



*Independent Statistics & Analysis*

U.S. Energy Information  
Administration

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## Country Analysis Executive Summary: Iran

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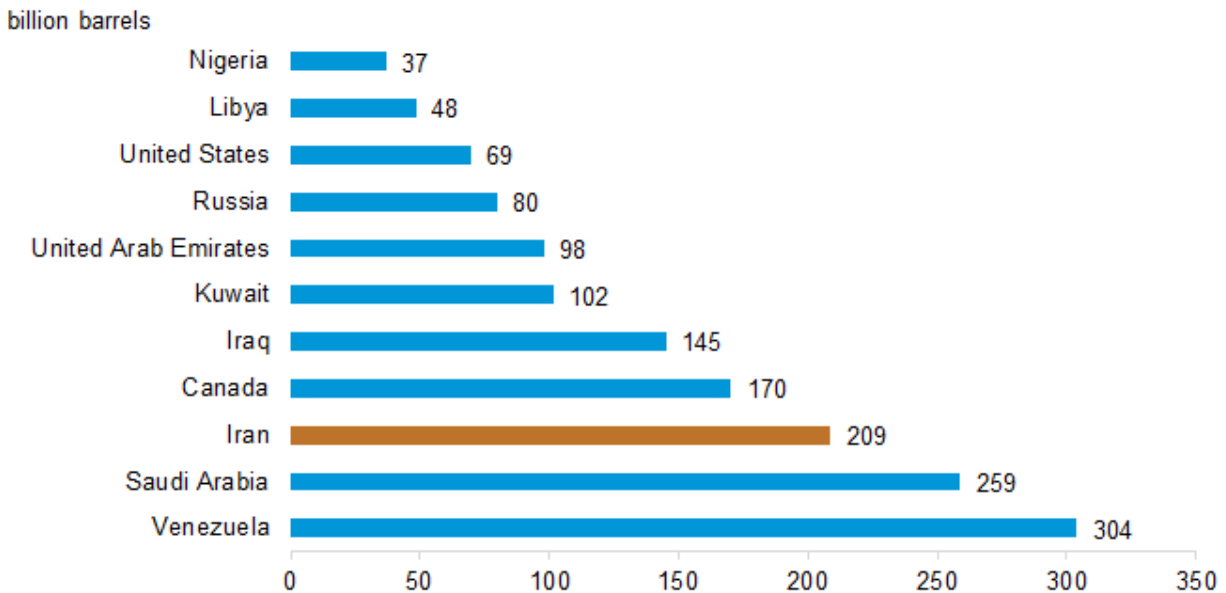
Last Updated: July 16, 2021

### Overview

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- Iran was the fifth-largest crude oil producer in OPEC in 2020 and the third-largest natural gas producer in the world in 2019.<sup>1</sup> It holds some of the world's largest deposits of proved oil and natural gas reserves, ranking as the world's third-largest and second-largest reserve holder of oil and natural gas, respectively, in 2020. At the end of 2020, Iran accounted for 25% of oil reserves in the Middle East and 12% in the world (Figure 1).<sup>2</sup> 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 remains limited by U.S.-imposed nuclear-related sanctions. Iran's crude oil production reached a 30-year low in 2020 as a result of these sanctions and the impacts of the global COVID-19 pandemic. EIA assesses that Iran's production could return to full capacity, at 3.8 million barrels per day (b/d), if the United States lifts oil sector sanctions.

