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U.S. Energy Information
Administration

Country Analysis Brief: Venezuela

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Overview

Venezuela holds the largest oil reserves in the world, in large part because of the heavy oil reserves in the Orinoco Oil Basin. In addition to oil reserves, Venezuela has sizeable natural gas reserves, although the development of natural gas lags significantly behind that of oil. However, in the wake of political and economic instability in the country, crude oil production has dramatically decreased, reaching a multi-decades low in mid-2018.

Venezuela, a founding member of the Organization of the Petroleum Exporting Countries (OPEC), is an important participant in the global oil market. It ranked among the top 15 producers of oil and liquid fuels in 2017, but its output has fallen significantly since global crude oil prices fell from their peak in mid-2014. The production declines have been especially acute since mid-2016, with Venezuela's crude oil output falling by 755,000 barrels per day (b/d) between June 2016 and May 2018.

In 2016, Venezuela consumed 74.6 million tons of oil equivalent, a 5% decline in total energy consumption compared with the previous year.¹ Natural gas and oil accounted for the largest share of the country's total energy consumed (81% of total), with hydroelectric power meeting about 19% of total demand.

Although Venezuela's oil output has been steadily declining since it peaked in the late 1990s, Venezuela has been among the top exporters of crude oil to the United States. However as Venezuela's crude oil production decreased, so did U.S. imports of Venezuelan crude oil. As of the first quarter of 2018, EIA data show that U.S. imports from Venezuela reached their lowest levels since January 1993.

The Venezuelan economy relies heavily on crude oil, and the decrease in oil revenues in recent years has resulted in a severely challenging financial situation. Venezuela's crude oil revenues have fallen significantly, falling to \$22 billion in 2016, according to EIA's estimates of Venezuela's [net oil export revenues](#). In 2011, Venezuela's net oil export revenues were more than \$73 billion (in 2016 dollars). Venezuela's economy contracted by nearly 9% in 2017, based on estimates from Oxford Economics. The economic situation is increasingly precarious, and directly affects the energy sector.

Figure 1. Venezuela



Venezuela's economic and political instability

Venezuela's crude oil production has been in rapid decline — average crude oil output has fallen to a 30-year low (excluding the decline in production during the 2002 – 03 strike). As of May 2018, Venezuela's crude oil production was 1.4 million barrels per day (b/d). According to tanker tracking data, Venezuela exported an average of 1.5 million b/d of crude oil in 2017, 10% lower than the 2016 level. In the first quarter of 2018, exports of Venezuela's crude oil fell to 1.1 million b/d, based on tanker loadings data.

In addition to falling production and exports, refiners in the United States and Asia have reported crude oil quality issues with crude oil imported from Venezuela, resulting in requests for discounts or discontinuation of purchases.

Venezuela's crude oil exports to the United States fell from 840,000 b/d in December 2015 to roughly 480,000 b/d in March 2018. Venezuela was the third-largest supplier of crude oil imports into the United States after Canada and Saudi Arabia, occupying a top-three spot from 2015 to 2017. In March 2018, Venezuela was the fifth largest supplier of crude oil imports into the United States.

The Venezuela's oil industry's chronic problems that led to the steep production declines are unlikely to change any time soon. The industry has been mismanaged since the late 1990s. A somewhat recent anti-corruption campaign has resulted in the firing and jailing of dozens of officials and technical staff at the Petroleos de Venezuela S.A. (PdVSA), the country's state-run oil and natural gas company, since last year. This has caused a near-complete paralysis at the company.²

The Venezuelan government is also facing with high levels of debt and hyperinflation. During the last quarter of 2017, Venezuela was late in making some bond payments, and the main rating agencies declared the country in selective default. During 2018, more than \$9 billion in bond payments will come

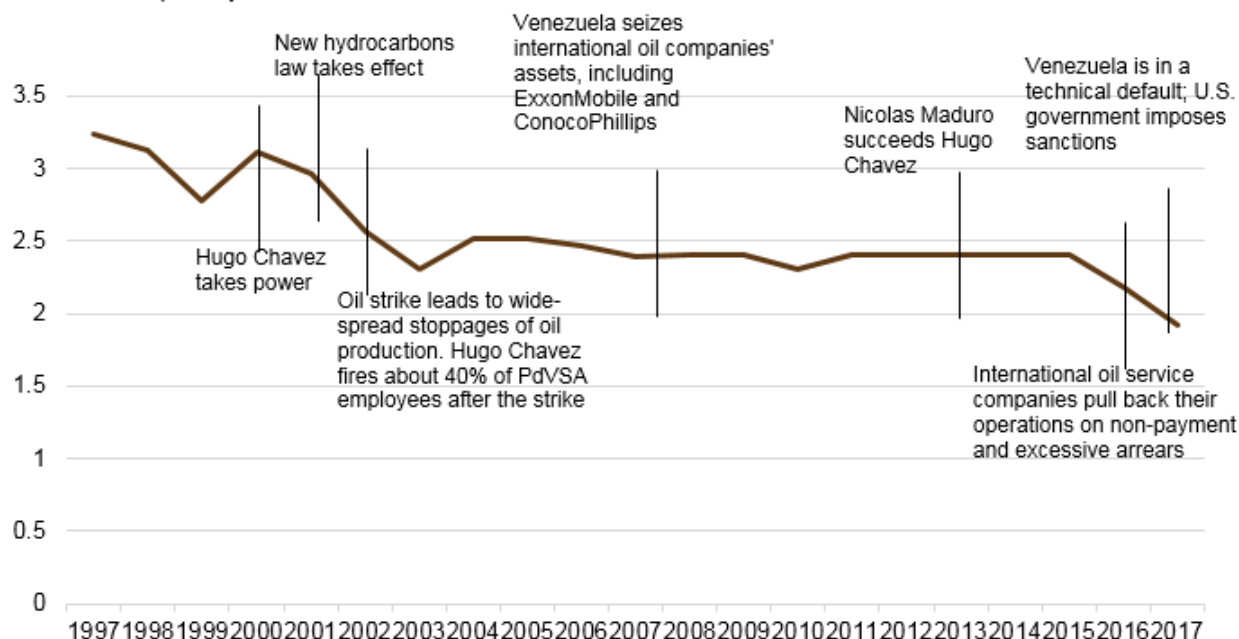
due, raising the possibility of a general default. In addition to the approximately \$64 billion of debt in traded bonds, Venezuela owes \$26 billion to creditors and \$24 billion in commercial loans, according to Torino Capital estimates, although some estimates place Venezuelan debt at \$150 billion.³

Venezuela's economy contracted by nearly 9% in 2017, based on estimates from Oxford Economics. While the Venezuelan government has not published any economic data in more than two years, Venezuela's National Assembly reported in mid-March 2018 that inflation was over 6,000% between February 2017 and February 2018. The International Monetary Fund projects that inflation will soar to 13,000% in 2018 and expects that Venezuela's economy will contract 15%, resulting in a cumulative gross domestic product (GDP) decline of nearly 50% from 2013 to 2018.

The reduced capital expenditures by PdVSA are resulting in foreign partners continuing to reduce activities in the oil sector and crude oil production losses are increasingly widespread. With Venezuela's heavy dependency on the oil industry, it is likely that Venezuela's economy will continue to shrink, and that the runaway inflation will remain the mainstay at least in the short-term.

