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U.S. Energy Information
Administration

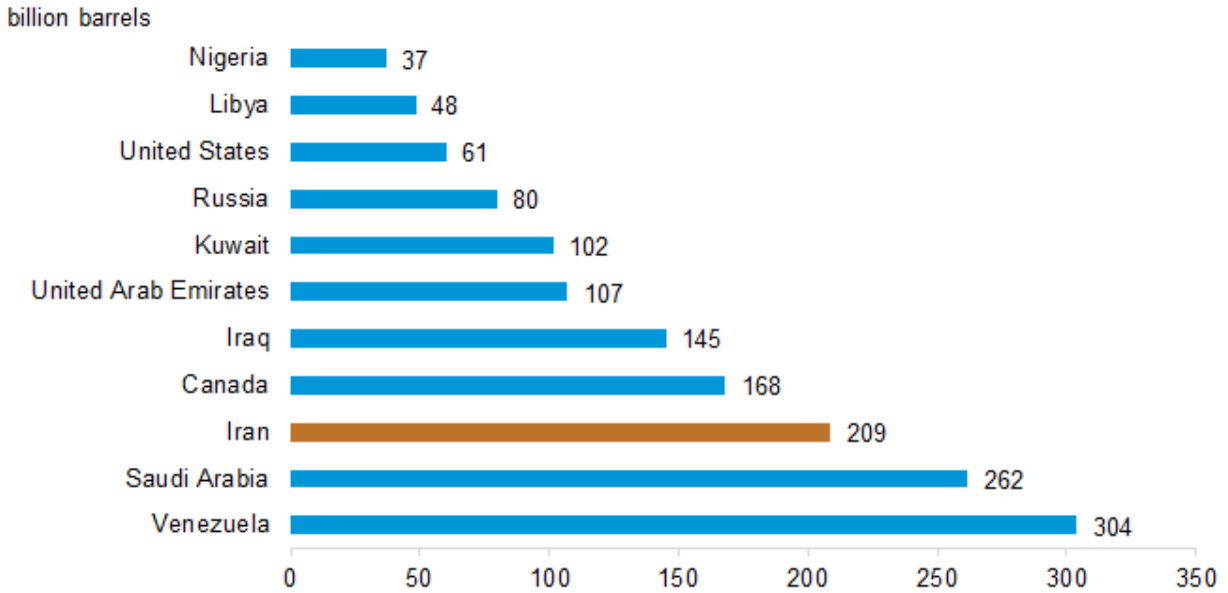
Country Analysis Executive Summary: Iran

Last Updated: November 17, 2022

Overview

- Iran was the fifth-largest crude oil producer in OPEC in 2021 and the third-largest natural gas producer in the world in 2020.¹ It holds some of the world's largest deposits of proved oil and natural gas reserves, ranking as the world's third-largest oil and second-largest natural gas reserve holder in 2021. At the end of 2021, Iran accounted for 24% of oil reserves in the Middle East and 12% in the world (Figure 1).² Despite its abundant reserves, Iran's crude oil production has fallen since 2017 because the oil sector has been subject to underinvestment and international sanctions for several years.
- Although Iran is a member of OPEC, it is exempt from the production cuts under the [OPEC+ agreement](#) because its crude oil production is constrained as a result of sanctions. Iran's crude oil production reached a 30-year low in 2020 as a result of these sanctions and the economic impacts of the global COVID-19 pandemic. Output rose slightly in 2021 because global oil demand increased. Although sanctions on its oil exports remained in place, Iran shipped more crude oil, primarily to China, in 2021.³ If sanctions were lifted, Iran's crude oil production could return to full capacity, which EIA assesses at 3.7 million barrels per day (b/d). Indirect negotiations related to Iran's nuclear program between the United States and Iran began in April 2021 and are ongoing as of September 2022.⁴

Figure 1. Largest proved reserve holders of oil, 2021

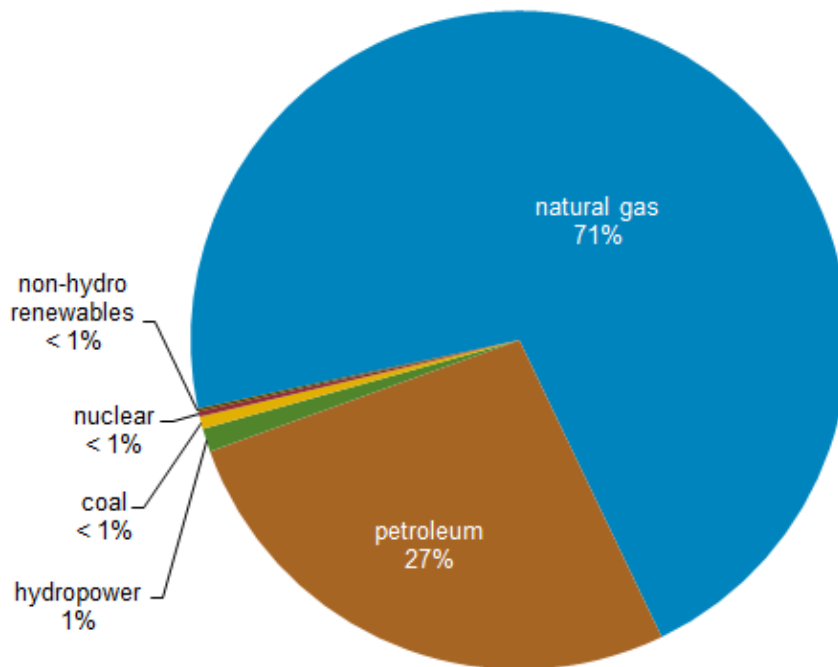


Data source: *Oil & Gas Journal*, December 2021

Note: Oil reserves include crude oil, condensates, natural gas liquids, and oil sands.