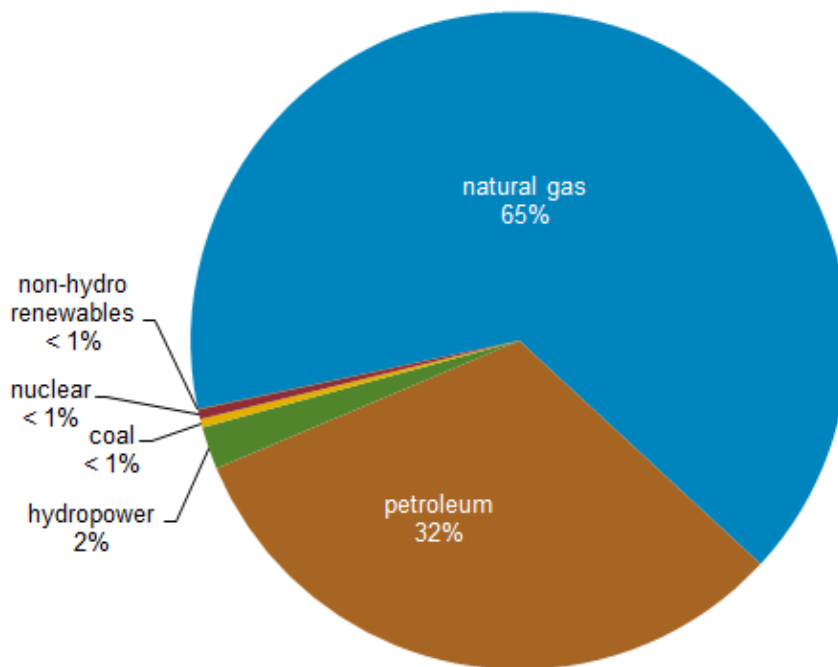
Figure 1. Largest proved reserve holders of oil, 2020



Source: Graph by U.S. EIA based on data from *Oil & Gas Journal*, December 2020  
Note: Oil reserves include crude oil, condensates, natural gas liquids, and oil sands.

- Iran’s economy is relatively diversified compared to many other Middle Eastern countries, but it still relies heavily on petroleum and other liquids revenues. In FY 2016 (April 2016–March 2017), the latest year of available data, crude oil export revenue accounted for nearly 40% of Iraq’s total government revenues, according to the International Monetary Fund (IMF).<sup>3</sup> In 2019, Iran earned \$30 billion in net oil export revenues, down from \$66 billion in 2018. Export revenues fell in 2019 after U.S. sanctions were imposed on Iran’s oil exports, which resulted in a decrease in both crude oil production and exports in Iran.<sup>4</sup> We estimate the oil price declines in 2020 further reduced Iran’s revenues.
- Iran’s economy consumed an estimated 11.7 quadrillion British thermal units of primary energy in 2019, making it the largest energy consumer in the Middle East. Natural gas and oil accounted for almost all of Iran’s total primary energy consumption, with marginal contributions from hydropower, coal, nuclear, and non-hydro power renewables (Figure 2).<sup>5</sup>

Figure 2. Iran's total primary energy consumption, share by fuel, 2019



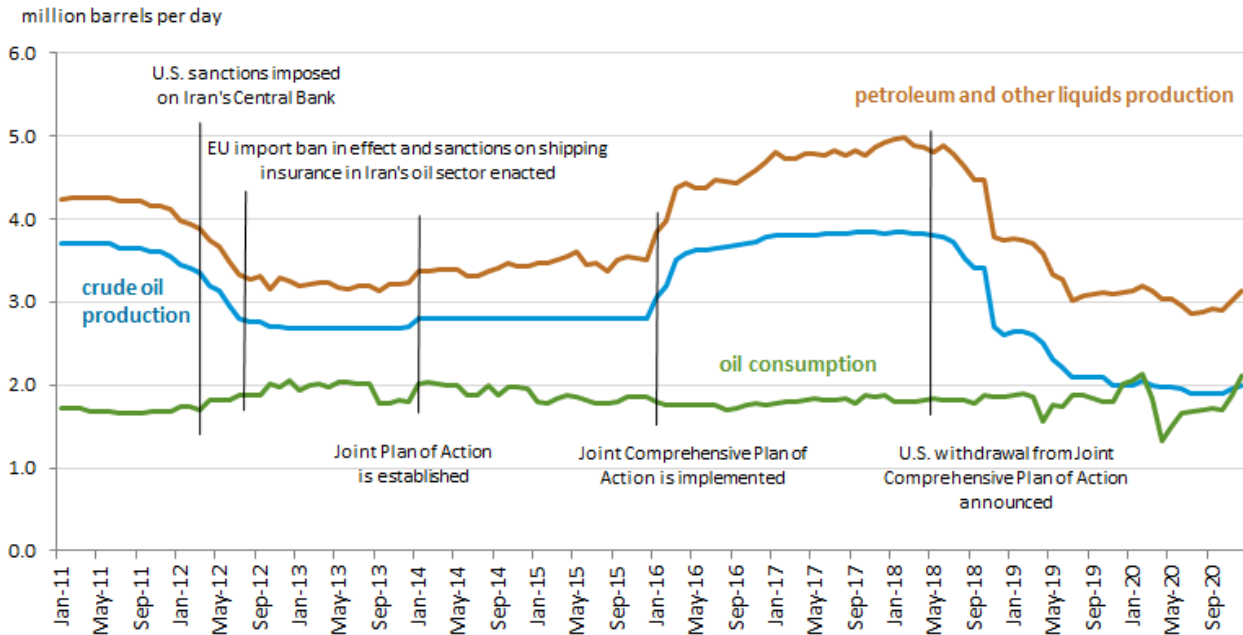
Source: Graph by U.S. EIA based on data from *BP Statistical Review of World Energy 2020*  
Note: Chart does not include traditional biomass and waste, such as burning firewood and waste.