Figure 2. Venezuela's annual average crude oil production

million barrels per day

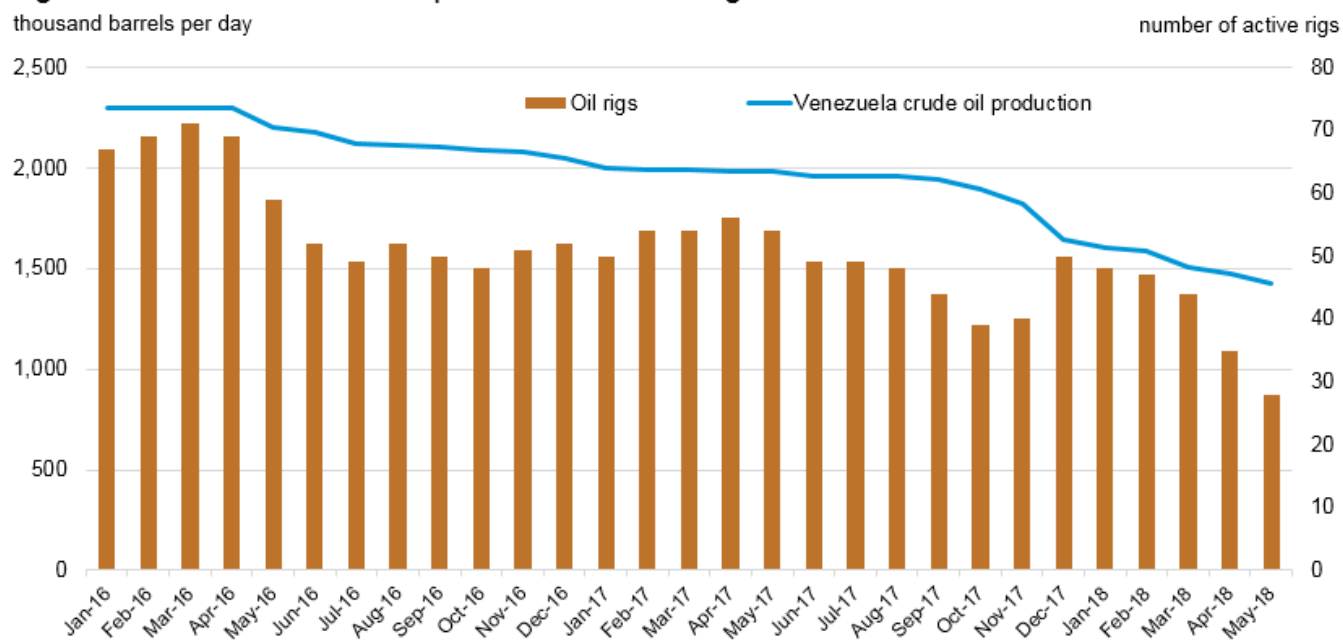


Source: U.S. Energy Information Administration, *Short-Term Energy Outlook* June 2018

The non-payment to oil service companies has resulted in the scaling back of operations, which has profoundly affected Venezuela's crude oil output, especially since mid-2016. Because PdVSA relies on international oil service companies to maintain and operate its oil and natural gas wells, reduced investment and involvement by these companies has led to precipitous declines in production, which has dropped to multi-decade lows. The number of active rigs fell from near 70 in the first quarter of 2016 to 35 rigs in April 2018. Reports indicate that missed payments to oil service companies, a lack of

working upgraders, a lack of knowledgeable and able managers and workers, and declines in oil industry capital expenditures will continue to affect crude oil production negatively.⁴

Figure 3. Venezuela's crude oil production and total rig count



Source: Venezuela's crude oil production: U.S. Energy Information Administration, *Short-Term Energy Outlook June 2018*; Rig count: Baker Hughes

Additionally, Venezuela's revenue from oil exports is severely constricted as only about half of the exports generate cash revenues. U.S. refiners are among the few customers that still remit cash payments. The remaining crude oil exports are sold domestically at a loss or sent as loan repayments to China and Russia (the repayments to Russia are sent to Nayara Energy's (formerly Essar) Vadinar refinery in India to service debt that Venezuela owes to Russian oil company Rosneft, the co-owner of the Vadinar refinery).

Venezuela's midstream, downstream, and export facilities are also experiencing difficulties. In a recent legal setback for PdVSA, ConocoPhillips successfully seized PdVSA Caribbean assets following a \$2 billion award the company received in April 2018 as compensation for the seizure of its assets in Venezuela. PdVSA depends on its Caribbean assets to export extra-heavy crude oil to Asia. This latest action will severely hamper Venezuela's ability to prevent production from declining further.

Venezuela has also been experiencing increasing power blackouts and electricity rationing, additionally exacerbating events.

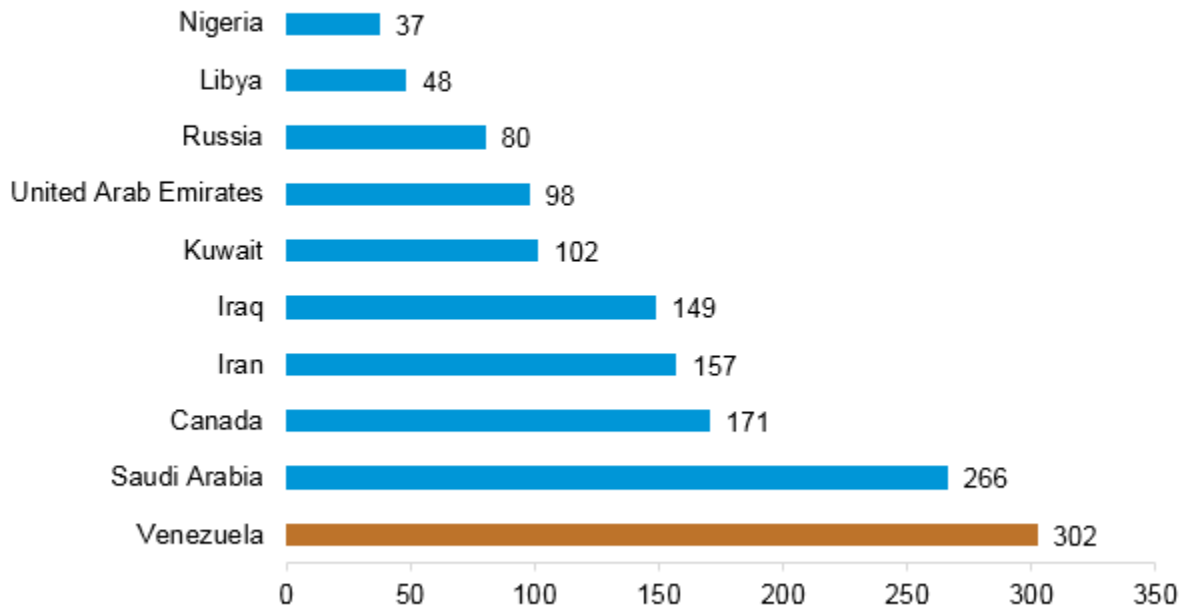
Petroleum and other liquids

Venezuela has the world's largest proved oil reserves, but production of oil and other liquids has been steadily decreasing. Most recent production data indicate that crude oil output has reached a multi-decade low as oil sector mismanagement and economic problems affect the industry.

In January 2018, Venezuela had 302 billion barrels of proved oil reserves, the largest in the world, followed by Saudi Arabia and Canada. Most of Venezuela’s proved oil reserves are heavy crude oil deposits located in its Orinoco Oil Belt (OOB) in central Venezuela, making Venezuela’s crude oil somewhat expensive to produce, but relatively technically simple.