- Iran’s economy is relatively diversified compared with many other Middle Eastern countries, but petroleum and other liquids exports are a significant source of government revenue. In 2021, Iran’s oil companies earned about \$40 billion in net oil export revenues, up from around \$15 billion in 2020. Total export revenues increased in 2021 as a result of rising global oil prices and Iran’s total petroleum liquids exports increasing from 2020.⁵ We estimate the oil price increases in 2022 will further increase Iran’s revenues.
- Iran’s economy consumed an estimated 11.6 quadrillion British thermal units of primary energy in 2021, making it the highest energy consumer in the Middle East. Natural gas and oil accounted for almost all of Iran’s total primary energy consumption, and hydropower, coal, nuclear, and non-hydropower renewables accounted for the remaining shares (Figure 2).⁶

Figure 2. Iran's total primary energy consumption, share by fuel, 2021



Data source: BP Statistical Review of World Energy 2022

Note: Chart does not include traditional biomass and waste, such as burning firewood and waste.

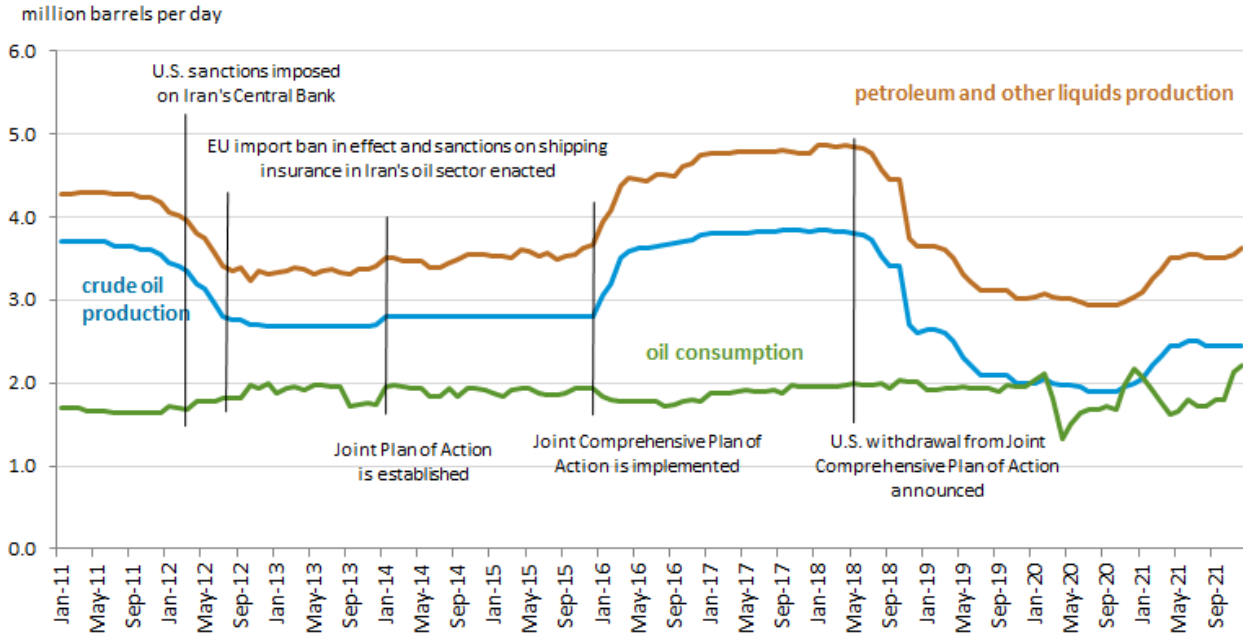
Petroleum and other liquids

- Total petroleum and other liquids production in Iran declined from an annual high of 4.8 million b/d in 2017 to below the 30-year annual low at less than 3.0 million b/d in 2020. In 2021, Iran's production rose to average 3.5 million b/d of petroleum and other liquids; almost 2.4 million b/d was crude oil, and the remainder was condensate and hydrocarbon gas liquids. Iran's crude oil exports and production have declined since the United States announced in May 2018 that it would withdraw from the Joint Comprehensive Plan of Action (JCPOA) and reinstate sanctions targeting Iran's oil exports (Figure 3). Economic fallout from the COVID-19 pandemic, including lockdowns and mobility restrictions, resulted in Iran's annual crude oil production dipping below 2.0 million b/d in 2020. In 2021, however, Iran increased crude oil production by about 430,000 b/d from 2020 after global oil demand began to increase as the effects of the COVID-19 pandemic began to subside. In the first half of 2022, Iran's crude oil production increased again, slightly, to more than 2.5 million b/d.⁷ We assess that Iran's crude oil production could increase to 3.7 million b/d within six after the sanctions have been lifted.
- Iran plans to sustain production capacity at fields with high decline rates through development of new wells and redevelopment of existing wells.⁸ The lack of foreign investment during the past few years as a result of sanctions prompted Iran to turn to local companies to develop its oil projects. However, local firms are limited in the capital and technology they need to maintain production at mature fields.⁹ Since 2019, Iran awarded several contracts to domestic companies to add about 450,000 b/d of crude oil production capacity.¹⁰ Iran's plans, which are partly focused on developing the West Karun oil fields located in its southwestern region (including Azadegan, Yadavaran, and Yaran), have made limited progress over the past several years.¹¹

Since 2021, Iran signed preliminary agreements with Russia and China, in part, to help finance and develop its oil and natural gas sectors. These agreements must overcome a number of challenges related to negotiating details and implementing projects.¹²