## Petroleum and other liquids

- Total oil production in Iran has declined since 2017, when output reached a high of 4.8 million b/d. Iran's production averaged 3.0 million b/d of petroleum and other liquids in 2020, and almost 2.0 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). Crude oil production reached 2.6 million b/d during the first few months of 2019 when the United States government granted sanctions waivers for some of Iran's key oil-importing countries. However, after these waivers expired in May 2019, output fell further to about 2.1 million b/d. Economic fallout from the COVID-19 pandemic, including lockdowns and mobility restrictions, resulted in Iran's crude oil production dipping below 2.0 million b/d in 2020. We assess that Iran's crude oil production could increase to 3.8 million b/d if global demand continues to rise and sanctions on Iran's oil exports are lifted.
- Consumption of petroleum products in Iran remained steady in 2019 at 1.8 million b/d compared to 2018 levels, despite the economic downturn that occurred after U.S. sanctions were re-imposed. Sanctions limit Iran's ability to export crude oil, condensate, and petroleum products, and these liquid fuels replaced some of the natural gas used in the power sector, mainly diesel and fuel oil. In the wake of the COVID-19 pandemic, Iran's economy consumed less than 1.8 million b/d in 2020. Use of gasoline, the key transportation fuel in Iran, decreased considerably. Use of petroleum and petroleum products will likely face competition from natural

gas, particularly in the power, residential, and commercial sectors, during the next several years, especially if demand for exports of petroleum and petroleum products increases.

**Figure 3. Iran's petroleum and other liquids production and consumption, 2011–2020**



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, June 2021.  
 Note: Iran's petroleum and other liquids production includes crude oil, condensate, and hydrocarbon gas liquids (HGLs).