Figure 4. Largest holders of crude oil proved reserves

billion barrels



Source: *Oil & Gas Journal*, December 2017

According to a study released by the U.S. Geological Survey, the mean estimate of recoverable oil resources from the OOB is 513 billion barrels of crude oil.⁵ Spread over 19,000 square miles, the belt is divided into 36 blocks within 4 exploration areas: Boyaca, Junin, Ayachucho, and Carabobo. Venezuela allows foreign firms to invest, but the country requires PdVSA to hold at least 60% equity in joint ventures. Major joint venture partners include Chevron, China National Petroleum Corporation, ENI, Statoil, Total, and Rosneft.

In addition to the Orinoco Oil Belt area, Venezuela also has reserves in and around Lake Maracaibo in the western part of the country.

Figure 5. Venezuela’s Orinoco Belt



Sector Organization

Venezuela nationalized its oil industry in the 1970s, creating Petroleos de Venezuela S.A. (PdVSA), the country's state-run oil and natural gas company. In addition to being Venezuela's largest employer, PdVSA accounts for a significant share of the country's gross domestic product (GDP), government revenue, and export earnings. During the 1990s, Venezuela took steps to liberalize the petroleum sector. However, since the election of Hugo Chavez in 1999, Venezuela has increased public participation in the oil industry. The Chavez government initially raised tax and royalty rates on new and existing projects and mandated majority PdVSA ownership of all oil projects.

In 2002, conflicts between PdVSA's employees and the government led to a strike in protest against the rule of then-President Chavez, largely bringing the company's operations to a halt. In the wake of the strike, PdVSA overhauled the internal organization to solidify government control. The government laid off thousands of PdVSA workers who had participated in the strike, resulting in a massive loss of expertise at the company, which especially affected PdVSA's technical capabilities. As a result, crude oil production in Venezuela never recovered to pre-2002 levels, declining nearly every year since then. In 2006, Chavez implemented the nationalization of oil exploration and production in Venezuela, mandating joint ventures with PdVSA with a renegotiation of a 60% minimum PdVSA share in projects.

A number of these joint ventures (JVs) currently operate in Venezuela, including JVs with U.S. companies, and a number of Chinese and Russian operators. In addition to the oil companies involved in the JVs, international oil service companies such as Halliburton, Schlumberger, Weatherford, and Baker-Hughes have made significant investments in Venezuela. However, as Venezuela's economy has worsened, these oil service companies have not been paid for oil field services rendered to PdVSA, which has accumulated very large arrears over the past few years. PdVSA now owes more than \$1 billion, including some of the companies' write-offs of arrears and accounts receivable.

Exploration and production

At 2.2 million barrels per day (b/d) of petroleum and other liquids produced in 2017, Venezuela was the 12th largest global producer. However, crude oil and other liquids production is continuing to fall amid Venezuela's economic woes, with declines widespread among PdVSA and joint venture projects.

The U.S. Energy Information Administration (EIA) estimates that Venezuela produced 2.2 million b/d of petroleum and other liquids in 2017. Crude oil and condensates represented 2 million b/d of the total, with natural gas liquids and refinery processing gains accounting for the remaining production. This production level marks a significant decrease from production peaks in the late 1990s to early 2000s. The production decreases experienced by the sector following the 2002—03 strike largely resulted because of technical expertise losses and the diversion of revenues to social programs rather than to reinvestment in petroleum production. More recent and more accelerated declines, however, have resulted from the breakdown in the economy, largely non-existent capital expenditures in the sector, and overall mismanagement of the industry. Despite its production declines, Venezuela was still the 12th largest producer of petroleum in the world in 2017.

Venezuela's conventional crude oil is heavy and sour by international standards. As a result, much of Venezuela's oil production must go to specialized domestic and international refineries. The country's most prolific production area is the OOB, which accounted for more than half of Venezuela's oil production in 2017. Production of heavy oil from the OOB had been increasing until 2016 and had accounted for an increasing share of total output. Production areas in the west, once a prolific source of oil, are home to many of Venezuela's mature fields, which have seen declines in production as PdVSA's strategy has focused on developing the heavy oil projects rather than the traditional western Maracaibo-Falcon Basin area. As a result of this pivot towards the OOB, production of medium and light oil has seen a decline in output in the past decade.

Venezuela had become increasingly reliant on its JV partners to produce its crude oil. In 2017, about half of Venezuela's crude oil production originated in JV projects, and the proportion of JV produced oil had been rising since at least 2010. By comparison, JVs accounted for about 30% of total production in Venezuela in 2010. However, since 2017 this share has fallen significantly.

Table 1. Venezuela's oil joint venture projects with foreign partners

Joint venture name	Estimated production in 2017 ('000 b/d)	Participating companies and their shares (%)
Petrolera Bielovenezolana	12.6	PdVSA (60), Belorusneft (40)
Petrozumano	2.4	PdVSA (60), CNPC (40)
Venangocupet	5.7	PdVSA (60), Cupet (20), Sonangol (20)
Petropiar	146.6	PdVSA (70), Chevron (30)
Petromonagas	114.1	PdVSA (60), Rosneft (40)
Petrolera Sinovensa	128.7	PdVSA (60), CNPC (40)
Petrocedeno	101.4	PdVSA (60), Total (30.3), Statoil (9.7)
Petrozamora	102.2	PdVSA (60), Gazprombank (40)
Petroboscan	86.2	PdVSA (60), Chevron (39.2), Inepetrol (0.8)
Petroquiriquire	32.5	PdVSA (60), Repsol (40)
Petroindependencia	38.1	PdVSA (60), Chevron (34), INPEX and Mitsubishi (5), Suelpetrol (1)
Petrosucre	23.9	PdVSA (74), Eni (26)
Petroregional del Lago	22.2	PdVSA (60), Shell (40)
Petrocarabobo	24.7	PdVSA (71), Repsol (11), ONGC Videsh (11), Indian Oil (7)
Petrolera Indovenezolana	17	PdVSA (60), ONGC Videsh (40)
Petromiranda	14.2	PdVSA (60), Rosneft (40)
Petrojunin	14.3	PdVSA (60), Eni (40)
Petroritupano	4.3	PdVSA (60), Pampa (22), Anadarko (18)
Petrowarao	2.1	PdVSA (60), Perenco (40)
Baripetrol	0.5	PdVSA (60), Perenco (17.5) PFC (5), Suizum (17.5)
Petromacareo	0	PdVSA (60), PetroVietnam (40)*
PetroCabimas	17	PdVSA (60), Suelopetrol (40)
Petrodelta	26.6	PdVSA (60), DP Delta Finance BV (40)
Petrolera Kaki	0.4	PdVSA (60), Inemaca (22.67), Inversiones Polar (17.33)
Petrocuragua	0.3	PdVSA (60), OPEN (12), CIP (28)
Petrocumarebo	0	PdVSA (60), PFC (40)
Petrolera Paria	0	PdVSA (60), Sinopec (32), INE Oil (8)
Petrolera Guiria	0	PdVSA (64.25), ENI (19.5), INE Oil (19.5)
PetroUrica	0.3	PdVSA (60), CNPC (40)
PetroVictoria	0	PdVSA (60), Rosneft (40)
Lagopetrol	1.3	PdVSA (69), Integra (26.35), Ehcopek (3.1), CIP (1.55)
Petroboqueron	3.2	PdVSA (60), Rosneft (26.67), PEI (13.33)
Petrolera Sinovenzolana	0.8	PdVSA (75), CNPC (25)
Petrowayu	0.7	PdVSA (60), Pampa (36), Anadarko (4)
Petrouрдaneta	1.7	PdVSA (60), Odebrecht (40)

