Worldwide look at reserves and production” (December 7, 2020); U.S. Energy Information Administration estimates.

⁴ U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2021.

⁵ U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2021.

⁶ International Monetary Fund, [2021 Article IV Consultation with Saudi Arabia](#), July 2021, pages 41, 44; *Middle East Economic Survey*, “Saudi Deficit Shrinks to Two Year Low,” August 13, 2021.

⁷ World Bank, [GDP growth, Saudi Arabia](#) (website accessed September 2021).

⁸ U.S. Energy Information Administration, [OPEC Net Oil Export Revenues](#), January 13, 2021.

⁹ *BP Statistical Review of World Energy 2021*.

¹⁰ *Oil & Gas Journal*, *Worldwide Look at Reserves and Production*, December 7, 2020.

¹¹ U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2021.

¹² U.S. Energy Information Administration, *Short-Term Energy Outlook*, November 2021.

¹³ *Middle East Economic Survey*, “Saudi-Kuwait Neutral Zone Output Rises To 270,000 b/d,” April 9, 2021.

¹⁴ U.S. Energy Information Administration, International Energy Statistics.

¹⁵ [Joint Oil Data Initiative](#) (accessed August 2021).

¹⁶ FACTS Global Energy, *Middle East Petroleum Databook*, Spring 2021, page 60.

¹⁷ [Joint Oil Data Initiative](#) (accessed August 2021).

¹⁸ [Joint Oil Data Initiative](#) (accessed August 2021).

¹⁹ [Joint Oil Data Initiative](#) (accessed August 2021).

²⁰ International Energy Agency, *Oil 2020*, page 18; Saudi Aramco, [Bond Prospectus](#), November 16, 2020, page 45; *Middle East Economic Survey*, “Saudi Liquids Burn Falls To Four-Year Lows In Early 2021,” April 23, 2021; U.S. Energy Information Administration, *Short-Term Energy Outlook*, August 2021.

²¹ Global Trade Tracker (accessed May 2021).

²² Global Trade Tracker (accessed May 2021).

²³ U.S. Energy Information Administration, [International Energy Statistics, U.S. Imports by Country of Origin](#) (accessed May 2021).

²⁴ *Oil & Gas Journal*, “Worldwide look at reserves and production” (December 7, 2020).

²⁵ U.S. Energy Information Administration, International Energy Statistics.

²⁶ *Middle East Economic Survey*, “Record Saudi Gas Output Helps Prevent Oil Burn Spike,” November 6, 2020.

²⁷ Rystad Energy UCube (accessed July 2021).

²⁸ Saudi Aramco, [Mega Projects, Fadhilli](#) (accessed August 2021).

²⁹ World Bank Global Gas Flaring Tracker 2021.

³⁰ Saudi Aramco, *Annual Report 2020*, page 76.

³¹ Saudi Aramco, [Bond Prospectus](#), November 16, 2020, page 45.

³² *Middle East Economic Survey*, “Saudi Aramco’s Master Gas System: A Work In Progress,” August 13, 2021; Saudi Arabia’s Water and Electricity Authority (WERA), [Electricity and Seawater Desalination Industries Annual Statistical Booklet 2019](#), page 155.

³³ International Energy Agency, *Gas Market Report Q3-2021 and Gas 2021*, pages 32-33.

³⁴ U.S. Energy Information Administration, International Energy Statistics.

³⁵ Arab Petroleum Investment Corporation (APICORP), [MENA Power Investment Outlook 2019-2023](#), July 2019, page 8.

³⁶ *BP Statistical Review of World Energy 2021*.

³⁷ Saudi Electricity Company, *Annual Report 2020*, page 91.

³⁸ *BP Statistical Review of World Energy 2021*.

³⁹ Fitch Solutions, “Saudi Arabia Power Report Q4 2021, pages 5 and 7.

⁴⁰ *BP Statistical Review of World Energy 2021*.

⁴¹ *Middle East Economic Survey*, “Saudi Arabia Solar Plans Hold Key To Displacing Liquids-Burn,” January 17, 2020.

⁴² *Middle East Economic Survey*, “Saudi Arabia’s Gas Consumption Flatlines As Oil Burn Rises,” October 9, 2020 and “Saudi Arabia Solar Plans Hold Key To Displacing Liquids-Burn,” January 17, 2020; PV Magazine, [“Saudi Arabia’s 300 MW Sakaka solar plant comes online,”](#) November 27, 2019.

⁴³ Al Jazeera, "[Saudi Arabia's first wind farm begins electricity production](#)," August 8, 2021.

⁴⁴ Reuters, "[Saudi Arabia signs agreements for seven new solar projects –SPA](#)," April 8, 2021; Arab Petroleum Investment Corporation (APICORP), [MENA Energy Investment Outlook 2021-2025](#), May 2021, page 40.