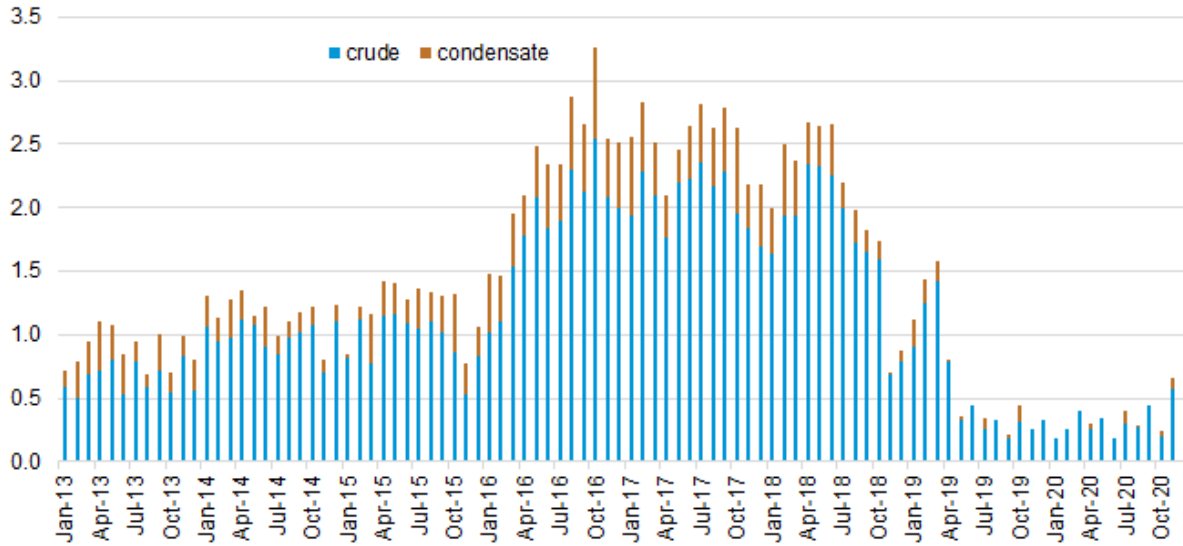
### Oil trade

- We estimate Iran's crude oil and condensate exports fell from more than 2.5 million b/d in 2017, the year before the United States re-imposed sanctions, to an average of less than 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 nearly 0.7 million b/d in the last two months of the year as Iran sent more crude oil to China.<sup>6</sup> Estimates based on ClipperData show that Iran's oil exports averaged more than 0.5 million b/d in the first few months of 2021. Other industry analysts and trade press vary in their range of estimates for Iran's oil exports from less than 0.6 million b/d to more than 0.8 million b/d during the first quarter of 2021.<sup>7</sup> The use of ship-to-ship (STS) transfers and switching off Iranian ship identification transponders, have made it difficult to track Iran's crude oil exports.
- 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 2020 (Figure 5). Industry analysts assess that shipments of oil to several countries were transferred ship to ship and blended with crude oil grades that did not originate in Iran before the volumes were sent to China. According to analysis from ClipperData, much of the oil that was shipped from Iran to China was relabeled from countries such as Malaysia, Singapore, the United Arab Emirates, Iraq, and Oman to escape detection from customs authorities and compliance with sanctions.<sup>8</sup> Syria has been receiving small amounts of crude oil and oil products mostly through a line of credit with Iran and through barter deals.<sup>9</sup>
- Iran's exports of petroleum products were 680,000 b/d in 2020. LPG, fuel oil, and gasoline accounted for about 61% of total petroleum product exports, according to FGE estimates, which was an increase from 2018 at 620,000 b/d.<sup>10</sup> Petroleum products are generally shipped on

smaller vessels that have been able to avoid detection more easily than crude oil cargoes. In addition, when the new Persian Gulf Star refinery was commissioned, the added refining capacity resulted in Iran becoming a net exporter of gasoline in 2019.<sup>11</sup> Historically, Iran relied on petroleum product imports to meet domestic demand.

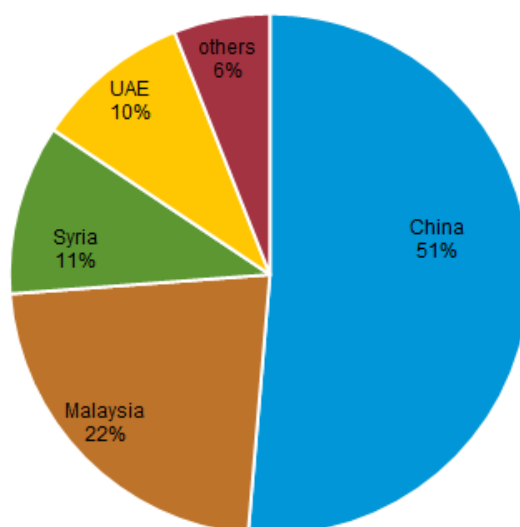
**Figure 4. Iran's monthly crude oil and condensate exports**