Petroindependiente	2.1	PdVSA (74.8), Chevron (25.2)
Petroguarico	0.6	PdVSA (70), INPEX (30)
Petronado	0.5	PdVSA (60), Compania de Combustibles (26), Petroamazonas (8.4), Korea National Oil Corporation (5.6)
Petroperija	7.1	PdVSA (60), Rosneft (40)
Petrokarina	0.4	PdVSA (60), Pampa (29.2), Inversora Mata (10.8)
Petroven-Bras	0	PdVSA (60), Pampa (29.2), Coroil (10.8)

Source: U.S. Energy Information Administration, based on information reported by PdVSA's JV partners, IPD Latin America, Energy Intelligence, NewsBase Latin America Oil&Gas Monitor, BN Americas, and Rystad Energy

Trade

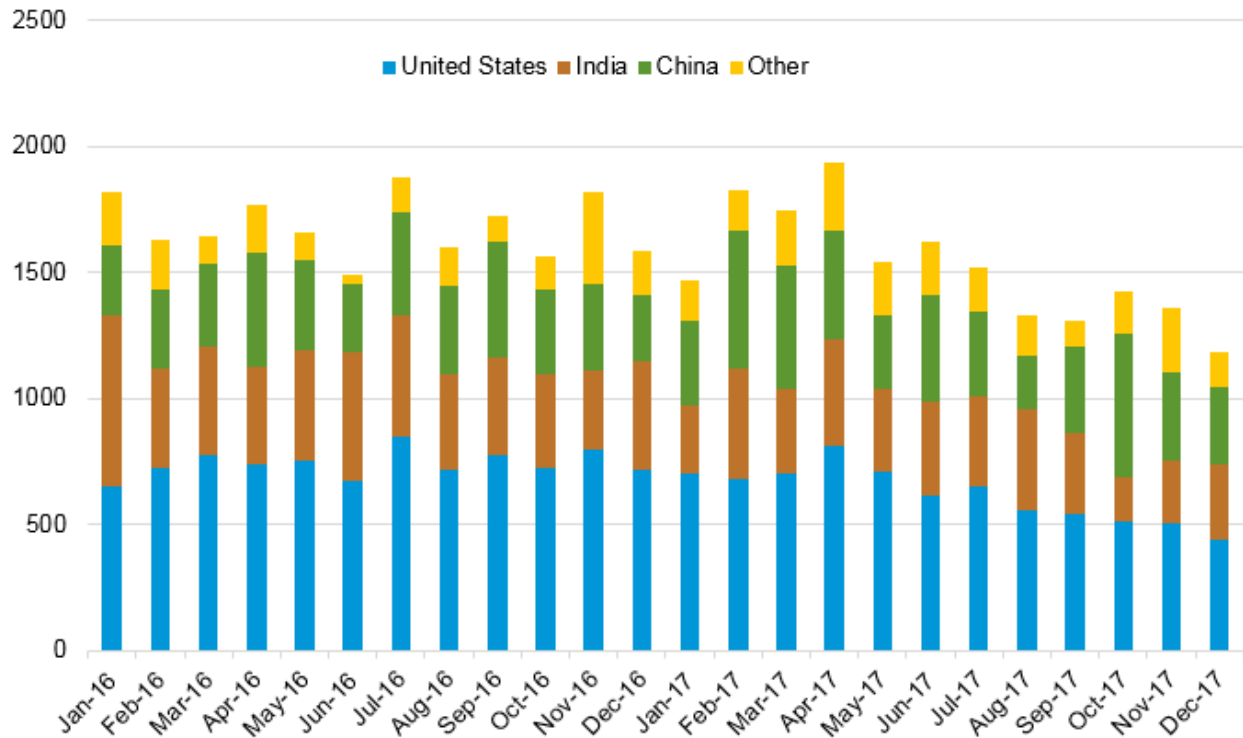
Venezuela was the fourth-largest supplier of imported crude oil and petroleum products to the United States in 2017. However, in the first quarter of 2018, Venezuela's exports to the United States have fallen to the lowest level since the 2002—03 strike.

The United States is the primary destination for Venezuelan crude oil shipments and receives about 41% of Venezuela's total exports. The other significant destinations of Venezuelan crude oil exports are Asia, the Caribbean nations, and, to a lesser extent, Europe. The second- and third-largest destinations and the fastest-growing destinations of Venezuelan crude oil exports have been India and China. EIA estimates that Venezuela sent more than 386,000 b/d of crude oil to China and 332,000 b/d of crude oil to India in 2017.

In the past, Venezuela provided sizable volumes of crude oil and refined products to its regional neighbors under the Petrocaribe initiative established in 2005. A number of countries in the Caribbean and in Central America are members of Petrocaribe, including Antigua and Barbuda, Bahamas, Belize, Cuba, Dominica, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Dominican Republic, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Saint Lucia, and Suriname. Under the Petrocaribe initiative, Venezuela offers favorable financing and long repayment terms that often feature barter arrangements instead of cash transactions. These favorable terms included deferred payments amortized over 25 years at low interest rates (as low as 1%).⁶ In mid-June 2018, PdVSA announced that it is indefinitely suspending fuel exports to Antigua and Barbuda, Belize, Dominica, El Salvador, Haiti, Nicaragua, St. Vincent and the Grenadines, and St. Kitts and Nevis. The eight nations accounted for about 38,000 b/d of Petrocaribe volumes. Exports to Cuba will reportedly continue.⁷

Figure 6. Venezuela's exports of crude oil, January 2016-December 2017

thousand barrels per day



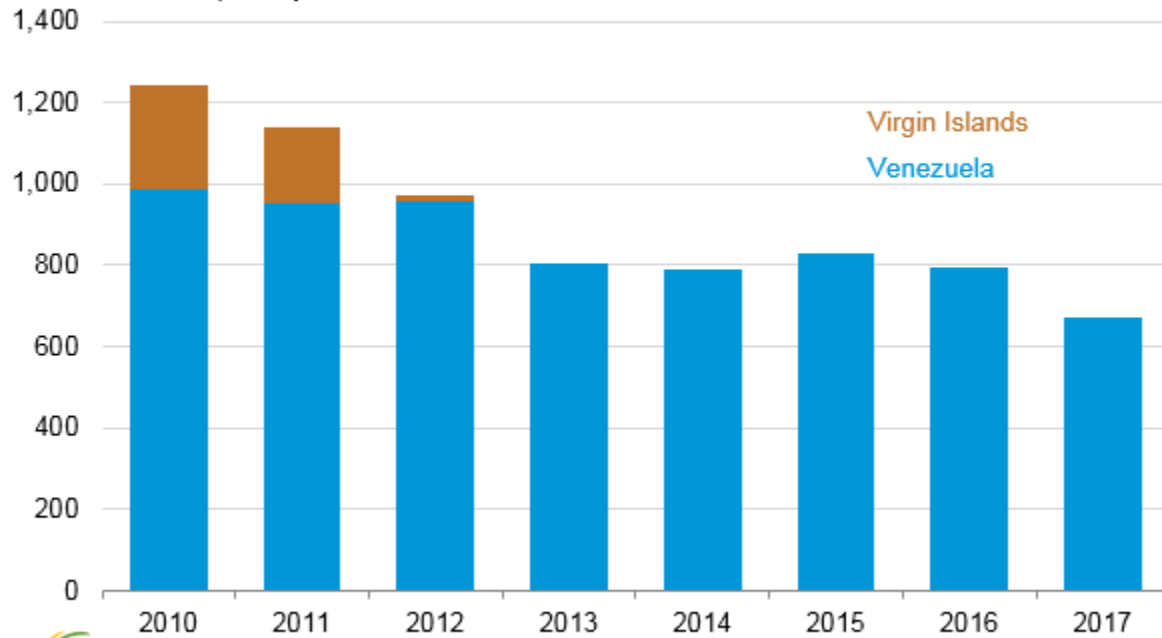
Source: U.S. data: U.S. Energy Information Administration, other data: U.S. Energy Information Administration based on data published by Clipper Data Inc.