- After reaching a record high of 2.0 million b/d in 2018, consumption of petroleum products in Iran fell to less than 1.8 million b/d in 2020 (Figure 3). The economic effects of U.S. sanctions, a significant gasoline price increase in late 2019, and economic slowdown from the COVID-19 pandemic reduced Iran's oil consumption from early 2019 through 2020. Liquid fuels replaced some of the natural gas used in the electric power sector once sanctions limited Iran's ability to export oil, which offset some of the oil consumption declines. In 2021, Iran's oil consumption began to return to pre-pandemic levels, reaching nearly 1.9 million b/d on average, because of increased mobility, improved economics, and higher vehicle sales that boosted gasoline demand. Use of petroleum and petroleum products will likely face competition from natural gas, particularly in the electric power, residential, and commercial sectors, during the next several years, especially if sanctions are lifted and exports of petroleum and petroleum products increases.¹³
- As of mid-2022, total crude oil distillation and condensate splitter capacity in Iran was more than 2.4 million b/d. The Persian Gulf Star condensate refinery, which processes condensates from Iran's South Pars natural gas field, came online in phases, starting in 2017 and continuing through 2020, and has a crude oil processing capacity of 420,000 b/d. More processing capacity to produce lighter petroleum products, such as gasoline, allowed Iran to substantially increase its gasoline output and become self-sufficient in all petroleum products by 2019.¹⁴ Pasargad Energy Development Company, an independent oil company based in Iran, brought online the 35,000-b/d Qeshm refinery, the country's first facility to process ultra-heavy oil grades, in 2022.¹⁵ Iran's government plans to increase the country's refining capacity to 3.5 million b/d by 2026. Although Iran has proposed several projects that are in various stages of planning and development, international sanctions on Iran have hindered some of the investment needed to complete these facilities within the next few years.¹⁶
- Although Iran's total oil-loading capacity for exports (more than 8.0 million b/d)¹⁷ is significantly higher than its oil production capacity, Iran is building the Jask oil export facility, located east of the Strait of Hormuz. This new facility allows the country to bypass any disruption that may occur within the Persian Gulf. Contractors completed the first phase of the Goreh-Jask pipeline, which began transporting crude oil from fields in Goreh, Iran, to the Jask terminal in 2021. The pipeline has the capacity to transport 1.0 million b/d.¹⁸ The terminal's pumping stations, storage tanks, loading points, and power generation facility are all under construction.¹⁹

Figure 3. Iran's petroleum and other liquids production and consumption, 2011–2021



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, September 2022
 Note: Iran's petroleum and other liquids production includes crude oil, condensate, and hydrocarbon gas liquids (HGLs).

Oil trade

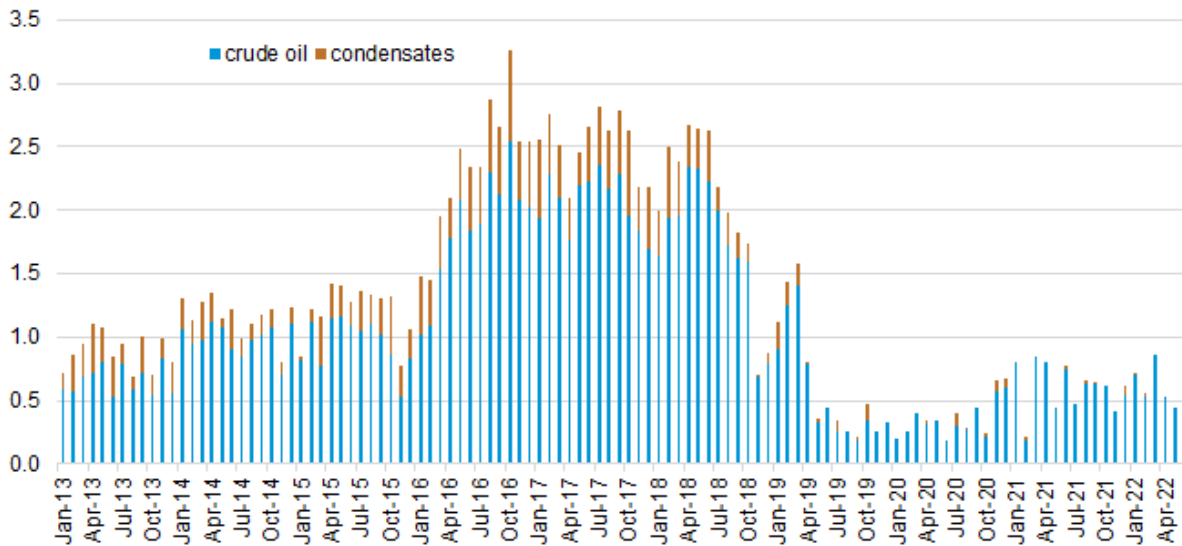
- We estimate Iran's crude oil and condensate exports averaged more than 2.5 million b/d in 2017, the year before the United States re-imposed sanctions, and fell to an average of 0.4 million b/d in 2020 (Figure 4). We base these estimates on tanker-tracking data reported by ClipperData, LLC. Iran's exports began to rise in November 2020 and reached an average of more than 0.6 million b/d in 2021 as a result of shipping more crude oil to China. Estimates based on ClipperData show that Iran's oil exports averaged more than 0.7 million b/d in the first quarter of 2022. In the second quarter of 2022, Iran's oil exports decreased to less than 0.6 million b/d because of high prices that slowed demand in China and competition from Russian oil cargoes.²⁰
- Although Iran supplied crude oil and condensates to a variety of countries in Europe and Asia in 2017, Iran sent nearly all of its crude oil and condensate exports to China and Syria in 2021 (Figure 5). Industry analysts assess that shipments of Iran's crude oil to several countries, such as Malaysia, were transferred to other ships and blended with crude oil grades that did not originate in Iran before they were sent to China. According to industry analysts, much of the oil that was shipped from Iran to China was relabeled from countries such as Malaysia, the United Arab Emirates, and Oman to escape detection from customs authorities.²¹ Syria has been receiving small amounts of crude oil and oil products, mostly through a line of credit with Iran and through barter deals.²²
- After Russia's full-scale invasion of Ukraine in February 2022, Europe began looking elsewhere for crude oil imports, which resulted in Russia significantly discounting its crude oil price. China's refiners began purchasing more crude oil from Russia, which displaced some of Iran's crude oil exports to China. Iran continues to compete with Russia for crude oil market share in China.²³
- In May 2022, Iran began exporting Iranian Heavy crude oil grade to Venezuela (less than 100,000 b/d) so that Venezuela could use the oil as a replacement for the similar Mesa 30 crude oil

grade. Venezuela uses the Mesa 30 crude oil grade in its domestic refineries and for blending with its extra heavy oil to make it a lighter crude oil grade suitable for exports. Using Iranian Heavy crude oil frees up more Mesa 30 crude oil for Venezuela to export.²⁴ In September 2021, Iran began exporting condensates to Venezuela (nearly 70,000 b/d) under a swap agreement. Iran's condensates act as a diluent for Venezuela's extra heavy crude oil and help bolster Venezuela's oil production and exports. Under the swap agreement, Venezuela sends some of its heavy oil back to Iran as payment.²⁵

- Iran exported nearly 840,000 b/d of petroleum products in 2021, which was an increase from about 700,000 b/d in 2020. Liquefied petroleum gas, fuel oil, and gasoline accounted for about 74% of total petroleum product exports, according to Facts Global Energy estimates.²⁶ Petroleum products are generally shipped on smaller vessels, which can avoid detection more easily than crude oil cargoes. In addition, in 2019, when the new Persian Gulf Star refinery was commissioned, the added refining capacity resulted in Iran becoming a net exporter of gasoline that year.²⁷ Historically, Iran's petroleum product imports were a significant component in meeting Iran's domestic demand.