million barrels per day



Source: Graph by U.S. EIA, based on data from ClipperData, LLC

Figure 5. Iranian crude oil and condensate exports by destination, 2020



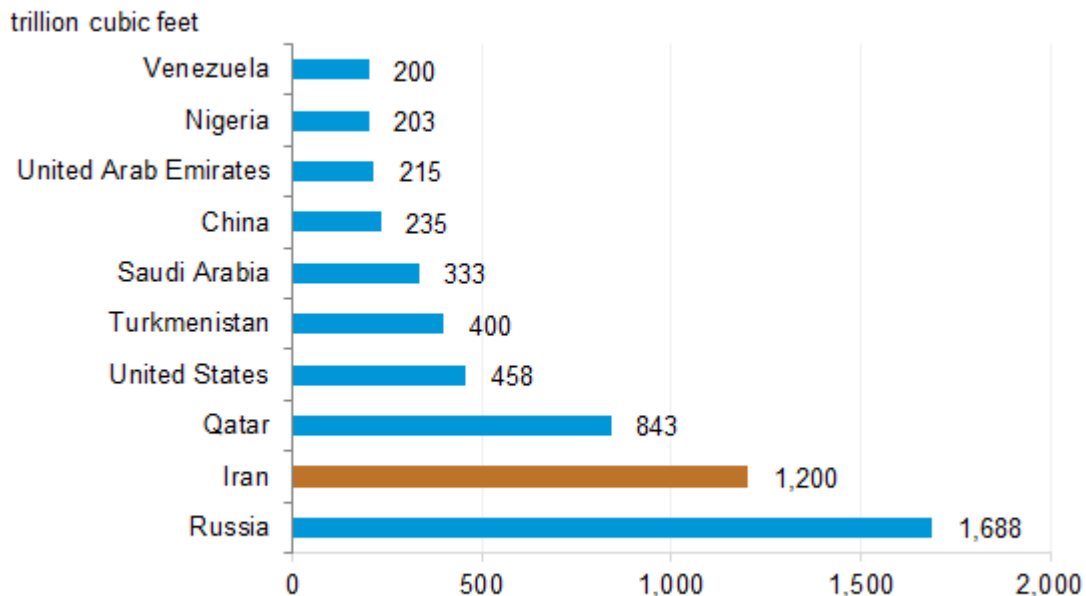
 Source: Graph by U.S. EIA, based on data from ClipperData, LLC

## Natural gas

- Iran's estimated proved natural gas reserves were 1,200 trillion cubic feet (Tcf) as of December 2020, second only to Russia, according to *Oil & Gas Journal* (Figure 6). Iran holds 16% of the world's proved natural gas reserves and almost half of OPEC's reserves.<sup>12</sup>
- Iran was the world's third-largest dry natural gas producer after the United States and Russia in 2019.<sup>13</sup> Dry natural gas production nearly doubled between 2009 and 2019, rising to 8.4 Tcf (Figure 7). 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. Since 2018, domestic companies have been primarily developing the 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.
- In 2017, the National Iranian Oil Company (NIOC) reinjected 1.2 Tcf of natural gas into oil wells for enhanced oil recovery (EOR),<sup>14</sup> 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 2020.
- In addition to the natural gas used for EOR, Iran vented or flared approximately 0.5 Tcf of natural gas in 2019, down from 0.6 Tcf in 2018, as a result of sanctions that indirectly depressed associated natural gas production from oil fields.<sup>15</sup> Plans are underway to capture more flared natural gas for use in power plants, refineries, and petrochemical plants. In early 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.<sup>16</sup> The oil ministry plans to eliminate natural gas flaring by 2023.<sup>17</sup> However, accomplishing this goal will depend on if sanctions are lifted, export markets are opened for natural gas liquids, and sufficient natural gas liquids processing capacity is added.<sup>18</sup>