EIA estimates that the United States imported an average of 618,000 b/d of Venezuelan crude oil in 2017, falling by nearly 17% compared with the previous year. At its peak, U.S. imports of Venezuelan crude oil averaged 1.1 million b/d in 2007. Venezuela was the third-largest supplier to the United States in 2017, but as of February 2018, Venezuela fell behind Canada, Saudi Arabia, Mexico, Iraq, and Colombia based on average imported volumes of crude oil during the month, when U.S. imports from Venezuela averaged 409,000 b/d.

In addition to crude oil, the United States imported about 55,000 b/d of refined products from Venezuela in 2017, and this volume of imports has remained relatively steady since 2013. U.S. imports of petroleum products in 2017 from Venezuela primarily consisted of motor gasoline blending components (18,000 b/d), kerosene-type jet fuel (15,000 b/d), and residual fuel oil (14,000 b/d). Before 2012, the United States imported Venezuelan petroleum products via the U.S. Virgin Islands. However, since the U.S. Virgin Island's Hovensa refinery was shut down in 2012, the U.S. Virgin Islands no longer exports refined Venezuelan petroleum.

Figure 7. U.S. total oil imports from Venezuela and U.S. Virgin Islands

thousand barrels per day

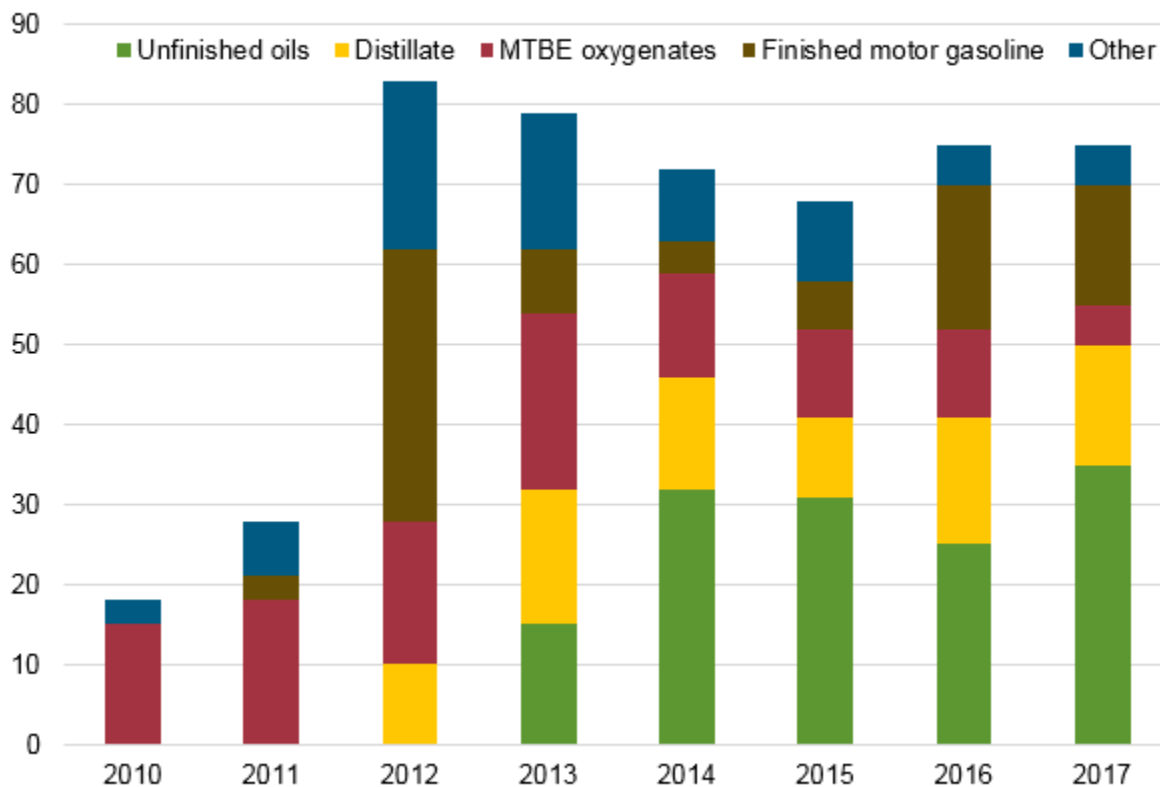


Source: U.S. Energy Information Administration

U.S. exports of petroleum products to Venezuela have increased largely because of lack of funds needed to maintain domestic refineries. U.S. exports of petroleum products. Venezuela peaked in 2012 at 85,000 b/d. In 2017, the United States exported 77,000 b/d of petroleum products to Venezuela, which relies heavily on imports of U.S. petroleum products, particularly unfinished oils and gasoline. More than 45% of its U.S. petroleum exports to Venezuela was unfinished oils, which are blended with heavy crude oils for processing. Before 2012, Venezuela imported primarily methyl tertiary butyl ether (MTBE), intended for blending in gasoline, motor gasoline, and distillate fuel oil, but the country has since begun to import increasing volumes of finished motor gasoline and distillate because its domestic refining system increasingly does not meet domestic demand.

Figure 8. U.S. exports of petroleum products to Venezuela, by type

thousand barrels per day



Source: U.S. Energy Information Administration

Venezuela's crude oil grades and export facilities

Venezuela produces eight different grades of crude oil, but most grades can be classified as the heavy, sour variety. These crude streams include:

- **Merey-16** is a heavy, high-sulfur (sour) (15.9° API, 2.7% sulfur) blended crude oil that requires coking units and complex refineries to be processed, making it an attractive stream for U.S. and some Chinese refiners. Merey-16 is one of Venezuela's largest crude oil streams and is actually a blend of the Mesa-30 grade and extra-heavy crude from the OOB, including from the Sinovensa JV and several other eastern Venezuelan heavy oil fields.⁸
- **Boscan** is a heavy sour crude oil (10.7° API, 5.2% sulfur) that is produced from the Boscan oil field in the western state of Zulia. This grade is loaded from the Bajo Grande terminal. Some Boscan volumes are shipped to China as loan repayments, and the remainder is sold under flexible term contracts.⁹
- **Mesa-30** crude oil stream is produced from PdVSA's El Furrial complex in Monagas state. Crude oil from the field is sold as a distinct stream—Mesa-30—and is blended with extra-heavy OOB crude to form the Merey-16 stream. Mesa-30 is a medium, sweet crude grade (29.1° API, 1.08% sulfur) and it was exported mainly to the United States in 2017.¹⁰