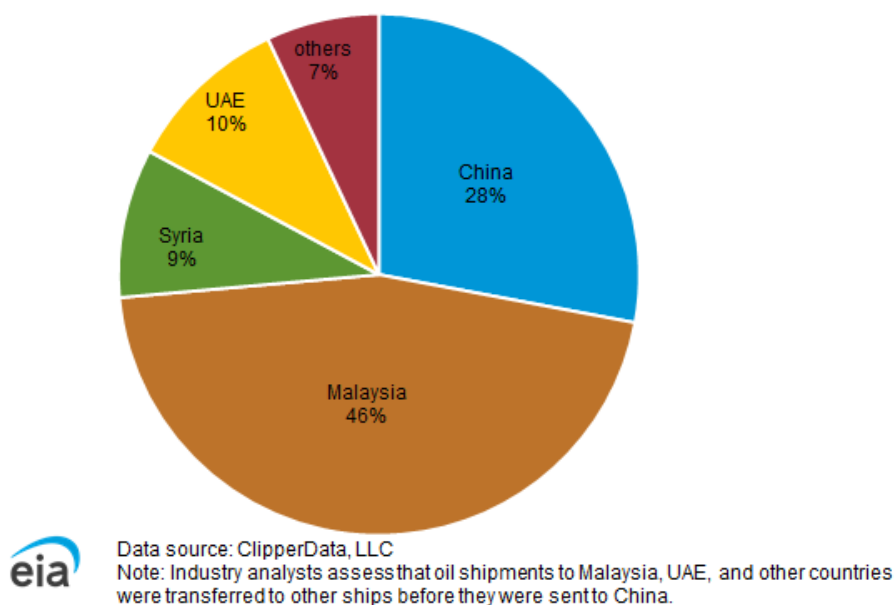
Figure 4. Iran's monthly crude oil and condensate exports

million barrels per day



Data source: ClipperData, LLC

Figure 5. Iran's crude oil and condensate exports by destination, 2021



Natural gas

- Iran's estimated proved natural gas reserves were 1,200 trillion cubic feet (Tcf) as of December 2021, second only to Russia, according to *Oil & Gas Journal*. Iran holds 17% of the world's proved natural gas reserves and almost half of OPEC's reserves (Figure 6).²⁸
- Iran was the world's third-highest dry natural gas producer after the United States and Russia in 2021.²⁹ Despite sanctions restricting investment and hindering Iran's natural gas development, dry natural gas production rose more than 60% between 2011 and 2021, expanding to nearly 8.8 Tcf (Figure 7).³⁰ Iran's increased crude oil production in 2021 drove its associated gas output slightly higher. In addition, Iran further raised production at the most recently developed phases of the South Pars field (the country's largest non-associated gas field). These five phases came online after 2017 and have gradually increased production to reach their maximum capacity. Iran has brought online several phases of the offshore South Pars natural gas field since 2014 and continues to develop natural gas fields, despite challenges posed by sanctions and a lack of foreign investment.³¹ Since 2018, domestic companies have primarily developed Iran's natural gas fields; however, while sanctions on Iran's oil exports are in place, the country's natural gas production growth, particularly from fields that produce condensate liquids, will remain limited because of condensate storage capacity constraints.
- PetroPars, a privately owned oil company in Iran, plans to bring online the last South Pars phase (SP11) by the second half of 2023. TotalEnergies and China's CNPC were the original investors in this project, but once U.S. sanctions were re-imposed, they withdrew, leaving the project development to local companies. Iran reduced the scope of the project's capacity from 730 billion cubic feet per year (Bcf/y) to 180 Bcf/y. In addition, PetroPars canceled the original plans to build a compression system and a large offshore platform for SP 11.³² Iran will need to invest more than \$20 billion to build compression stations to stem pressure drops and production declines from some of the older phases of the South Pars field. Iran estimates that natural gas

production could lose about 350 Bcf/y starting in 2023 without sufficient investment in these fields.³³ Iran's local companies are attempting to develop other natural gas fields, but we assume progress will likely be very slow as long as the sanctions remain in place.³⁴ Without investment from foreign firms, Iran will face challenges in meeting its natural gas demand requirements with domestic production.