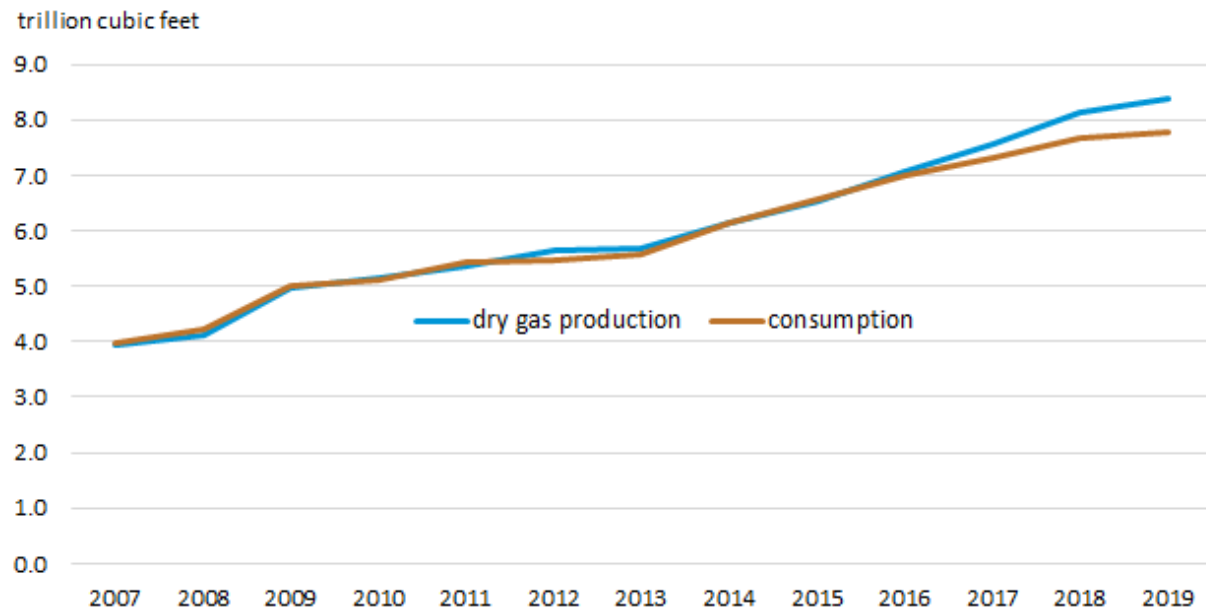
- In 2019, Iran was the world’s fourth-largest consumer of natural gas after the United States, Russia, and China.<sup>19</sup> Most of Iran’s natural gas production is consumed domestically. Iran’s natural gas consumption averaged 7.8 Tcf in 2019, about 2% higher than the 2018 level (Figure 7).<sup>20</sup> Growth in natural gas consumption slowed in 2019 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 2019, the residential and commercial sectors consumed the most natural gas (35%), followed by the industrial (including petrochemicals) sector (27%), and the electric power sector (26%). Natural gas consumption in the residential and commercial sector and the industrial sector has increased significantly in the past decade as natural gas replaced some liquid fuels, Iran’s natural gas pipeline system expanded, and the industrial sector expanded. Although Iran’s natural gas consumption for electric power generation fell in 2019, once sanctions are lifted, we assess that natural gas share in this sector will increase, which would free up more crude oil and petroleum products for exports.<sup>21</sup> The petrochemical industry is slated to grow in Iran during the next several years and will require more natural gas for fuel.