- The **Santa Barbara** stream, which is exported from the Bonaire terminal, is a light, sweet crude oil (39.3° API, 0.48% sulfur) that is mainly sourced from the Santa Barbara field (Monagas state), although a number of other, smaller fields also contribute volumes. Most of the Santa Barbara stream is consumed domestically.¹¹
- **Hamaca Blend** is a medium-heavy, sour synthetic crude oil stream (26.0° API, 1.55% sulfur) sourced from the extra-heavy Hamaca (or Ayacucho) field located in the OOB and then upgraded at the Jose upgrading and terminal complex. The Hamaca project is operated by the PdVSA and Chevron JV, Petropiar, and it upgrades extra-heavy 8.5° API crude into lighter, synthetic 26° API crude. Most of the Hamaca volumes were exported in 2017.
- **Monagas-18** (18.0° API, 3.34% sulfur) blend is also a synthetic crude produced in the OOB and then upgraded at the Petromonagas facility in the Jose Industrial Complex. Venezuela's other synthetic crude streams are Petrozuata (19°-25° API, 2.9% sulfur), which is upgraded at the Petro San Felix upgrader, along with the Zuata Sweet blend (30°-32° API, 0.13% sulfur), produced in the OOB and upgraded at PetroCedeno's facilities.¹²

In 2017, Venezuela exported crude oil from nine loading points—six are located in Venezuela and three others are located in the Caribbean in Curacao, Bonaire, and St. Eustatius. Venezuela's largest terminal by barrels loaded is the Jose Terminal, located offshore of the Jose industrial complex in the northeast of Venezuela. In 2017, about 73% of all crude oil loadings in Venezuela occurred at the Jose Terminal, which consists of two berths that can handle 300,000 deadweight tons at an average of 55,000 barrels per hour.¹³ Other loading terminals in Venezuela include the Puerto de la Cruz, Bajo Grande Terminal, Puerto Miranda, and Amuay Bay Terminal.

Outside of Venezuela, PdVSA exported about 10% of its total loadings from the Bullen Bay Port in Curacao, also home to the Isla refinery. In addition to crude oil, PdVSA exports refined products from the island. The loading terminal in St. Eustatius is operated by NuStar Energy, and PdVSA rents storage tanks for exporting crude oil. In 2017, about 4% of Venezuela's crude oil was exported from this terminal. Bonaire accounted for another 3% of Venezuelan crude oil exports. PdVSA owns this 10 million barrel BOPEC terminal. PdVSA and Citgo lease a refinery and a storage terminal in Aruba, but crude oil is not exported from that island.

The recent seizure of PdVSA's Caribbean export and storage facilities that support PdVSA's exports by ConocoPhillips will hamper Venezuela's ability to maintain the current level of exports because the country relies on these terminals to send crude oil to Asia.

Table 2. PdVSA's crude oil loading terminals and percentages shares of total exports, 2017

Loading point	Percentage of total loadings during 2017
Jose Terminal	73%
Curacao Terminal	10%
Puerto De La Cruz	5%
St. Eustatius Terminal	4%

Bonaire Terminal	3%
Puerto Miranda Terminal	3%
Bajo Grande Terminal	1%
Nabarima FPSO	1%
Amuay Bay Terminal	1%

Source: U.S. Energy Information Administration, based on information published by Clipper Data, Inc tanker tracking database

Refining

In 2017, Venezuela had about 2.7 million b/d of total nameplate refining capacity assets throughout the United States, the Caribbean, Europe, and in Venezuela. However, actual operating capacity is significantly lower—estimated at about 1.8 million b/d—as a result of the disrepair at PdVSA’s refineries in Venezuela, which have operated at rates as low as 20% in 2017 and in early 2018.

Venezuela had 1.3 million b/d of domestic nameplate crude oil refining capacity in 2017, which were all operated by PdVSA.¹⁴ However, actual refining capacity in early 2018 was less than half of its nameplate capacity, estimated at 626,000 b/d. Nearly all of the facilities have fallen into disrepair, and some facilities lack feedstock to run at rates higher than 20%-30%. A number of facilities have suffered damage from fires and operational accidents over the past few years, and PdVSA lacks the funds to repair them or invest sufficient capital to keep the facilities operating. Venezuela’s major facilities include the Paraguana Refining Center (nameplate capacity 955,000 b/d), Puerto de la Cruz (nameplate capacity 195,000 b/d), El Palito (nameplate capacity 140,000 b/d), and San Roque (nameplate capacity 5,800 b/d). PdVSA also owns the 16,000 b/d Bajo Grande refinery, but this facility was shut down in August 2016. Additionally, San Roque operates infrequently as a result of lack of crude oil feedstock.

Table 3. PdVSA’s refinery capacity by region, 2018, barrels per day

	Nameplate Capacity	Operating Capacity	PdVSA's share of nameplate capacity
Venezuela	1,303,800	625,800	1,303,800
United States	749,000	749,000	749,000
Caribbean	640,000	305,000	604,000
Europe	84,000	84,000	38,000
Total	2,776,800	1,763,800	2,694,800

Source: Oil and Gas Journal, PdVSA, IPD Latin America, trade press

PdVSA also operates significant refining capacity outside the country. The largest share of Venezuela's foreign downstream operations is in the United States, followed by significant operations in the Caribbean and stakes in Europe. CITGO, a wholly-owned subsidiary of PDVSA, operates three refineries (Lake Charles, Louisiana; Corpus Christi, Texas; and Lemont, Illinois), with a combined crude oil distillation capacity of about 758,000 b/d. PdVSA used to own a 50% stake in the Louisiana Chalmette refinery, but in 2015 ExxonMobil and PdVSA reached an agreement with PBF Energy for the sale of the refinery. Similarly, the Sweeney, Texas, refinery is no longer part of PdVSA’s refining portfolio since

September 2015, when federal court in New York ruled that ConocoPhillips is the sole owner of the facility in. The court case and ruling was the result of a contractual dispute between PdVSA and ConocoPhillips.

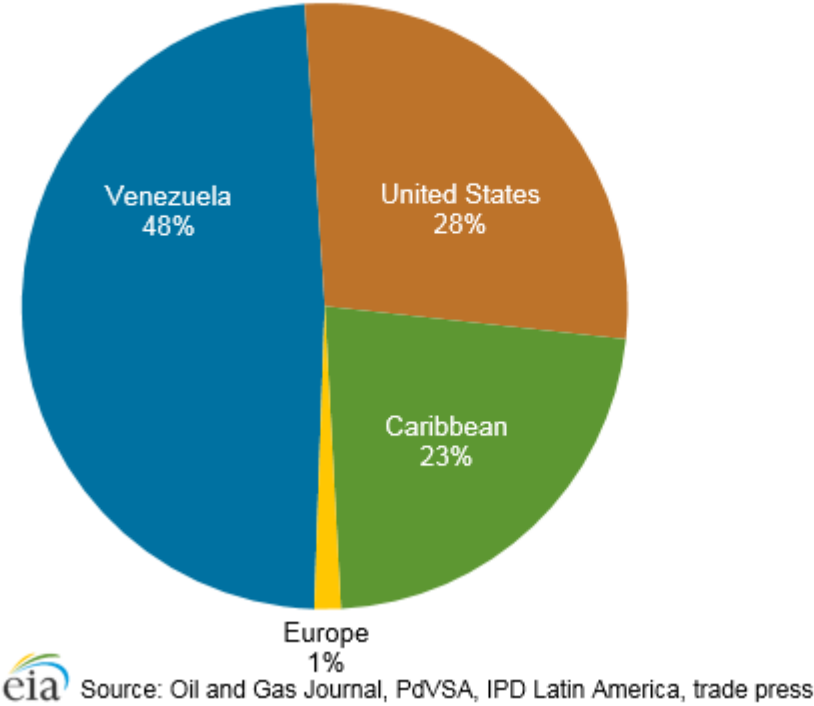
In May 2018, ConocoPhillips also targeted PdVSA's Caribbean assets in an effort to enforce the \$2 billion arbitration award given to the company as compensation for Venezuela's nationalizations of its oil projects. ConocoPhillips reportedly is looking at PdVSA assets on Curacao, Bonaire, and St. Eustatius and has seized storage tanks and operations on the islands. As a result, Venezuela is unable to use the crucial Curacao terminal for crude oil exports to Asia, further deepening the country's problems in producing and exporting crude oil.