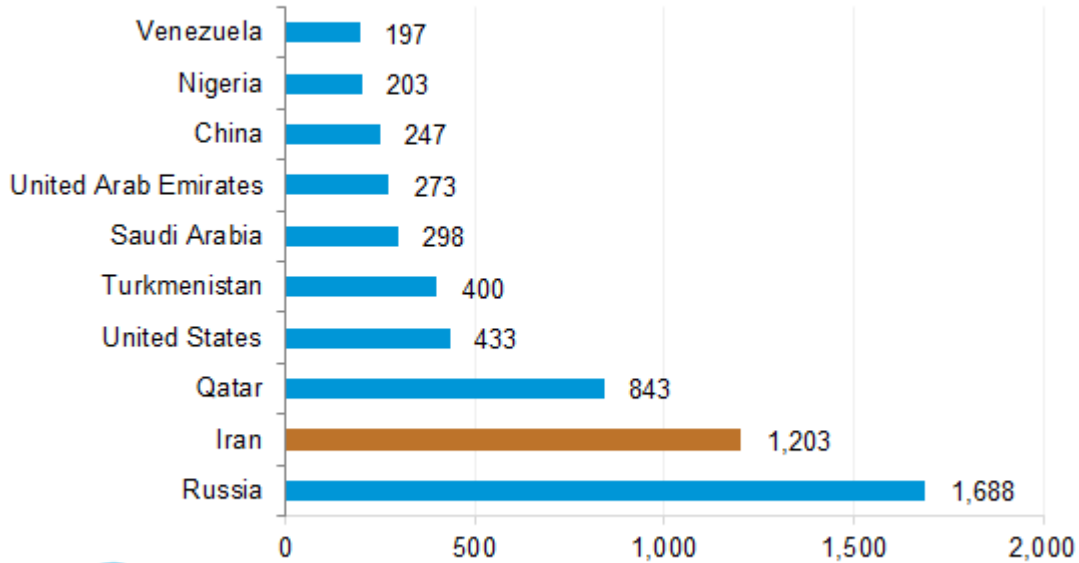
- In 2017, the National Iranian Oil Company (NIOC) reinjected 1.2 Tcf of natural gas into oil wells for enhanced oil recovery (EOR), which plays a central role in Iran's oil production. Once sanctions resumed on Iran's oil exports in 2018, reinjected natural gas volumes fell significantly, to an estimated 0.2 Tcf, in 2021.³⁵
- In addition to the natural gas used for EOR, Iran vented or flared approximately 615 Bcf of natural gas in 2021, up from 470 Bcf in 2020, as a result of higher associated natural gas production from oil fields.³⁶ Plans are underway to capture more flared natural gas for use in power plants, refineries, and petrochemical plants. In 2021, the Bid Boland-2 natural gas processing plant, one of the largest plants in Iran, was commissioned, which will increase natural gas processing capacity and reduce natural gas flaring once it reaches full capacity.³⁷ The oil ministry plans to eliminate natural gas flaring in 2023;³⁸ however, eliminating flaring will depend on whether or not sanctions are lifted, export markets are opened for natural gas liquids, and sufficient natural gas liquids processing capacity is added. Currently, three natural gas liquids plants are under construction and four plants are in the early planning stages.³⁹
- In 2021, Iran was the world's fourth-highest consumer of natural gas after the United States, Russia, and China.⁴⁰ Most of Iran's natural gas production is consumed domestically. Over the past decade, Iran's natural gas consumption grew by about 50% because of:
 - Highly subsidized prices
 - An extensive grid network
 - Domestic production increases
 - Government attempts to substitute oil with natural gas in the residential, commercial, and electric power sectors.

Iran's natural gas consumption averaged 8.2 Tcf in 2021, about 4% higher than in 2020 (Figure 7).⁴¹ Growth in natural gas consumption slowed in 2019 and 2020 as a result of the U.S. sanctions on exports of petroleum and other liquids. Iran reduced its supply of natural gas from the South Pars field because of insufficient storage for its associated condensate production. Iran substituted some natural gas with oil products, particularly in its electric power sector, as a result of the natural gas supply constraint. In 2021, natural gas demand growth accelerated because of economic recovery from the effects of the COVID-19 pandemic and increased oil exports, which allowed more of Iran's natural gas to be used in the electric power sector.⁴²

- In 2020, the residential and commercial customers used the most natural gas (35%), followed by the industrial (including petrochemicals) sector (27%) and the electric power sector (26%). Natural gas consumption in all of these sectors has increased significantly in the past decade because natural gas has been replacing some liquid fuels, Iran's natural gas pipeline system has expanded, and the industrial sector has expanded. The petrochemical industry is slated to grow in Iran during the next several years and will require more natural gas for fuel.⁴³ In the future, if more crude oil, oil products, and condensates are freed up for exports, the electricity sector could switch more oil-fired generation to natural gas-fired generation.

Figure 6. Largest proved reserve holders of natural gas, 2021

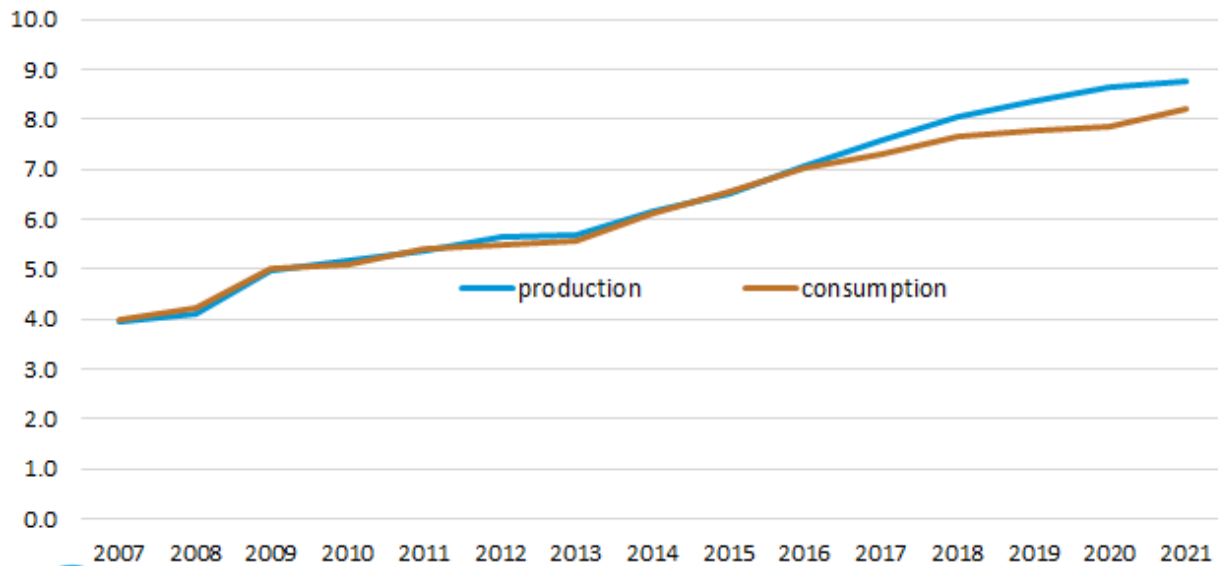
trillion cubic feet



Data source: *Oil & Gas Journal*, December 2021

Figure 7. Iran's dry natural gas production and consumption

trillion cubic feet



Data source: U.S. Energy Information Administration, International Energy Statistics