**Figure 6. Largest proved reserve holders of natural gas, 2020**



Source: Graph by U.S. EIA, based on data from *Oil & Gas Journal*, December 2020

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



 Source: U.S. Energy Information Administration

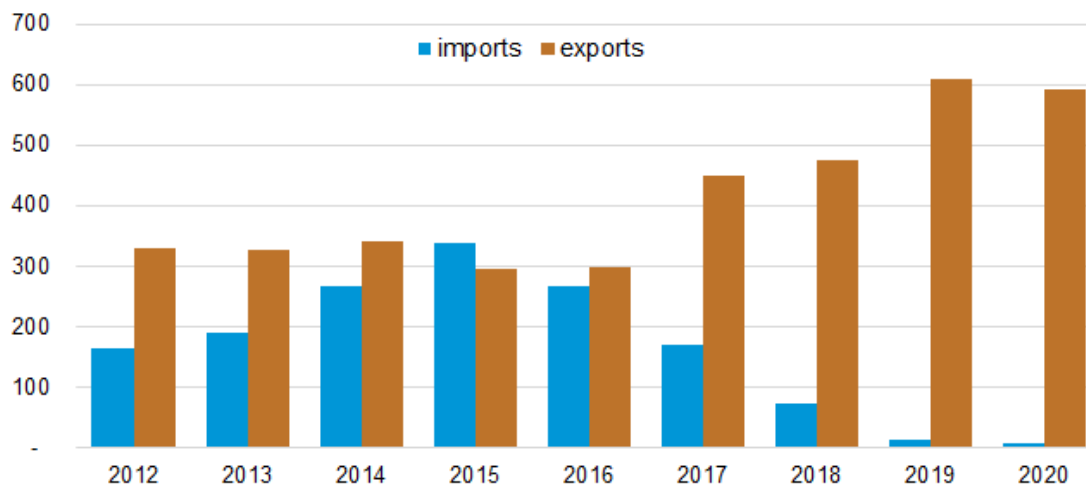
## Natural gas trade

- Iran exports natural gas by pipeline to Turkey, Armenia, Azerbaijan, and Iraq, and it receives imports from Azerbaijan. In 2020, Iran exported about 590 billion cubic feet (Bcf) and imported 7 Bcf of natural gas via pipelines (Figure 8). Iran's natural gas imports decreased substantially after 2015, but exports rose sharply because of Iran's increased natural gas production from several new South Pars projects since 2014 and increased exports to Iraq. Iran stopped importing natural gas from Turkmenistan in 2019 because higher production and more pipeline coverage made it possible for domestic supplies to reach the northeastern region.
- In 2020, Iraq and Turkey accounted for 64% and 33%, respectively, of Iran's natural gas exports. Natural gas exports to Iraq increased substantially since their trade contract was implemented in mid-2017. Iraq has been relying increasingly on electricity and natural gas exports from Iran to fuel its power sector. Iran's exports to Turkey dropped in 2020 because an explosion on the Iran-Turkey natural gas pipeline stopped flows for a few months.<sup>22</sup> Iran's exports to Armenia and Azerbaijan are relatively small volumes and are traded on long-term agreements.



Figure 8. Iran's natural gas pipeline imports and exports, 2012–2020

billion cubic feet

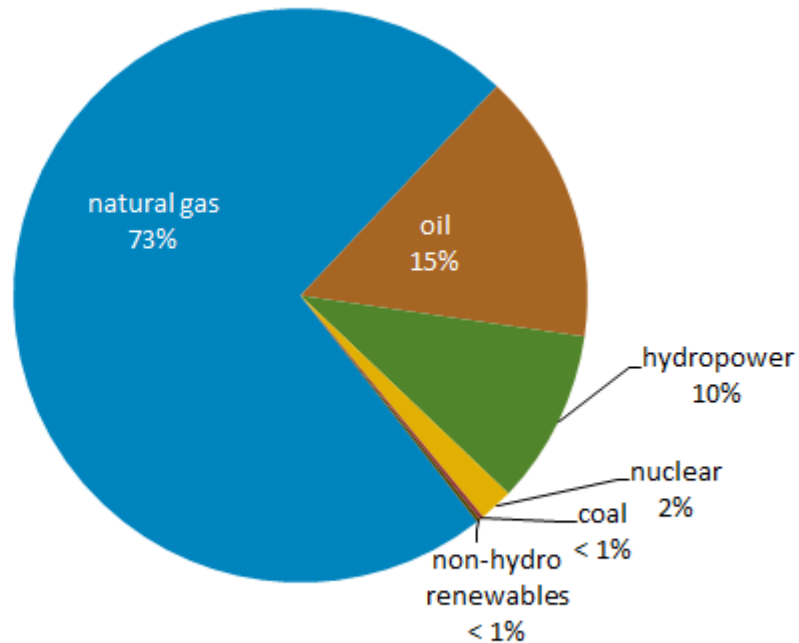


Source: Graph by U.S. EIA, based on data from Facts Global Energy

## Electricity

- In 2019, Iran's electric power generation was 306 terawatthours (TWh) of net electricity, with 88% of generation coming from fossil fuel sources.<sup>23</sup> Natural gas is the largest source of fuel for electricity generation in Iran, accounting for nearly 73% of total generation. Oil fueled 15% of Iran's electric power production in 2019, up from 9% in 2018. Because sanctions limited Iran's oil exports, more oil production was used domestically, therefore, diesel and fuel oil replaced some of the natural gas used in the power sector.
- Coal, hydropower, nuclear, and non-hydro power renewables are the remaining fuel sources used to generate electricity in Iran (Figure 9). Iran's hydroelectric power output doubled from almost 16 TWh in 2018 to 30 TWh in 2019, the highest increase of generation on record, because of heavy, widespread rains and flooding.<sup>24</sup> Hydropower rose to 10% of Iran's total generation, supplanting some oil-fired and natural gas-fired power in 2019.

Figure 9. Iran's net electricity generation by fuel, 2019



Source: U.S. EIA, based on data from the International Energy Agency  
Note: Total may not add to 100% because of independent rounding.