PdVSA, through its subsidiary PDV Europe B.V., also owns a 50% stake of Nynas AB and its refineries across Europe. PdVSA also owns a 25% stake in the Eastham, UK refinery, which is a joint venture with Shell.

In the Caribbean, PdVSA owns about 600,000 b/d of nominal refining capacity, including facilities in Curacao, Aruba, Jamaica, and the Dominican Republic, although, operational capacity is much lower. For example, the Isla refinery in Curacao has a nameplate capacity of 335,000 b/d, but its operating capacity in the first quarters of 2018 was lower than 100,000 b/d because one of the refineries' distillation units has been out of service. In early April 2018, the refinery was almost completely shut down as PdVSA has been unable to pay for the light crude oil that is processed at the refinery and lacked funds to repair the steam and power issues at the facility.

PdVSA also used to own a 49% stake in Cuba's Cienfuegos 65,000 b/d refinery but appears to have pulled out of the partnership sometime in 2017. In December 2017, Granma, the Cuban Communist Party's newspaper, reported that since August 2017, the Cienfuegos refinery had been operating as a fully Cuban state entity. PdVSA has not issued any statements regarding this change.

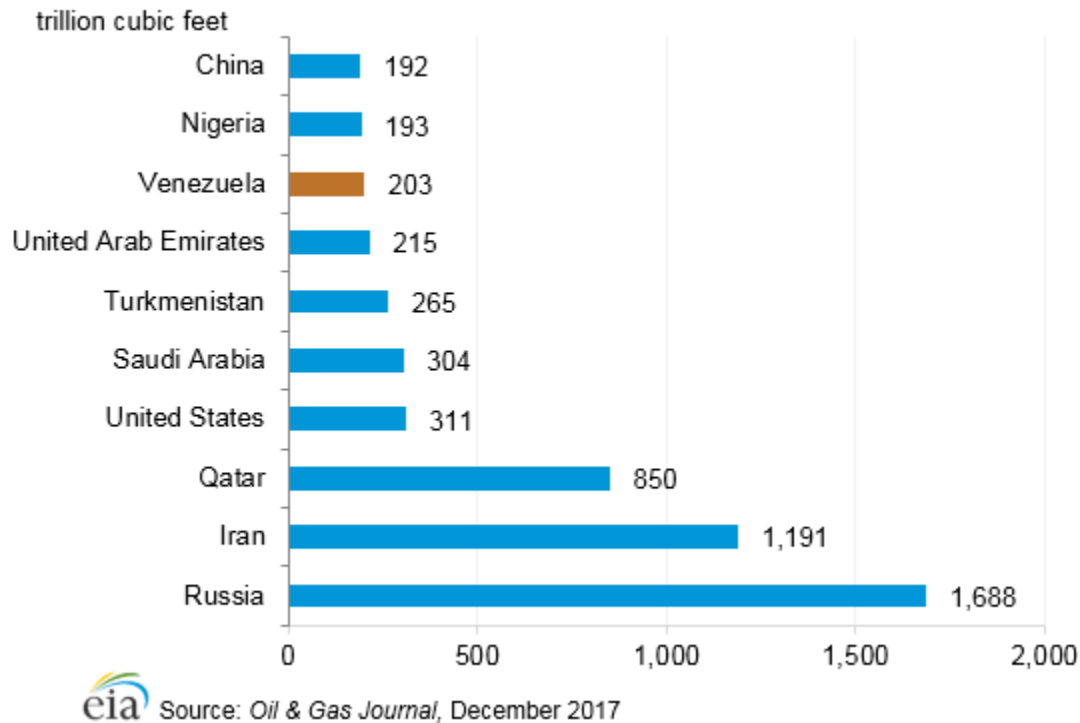
Figure 9. PdVSA's crude oil refining nameplate capacity by region, 2018



Natural gas

Venezuela has the second-largest natural gas reserves in the Americas, behind the United States and is the eighth-largest holder of natural gas reserves in the world. Much of Venezuela's natural gas is used to increase production in its mature oil fields, and its development of natural gas resources has generally lagged behind that of oil.

Figure 10. Largest proved natural gas holders globally, 2018



Venezuela had 203 trillion cubic feet (Tcf) of proved natural gas reserves in 2017. In 2016, Venezuela produced 3.3 billion cubic feet per day (Bcf/d) of natural gas and consumed 3.4 Bcf/d of natural gas.

IPD Latin America estimated that only about 12% of Venezuela’s natural gas was produced by private companies via nonassociated gas licenses. Nearly all of the remaining natural gas output was production associated with crude oil by PdVSA or its JVs.¹⁵ With its traditional focus on crude oil, Venezuela has not sufficiently incentivized natural gas production domestically. As a result, despite the sizable reserves and relatively minor geological risk, natural gas production has lagged behind domestic consumption for more than a decade.

In 2017, more than 38% of Venezuela’s total natural gas production was reinjected, according to data published by Rystad Energy.¹⁶ The country’s petroleum industry is a major consumer of natural gas production, and the reinjected volumes are primarily used for gas reinjection to increase crude oil extraction. Because of the declining output of mature oil fields, natural gas use for enhanced oil recovery has consistently accounted for more than 40% of total production since at least 2004. The share of reinjected gas peaked at 60% in 2009.

Sector organization

In 1999, Venezuela adopted the Gas Hydrocarbons Law, which was intended to diversify the economy through encouraging nonassociated natural gas development and through expanding the role of natural gas in Venezuela's energy sector. This legislation allows private operators to own 100% of nonassociated projects, in contrast to the ownership rules in the oil sector. The legislation also requires lower royalty

and income tax rates on nonassociated natural gas projects than on oil projects. The law gives PdVSA the right to purchase a 35% stake in any project that moves into commercial status.

PdVSA produces the largest amount of natural gas in Venezuela, and it is also the largest natural gas distributor. In addition, a number of private companies currently operate in Venezuela's natural gas sector. In 2001, Venezuela awarded nonassociated gas production licenses to Repsol and Total, with additional licenses awarded through 2010 under a cost-recovery scheme that was deemed more attractive to companies. The government compensated companies under a pricing scheme that would allow the companies to recover both the operating and capital expenditures, as well as build in a profit margin. However, this pricing scheme expired in December 2015 and the government had not replaced it.

Since natural gas is currently sold at a regulated price, and often below cost, natural gas production in the country is not economically viable for PdVSA, which purchases natural gas from producers at *cost of service* and sells it on the domestic market at a government-controlled price.

Given Venezuela's precarious economic, political, and social situation, natural gas production is unlikely to become a priority for the government.