Natural gas trade

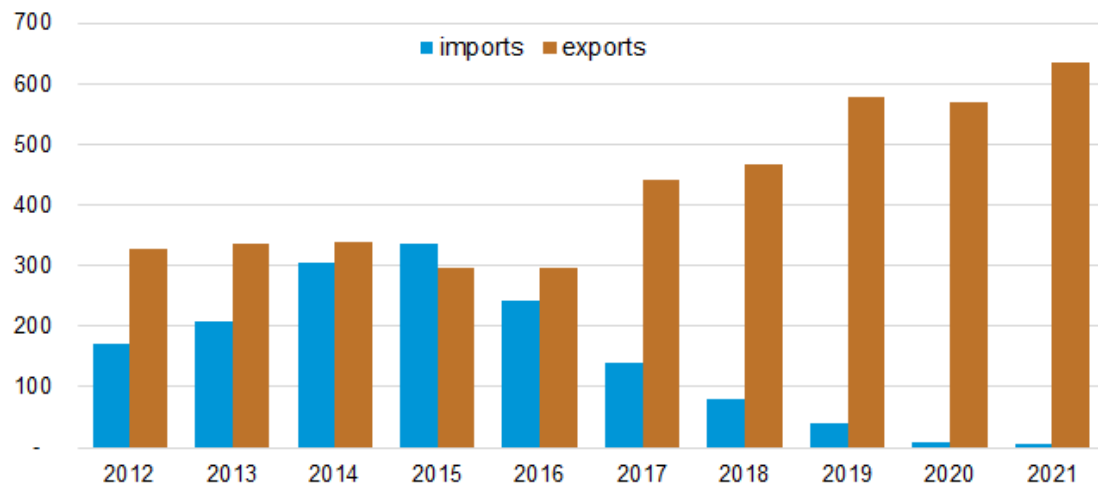
- Iran exports natural gas by pipeline to Turkey, Armenia, Azerbaijan, and Iraq, and it receives imports from Azerbaijan and Turkmenistan. In 2021, Iran exported about 635 billion cubic feet

(Bcf) and imported 7 Bcf of natural gas via pipelines (Figure 8). Iran’s natural gas imports decreased substantially after 2015, and exports have risen sharply since 2014 because of Iran’s increased natural gas production from several new South Pars projects and increased exports to Iraq since 2017.⁴⁴ Although Iran reduced its exports to Iraq in 2021 because of domestic requirements and Iraq’s financial challenges in debt payments, it increased its exports to Turkey. Iran stopped importing natural gas from Turkmenistan in 2019 because Iran had not settled the debt payments it owed Turkmenistan.

- In 2021, Iraq and Turkey accounted for nearly all (97%) of Iran’s natural gas exports.⁴⁵ Natural gas exports to Iraq increased substantially between mid-2017, when the trade contract between Iran and Iraq was implemented, and 2020. Electricity and natural gas exports from Iran are increasingly important to Iraq’s electric power sector in meeting demand. Iran’s exports to Turkey dropped in 2020 because an explosion on the Iran-Turkey natural gas pipeline stopped flows for a few months, but natural gas flows returned in 2021.⁴⁶
- Iran’s natural gas exports to Armenia and Azerbaijan are based on long-term swap agreements. At the beginning of 2022, Iran renewed its swap agreement with Azerbaijan to begin importing natural gas from Turkmenistan into northeastern Iran and to send an equal amount of natural gas to Azerbaijan from northwestern Iran. In June 2022, Azerbaijan and Iran agreed to double the shipments from at least 50 Bcf/y to over 100 Bcf/y.⁴⁷ Iran exports a small amount of natural gas to Armenia for electricity generation.⁴⁸

Figure 8. Iran's natural gas pipeline imports and exports, 2012–2021

billion cubic feet



Data source: U.S. Energy Information Administration, International Energy Statistics

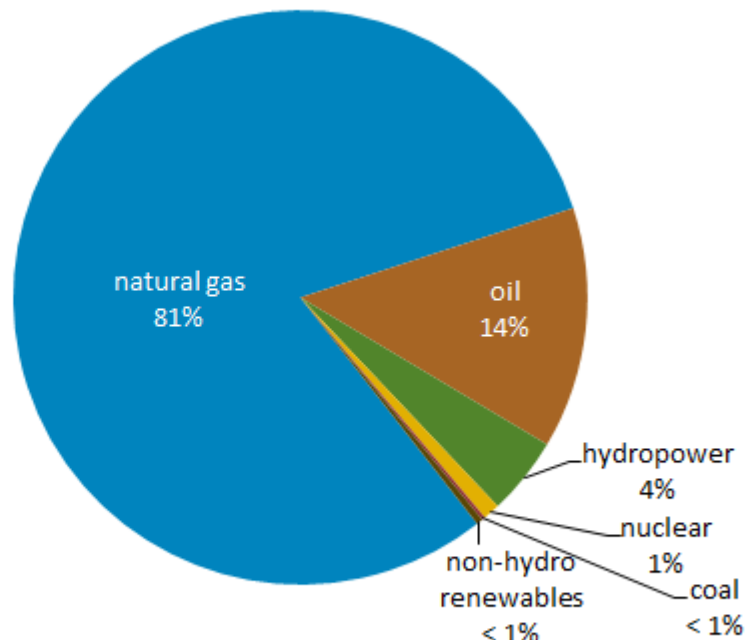
Electricity

- In 2021, Iran generated 341 terawatt-hours (TWh) of net electricity, and 94% of generation was from fossil fuel sources.⁴⁹ Natural gas is the largest source of fuel for electricity generation in Iran, accounting for nearly 81% of total generation. Oil fueled 14% of Iran’s electric power generation in 2021, up from 9% in 2018.⁵⁰ Because sanctions limited Iran’s oil exports and

production of associated natural gas, more of Iran’s oil production was used domestically. As a result, diesel and fuel oil have been replacing some of the natural gas used in the electric power sector since sanctions were reimposed. In addition, Iran’s non-associated natural gas production is below its capacity because of limited condensate storage. Overall, the lack of sufficient natural gas supply causes Iran’s electricity grid to partially rely on other fuels. Iran is converting its older, less efficient natural gas plants to combined-cycle plants and adding natural gas capacity because the country intends to free up more oil for export, reduce its heavy use of hydropower, and increase the efficiency of its electric power plants.⁵¹