## Notes

- In response to stakeholder feedback, the U.S. Energy Information Administration has revised the format of the *Country Analysis Briefs*. As of December 2018, updated briefs are available in two complementary formats: the Country Analysis Executive Summary provides an overview of recent developments in a country's energy sector and the Background Reference provides historical context. Archived versions will remain available in the original format.
- Data presented in the text are the most recent available as of April 30, 2021.
- Data are EIA estimates unless otherwise noted.

## Endnotes

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- <sup>1</sup> U.S. Energy Information Administration, *Short-Term Energy Outlook*, April 2020 and International Energy Statistics.
- <sup>2</sup> *Oil & Gas Journal*, Worldwide look at reserves and production (December 2020).
- <sup>3</sup> IMF Country Report No. 17/62, page 4 and [Islamic Republic of Iran](#) (March 2018), IMF Country Report No. 18/93, page 31.
- <sup>4</sup> U.S. Energy Information Administration, [OPEC Net Oil Export Revenues](#), January 13, 2021.
- <sup>5</sup> BP Statistical Review of World Energy 2020.
- <sup>6</sup> ClipperData LLC (data pulled May 10, 2021).
- <sup>7</sup> Reuters, [“China’s Iran oil imports seen hitting new high in March, curbing OPEC output options,”](#) March 30, 2021; FACTS Global Energy, Flash Alert, “How Much Iranian Oil Will Enter the Market if the JCPOA Takes Effect by June? A Short-Term Perspective,” May 10, 2021; FACTS Global Energy, *Iran Oil and Gas Monthly*, April 28, 2021, page 7; *Middle East Economic Survey*, “Will A Resurgent Iran Flood Oil Markets In 2021?,” December 18, 2020; *Middle East Economic Survey*, “China Crude Imports: Bumper Volumes From ‘Iran Surrogate’ Suppliers,” March 26, 2021; *Middle East Economic Survey*, “China Q1 Crude Imports: Iran Volumes Hiding in Plain Sight?,” April 23, 2021.
- <sup>8</sup> 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.
- <sup>9</sup> Reuters, [“Syria fuel crisis eases as Iran delivers new oil supplies,”](#) October 23, 2020.
- <sup>10</sup> Facts Global Energy, *Iran’s Oil and Gas Annual Report 2020* (December 2020), page 82.
- <sup>11</sup> Reuters, [“Sanctions choke Iran’s crude sales, but oil product exports booming,”](#) September 2, 2019.
- <sup>12</sup> *Oil & Gas Journal*, Worldwide look at reserves and production, (December 2020).
- <sup>13</sup> BP Statistical Review of World Energy 2020.
- <sup>14</sup> Facts Global Energy, *Iran’s Oil and Gas Annual Report 2020*, (December 2020), page 118.
- <sup>15</sup> World Bank Global Gas Flaring Tracker 2020; *Middle East Economic Survey*, “Global Gas Flaring Gets Worse in 2019”, July 24, 2020, page 3; Financial Tribune, [“Gas Flaring Down 40%,”](#) July 19, 2020.
- <sup>16</sup> Tehran Times, [“Major gas refinery goes operational in southwestern Iran,”](#) January 22, 2021.
- <sup>17</sup> 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.
- <sup>18</sup> Facts Global Energy, *Iran’s Oil and Gas Annual Report 2020*, (December 2020), pages 105-106.
- <sup>19</sup> BP Statistical Review of World Energy 2020.
- <sup>20</sup> U.S. Energy Information Administration, International Energy Statistics.
- <sup>21</sup> Facts Global Energy, *Iran’s Oil and Gas Annual Report 2020*, (December 2020), pages 20-21, 31-34, and 110 and 118.
- <sup>22</sup> Facts Global Energy, *Iran Oil and Gas Monthly*, January 2021, page 14.
- <sup>23</sup> U.S. Energy Information Administration based on International Energy Agency, World Energy Statistics 2020.
- <sup>24</sup> U.S. Energy Information Administration; Caspian News, [“In A Country Often Plagued By Drought, Dams Are Now Overflowing,”](#) June 6, 2019; Caspian News, [“Iran Launches 133 Water & Power Projects,”](#) February 2, 2020.