Exploration and Production

About 90% of Venezuela's natural gas is found associated with oil, but the government has been looking to encourage exploration and production of natural gas from nonassociated fields. However, the deteriorating economic and social situation in Venezuela has slowed down the development of natural gas projects even beyond the extremely slow pace seen before.

An estimated 90% of Venezuela's natural gas reserves are associated, meaning they are located in the same place as oil reserves. Venezuela's government has long planned to increase production of nonassociated natural gas, largely through the development of its offshore reserves. These plans have been delayed as a result of lack of capital and foreign investment. To attract foreign investment, Venezuela awarded 18 natural gas exploration and production licenses to private companies, but currently only five of those licensees are operating (including three in which PdVSA Gas serves a minority partner). As of early 2018, these licenses accounted for 860 thousand cubic feet per day (Mcf/d) of natural gas production, according to IPD Latin America.¹⁷

Table 4. Venezuela's natural gas projects with foreign partners

Joint venture/project name	Estimated production in 2017 (Mcf/d)	Participating companies and their shares (%)
Bielovenezolana (Zamaca West)	unknown	Belarusneft (40), PdVSA Gas (60)
Cardon IV (Perla)	490	Eni (50), Repsol (50)
Ypergas (Yucal-Placer)	150	Total (69.5), Repsol (15), Inepetrol (10.2), Otepi (5.3)
Quiriquire Gas	128	Repsol (60), PdVSA Gas (40)
Gas Guarico	80	INPEX (70), PdVSA Gas (30)

Source: U.S. Energy Information Administration, based on information reported by PdVSA and its JV partners, IPD Latin America, NewsBase Latin America Oil&Gas Monitor, BN Americas, and Rystad Energy

Onshore, PdVSA is working to increase production and capacity at existing sites, including in the Anaco field, the Barrancas field, and Yucal Placer. Offshore, PdVSA has awarded exploration blocks to international oil companies including Total, Statoil, and Chevron, in the Plataforma Deltana, Marsical Sucre, and in the Blanquilla-Tortuga areas off Venezuela's northeast coast. Offshore exploration has yielded many successful natural gas finds, including Repsol-YPF's and ENI's discovery of 6 Tcf-8 Tcf of recoverable natural gas in the Perla field, located in the Cardon IV block in the Gulf of Venezuela—one of the largest natural gas discoveries in the history of the country. In July 2015, operations began at the Perla field project, where output has reached nearly 550 Mcf/d in the first quarter of 2018, according to IPD Latin America.¹⁸

Pipelines

Before to the onset of the current economic crisis, Venezuela improved its 2,750-mile domestic natural gas pipeline transport network to allow greater domestic movement and use of natural gas with the nearly 190-mile Interconnection Centro Occidente (ICO) system. The ICO connects the eastern and western parts of the country, making natural gas more readily available for domestic consumers and for reinjection into western oil fields. In addition, the 300-mile SinorGas pipeline project will transport natural gas produced offshore to the domestic pipeline network via the states of Sucre and Anzoategui.

The Antonio Ricaurte pipeline, connecting Venezuela with Colombia came online in 2008. The pipeline allowed Colombia to export natural gas to Venezuela, with contracted volumes ranging between 80 million cubic feet per day (MMcf/d) and 150 MMcf/d. Although Venezuela planned to eventually export 140 MMcf/d of natural gas to Colombia, difficulties surrounding the development of its resources required Venezuela to continue to import natural gas from Colombia.

Electricity

Venezuela depends on hydroelectricity, which accounted for 66% its electricity generation in 2015 for most of its electricity needs. The remaining 34% of generation was generated for by fossil fuels.

In 2016, Venezuela generated more than 115 billion kilowatthours of electricity, a decline of nearly 10% compared with the previous year, according to data published by BP. The fall in electric generation in 2016 was primarily the result of extreme drought conditions during the year and lack of sufficient rainfall. Since 2016, electric generation has continued to decrease, but the most recent declines in generation are the result of technical failures affecting both the hydropower and thermal electric power generation plants. These failures include the government's inability to repair or maintain facilities that are vital to electric power generation. For example, in February 2018, six states in Venezuela reported power blackouts that lasted as long as 15 hours, affecting large population centers (including the capital city Caracas). Since then, the National Electricity Corporation (CORPOELEC) announced that it is implementing power rationing that affects seven states.¹⁹

Between 2000 and 2015, available data show Venezuela's electricity consumption increased by 18%. However, the most recently available data show that between 2013 and 2015, electricity consumption fell by more than 22%, reflecting Venezuela's economic situation.

Hydroelectricity provides most of Venezuela's electricity supply. The country's hydroelectric production facilities are primarily located on the Caroni River in the Guayana region. The 10,200-megawatt Guri hydroelectric power plant on the Caroni is one of the largest hydroelectric dams in the world and provides most of Venezuela's electric power.

About half of the electricity generation from fossil fuels in Venezuela is from natural gas, and the rest is from fuel oil and diesel. The government increased investment in conventional fossil fuel-fired electric generation capacity to reduce the reliance on hydropower and to increase use of domestic hydrocarbon resources before the onset of the current economic crisis. However, all investment in the electricity sector appears to have stopped.

Sector organization

Large, state-owned companies dominate the electricity sector in Venezuela. The government controls the electric sector through the CORPOELEC, a state-owned holding company created in 2007 to consolidate the power sector. CORPOELEC is responsible for the entire electricity supply chain, controlling all major electricity companies in Venezuela including Electrificación del Caroni (EDELCA), which supplies more than 70% of the country's electricity.

Notes

- Data presented in the text are the most recent available as of June 14, 2018.
- Data are EIA estimates unless otherwise noted.

¹ BP Statistical Review of World Energy, 2016

² See, for example, IPD Latin America's "Venezuela's Oil Industry Rocked by Political Power Play."

³ Financial Times, "Venezuela debt: U.S., Russia, and China play for high stakes,"

<https://www.ft.com/content/f51c4880-cddc-11e7-b781-794ce08b24dc>

⁴ Reuters, "Venezuela's deteriorating oil quality riles major refiners," October 18, 2017

⁵ USGS, "An Estimate of Recoverable Heavy Oil Resources of the Orinoco Oil Belt, Venezuela." October 2009.

<http://pubs.usgs.gov/fs/2009/3028/pdf/FS09-3028.pdf>.

⁶ Petrocaribe. "About Petrocaribe." <http://www.petrocaribe.org/>.

⁷ Antigua Daily Observer, "Venezuela suspends oil delivery to Antigua and Barbuda and others," June 12, 2018

⁸ Energy Intelligence, "World Crude Oil Data, Venezuela" (accessed April 2018).

⁹ Ibid

¹⁰ Ibid

¹¹ Ibid

¹² Ibid

¹³ Clipper Data, Inc tanker loadings (accessed April 2018) and Energy Intelligence World Crude Oil Data, Venezuela" (accessed April 2018).

¹⁴ Oil and Gas Journal, "Worldwide Refining Survey," January 2017.

¹⁵ IPD Latin America, "Venezuela's Natural Gas Sector: Getting to Yes," (March 30, 2018)

¹⁶ Rystad Energy, May 2018 data update (accessed May 2018)

¹⁷ IPD Latin America, “Venezuela’s Natural Gas Sector: Getting to Yes,” (March 30, 2018)

¹⁸ Ibid.

¹⁹ IPD Latin America, “Venezuela’s Lurch into Darkness,” (March 23, 2018)