- In the past few years, illegal cryptocurrency mining, population growth, highly subsidized electricity prices, and fuel supply shortages drove steady growth in Iran’s electricity demand and strained its capacity during peak electricity demand seasons (summer and winter). As a result, this supply gap led to power shortages in 2020 and 2021.⁵² In 2021, peak summer demand in Iran exceeded supply by almost 12 gigawatts (GW).⁵³
- Coal, hydropower, nuclear, and non-hydropower renewables are the remaining fuel sources used to generate electricity in Iran (Figure 9). Although Iran generates the most hydroelectric power in the Middle East, its output is susceptible to regional droughts, which have become more frequent in the past few years.⁵⁴ Despite other renewables (not including hydroelectricity) having a small share of total capacity, Iran plans to boost its wind and solar capacity from less than 1 GW in 2021 to 10 GW by 2025 and by another 4 GW in solar plants in a future phase with local private investment.⁵⁵ Although we assess this plan as ambitious, Iran has slowly increased its solar and wind capacities in the past decade and is constructing manufacturing plants for solar panels.⁵⁶

Figure 9. Iran's net electricity generation by fuel, 2021



eia Data source: U.S. EIA based on data from *BP Statistical Review of World Energy 2022*
 Note: Total may not add to 100% because of independent rounding.

Notes

- Data are the most recent available as of September 2022.
- Data are EIA estimates unless otherwise noted.

Endnotes

- ¹ U.S. Energy Information Administration, *Short-Term Energy Outlook*, September 2022 and International Energy Statistics.
- ² *Oil & Gas Journal*, Worldwide look at reserves and production (December 2021).
- ³ Reuters, “[As nuclear talks resume, Iran's oil exports increase](#)”, February 10, 2022.
- ⁴ Reuters, “[Iran, world powers to discuss U.S. return to nuclear deal, compliance](#)”, April 1, 2021.
- ⁵ U.S. Energy Information Administration, *OPEC Net Oil Export Revenues*, August 2022.
- ⁶ *BP Statistical Review of World Energy 2022*.
- ⁷ U.S. Energy Information Administration, *Short-Term Energy Outlook*, September 2022 and International Energy Statistics.
- ⁸ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), page 55; *Iran Oil and Gas Monthly*, “Key Issue: Iran Awards Development of Eight Brownfield Projects to Local Companies”, January 2021.
- ⁹ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), page 55-56.
- ¹⁰ Rystad Energy, “What’s at stake for Iran’s oil sector as nuclear talks hit roadblock?”, September 20, 2022; Rystad Energy, “What’s in store for Iran’s upstream sector if sanctions are lifted?”, May 17, 2022.
- ¹¹ *Middle East Economic Survey*, “Iran Hopes To Develop Iraq Border Fields, Finances & Technology Stand In The Way,” October 1, 2021.
- ¹² Rystad Energy, “What’s at stake for Iran’s oil sector as nuclear talks hit roadblock?”, September 20, 2022; *Middle East Economic Survey*, “Iran’s Energy Sector: Lots Of Bluster But Limited Progress,” August 5, 2022; FACTS Global Energy, Iran Alert, “NIOC Signs \$40 Billion MoU with Gazprom, but Few Projects Likely to Go Ahead”, August 5, 2022; ClipperData LLC, Geopolitic Oil, March 31, 2021, pages 2-3.
- ¹³ U.S. Energy Information Administration, *Short-Term Energy Outlook*, September 2022; Fitch Solutions, Iran Oil & Gas Report, Q4 2022, pages 26-28; FACTS Global Energy, Iran Oil and Gas Monthly Report, February 28, 2022, pages 3-5.
- ¹⁴ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), pages 84-94; Facts Global Energy, *Iran's Oil and Gas Annual Report 2020*, (December 2020), pages 69-79; Middle East Economic Survey, “Iran Hikes Capacity at Persian Gulf Star Condensate Splitters,” July 24, 2020, page 9; [Abadan Oil Refining Company](#) (accessed September 2022).
- ¹⁵ FACTS Global Energy, Middle East Petroleum Databook, Spring 2022, page 67; Islamic Republic News Agency, “[1st phase of Qeshm ultra-heavy crude oil refinery becomes operational](#)”, January 14, 2022; *Middle East Economic Survey*, “Iran Eyes Local Firms For Downstream Boost,” September 9, 2022.
- ¹⁶ *Middle East Economic Survey*, “Iran Targets 3.5 mn b/d Refining Capacity”, January 28, 2022 and “Iran Eyes Local Firms For Downstream Boost,” September 9, 2022; SHANA, “[Iran Oil Refining Capacity to Hit 3.5mn Barrels](#)”, November 6, 2021.
- ¹⁷ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), page 79.
- ¹⁸ *Middle East Economic Survey*, “Iran Starts Up New Terminal On The Gulf Of Oman”, July 23, 2021.
- ¹⁹ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), page 80.
- ²⁰ ClipperData LLC (data pulled August 31, 2022).
- ²¹ Reuters, “[China's Iranian oil imports ease on poor margins, lure of Russian oil](#)”, May 9, 2022; ClipperData Geopolitical Report, Volume 4, Issue 13, March 31, 2021, pages 2-3; Middle East Institute, “[Iranian sanctions evasion and the Gulf's complex oil trade](#),” May 11, 2021.
- ²² Reuters, “[Syria fuel crisis eases as Iran delivers new oil supplies](#),” October 23, 2020; Facts Global Energy, *Iran Oil and Gas Monthly*, January 2022, page 3.
- ²³ Reuters, “[China's Iranian oil imports ease on poor margins, lure of Russian oil](#)”, May 9, 2022; Argus Media, “[Opec+ added 500,000 b/d in July, remained below target](#)”, August 10, 2022; Iran International, “[More Evidence Emerges Of Russia Taking Iran's Oil Market Share](#)”, July 22, 2022.
- ²⁴ Facts Global Energy, *Iran Oil and Gas Monthly Report*, August 2022, page 6; Reuters, “[Venezuela begins imports of Iranian heavy oil for refining -PDVSA documents](#)”, May 9, 2022; Reuters, “[Iran boosts crude supply to Venezuela for refining, freeing up exportable oil](#)”, July 19, 2022.

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- ²⁵ Facts Global Energy, *Iran Oil and Gas Monthly Report*, August 2022, page 7; Argus Media group, “[Venezuela adapts to US sanctions with rising oil flow](#)”, November 3, 2021; Reuters, “[Tankers to discharge Iranian crude, condensate at Venezuela's main port](#)”, September 26, 2022.
- ²⁶ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021* (December 2021), page 96.
- ²⁷ Reuters, “[Sanctions choke Iran's crude sales, but oil product exports booming](#)”, September 2, 2019.
- ²⁸ *Oil & Gas Journal*, Worldwide look at reserves and production, (December 2021).
- ²⁹ *BP Statistical Review of World Energy 2022*.
- ³⁰ U.S. Energy Information Administration, International Energy Statistics.
- ³¹ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), pages 66-67, 74 and *Iran's Oil and Gas Annual Report 2020* (December 2020), page 93.
- ³² Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), page 71.
- ³³ *Middle East Economic Survey*, “Iran's Energy Sector: Lots of Bluster But Limited Progress”, August 5, 2022; “Tehran & Baku Agree to Double Gas Swap”, June 10, 2022; and “Iran Details \$80bn Gas Development Plan”, January 14, 2022.
- ³⁴ Facts Global Energy, *Iran's Oil and Gas Monthly Report*, November 2021, pages 2-4.
- ³⁵ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), page 113.
- ³⁶ Global Gas Flaring Reduction Partnership (GGFR), [Global Gas Flaring Data](#) (accessed August 2022).
- ³⁷ Tehran Times, “[Major gas refinery goes operational in southwestern Iran](#),” January 22, 2021.
- ³⁸ Mehr News Agency, “[Iran gas flaring zero by March 2023: Zanganeh](#),” January 22, 2021; *Middle East Economic Survey*, “Gas Plant Inauguration Boosts Iran's Petchems Outlook”, January 29, 2021, page 12.
- ³⁹ Facts Global Energy, *Iran's Oil and Gas Annual Report 2020*, (December 2020), pages 105-106; *Iran's Oil and Gas Annual Report 2021*, (December 2021), pages 101, 103-104; Tehran Times, “[Over \\$1.5b worth of natural gas wasted in Iran annually](#)”, August 16, 2022.
- ⁴⁰ *BP Statistical Review of World Energy 2022*.
- ⁴¹ U.S. Energy Information Administration, International Energy Statistics.
- ⁴² Fitch Solutions, *Iran Oil & Gas Report, Q4 2022*, pages 29-30; *Iran's Oil and Gas Annual Report 2021*, (December 2021), pages 107-108; Iran International, “[Iran Spends Tens of Billions Of Dollars A Year On Energy Subsidies](#)”, February 4, 2022, and “[Senior Official Says Iran Paying \\$100 Billion In Energy Subsidies](#)”, May 9, 2022.
- ⁴³ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), pages 20-21, 31-34, and 110 and 118.
- ⁴⁴ U.S. Energy Information Administration, International Energy Statistics.
- ⁴⁵ Facts Global Energy, *Iran Oil and Gas Monthly*, August 2022, page 18.
- ⁴⁶ Facts Global Energy, *Iran Oil and Gas Monthly*, January 2021, page 14, and Facts Global Energy, *Iran Oil and Gas Monthly*, August 2022, page 18.
- ⁴⁷ *Middle East Economic Survey*, “Iran Unveils 10 Year Upstream Investment Plan”, December 3, 2021, and “Tehran & Baku Agree to Double Gas Swap”, June 10, 2022; Facts Global Energy, Iran Alert, “Iran is keen to expand gas trade with neighbors”, June 27, 2022.
- ⁴⁸ Facts Global Energy, *Iran's Oil and Gas Annual Report 2021*, (December 2021), page 111.
- ⁴⁹ U.S. Energy Information Administration, International Energy Statistics.
- ⁵⁰ U.S. Energy Information Administration, International Energy Statistics using data from *BP Statistical Review of World Energy 2022*.
- ⁵¹ Fitch Solutions, *Iran Power Report, Q4 2022*; pages 7-8; FACTS Global Energy, *Iran Oil and Gas Monthly*, July 2021, pages 1-7.
- ⁵² Iran International, “[Energy Minister Says Iran Faces 15,000 Megawatt Power Deficit](#)”, April 1, 2022 and “[Iranian Industry Losing Money Due To Gas And Electricity Shortages](#)”, September 5, 2022; BBC News, “[Electricity blackouts spark protests in Iranian cities](#)”, July 6, 2021; BBC News, “[Iran bans cryptocurrency mining for four months after blackouts](#)”, May 26, 2021; Reuters, “[After protests, Iran's President apologises over power blackouts](#)”, July 6, 2021.
- ⁵³ *Middle East Economic Survey*, “Iran Dreams Up 14GW Renewables Target”, May 20, 2022.
- ⁵⁴ Reuters, “[ANALYSIS-As Iran faces 'water bankruptcy', drought exposes past problems, future threats](#)”, July 28, 2021; Iran International, “[Iran Facing Water, Power Shortages This Summer](#)”, June 3, 2022; Fitch Solutions, *Iran Power Report, Q4 2022*; page 4.

⁵⁵ Fitch Solutions, Iran Power Report, Q4 2022; pages 10-11; Tehran Times, “[Iran to add 10GW to renewable energy capacity](#)”, January 2, 2022; *Middle East Economic Survey*, “Iran Dreams Up 14GW Renewables Target”, May 20, 2022.

⁵⁶ Tehran Times, “[There is possibility to set up 1m household solar power plants in country](#)”, August 19, 2022; Fitch Solutions, Iran Power Report, Q4 2022; page 11.