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Proved Reserves of Crude Oil and Natural Gas in the United States, Year-End 2020

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Proved Reserves of Crude Oil and Natural Gas in the United States, Year-End 2020

The price effects of the economic slowdown following the COVID-19 pandemic contributed to reductions in U.S. petroleum and natural gas reserves in 2020. Proved reserves of crude oil and lease condensate decreased by 9 billion barrels in 2020, a decline of 19%, and proved reserves of natural gas decreased by just over 22 trillion cubic feet (Tcf), a decline of 4% (Table 1).

The COVID-19 pandemic had significant effects on the reserves we report in this paper. On March 11, 2020, the World Health Organization characterized the COVID-19 outbreak as a pandemic, and on March 13, 2020, President Trump declared a national emergency in the United States. Many states imposed mandatory lockdowns and issued stay-at-home orders, and in addition to travel restrictions, people also voluntarily chose not to travel to avoid exposure. Consequently, demand fell for transportation fuels, and fuel prices fell. Liquid fuel production also faced a critical shortage of available storage. Operators revised their proved reserves downward in 2020 and postponed developmental drilling.

Oil highlights

- Proved reserves of U.S. crude oil and lease condensate declined 19%, from 47.2 billion barrels to 38.2 billion barrels at the end of 2020. Proved reserves of crude oil decreased 8.4 billion barrels in 2020, and proved reserves of lease condensate (produced from natural gas wells) decreased by 560 million barrels (Table 5).
- U.S. production of crude oil and lease condensate decreased by 7% in 2020 (Table 5).
- Texas, the state with the largest volume of proved reserves of crude oil and lease condensate, had the largest net decrease in proved reserves in 2020 (3.1 billion barrels or 16%) (Table 6).
- North Dakota had the second-largest net decrease (2.2 billion barrels or 38%), and the Federal Offshore Gulf of Mexico experienced the third-largest decline (0.8 billion barrels or 16%).
- The largest net increase in proved reserves of crude oil and lease condensate in 2020 was in Utah (91 million barrels or 30%) (Table 6).
- The annual average spot price for West Texas Intermediate (WTI) crude oil at Cushing, Oklahoma, decreased by 28% from \$55.17 per barrel in 2019 to \$39.66 per barrel in 2020 (Figure 6).

Natural gas highlights

- Proved reserves of natural gas decreased 4%, from 495.4 Tcf at year-end 2019 to 473.3 Tcf at year-end 2020 (Table 10).
- This decrease was the second consecutive annual decrease in proved reserves of natural gas in the United States.
- Producers in Alaska added a substantial new volume of proved natural gas reserves in 2020. The annual total of proved natural gas reserves in Alaska increased in 2020 by 27 Tcf, quadrupling the state's total from 9 Tcf to 36 Tcf.
- Producers in Texas reported the largest decrease in proved reserves of natural gas in 2020 (11 Tcf or 9%). Pennsylvania saw the second-largest decrease of natural gas proved reserves (9.6 Tcf or 9%).

- The annual average spot price for natural gas at the Louisiana Henry Hub decreased by 24% from \$2.63 per million British thermal units (MMBtu) in 2019 to \$1.99 per MMBtu in 2020 (Figure 7).

Proved reserves are estimated volumes of hydrocarbon resources that analysis of geologic and engineering data demonstrates with reasonable certainty¹ are recoverable under existing economic and operating conditions.

Reserves estimates change from year to year because of:

- New discoveries
- Thorough appraisals of existing fields
- Production of existing reserves
- Changes in prices, costs, ownership, or planned infrastructure
- New and improved techniques and technologies

To prepare this report, we collected independently developed estimates of proved reserves from a sample of operators of U.S. oil and natural gas fields with Form EIA-23L. We use this sample to further estimate the portion of proved reserves from operators who do not report. We received responses from 371 of 404 sampled operators, which provided coverage of about 90% of proved reserves of oil and natural gas at the national level. We developed estimates for the United States, each state individually, and some state subdivisions. States and regions with subdivisions include:

- California
- Louisiana
- New Mexico
- Texas
- Federal Offshore Gulf of Mexico

¹ *Reasonable certainty* assumes a probability of recovery of 90% or greater.

National summary

Table 1. U.S. proved reserves and reserves changes, 2019–20

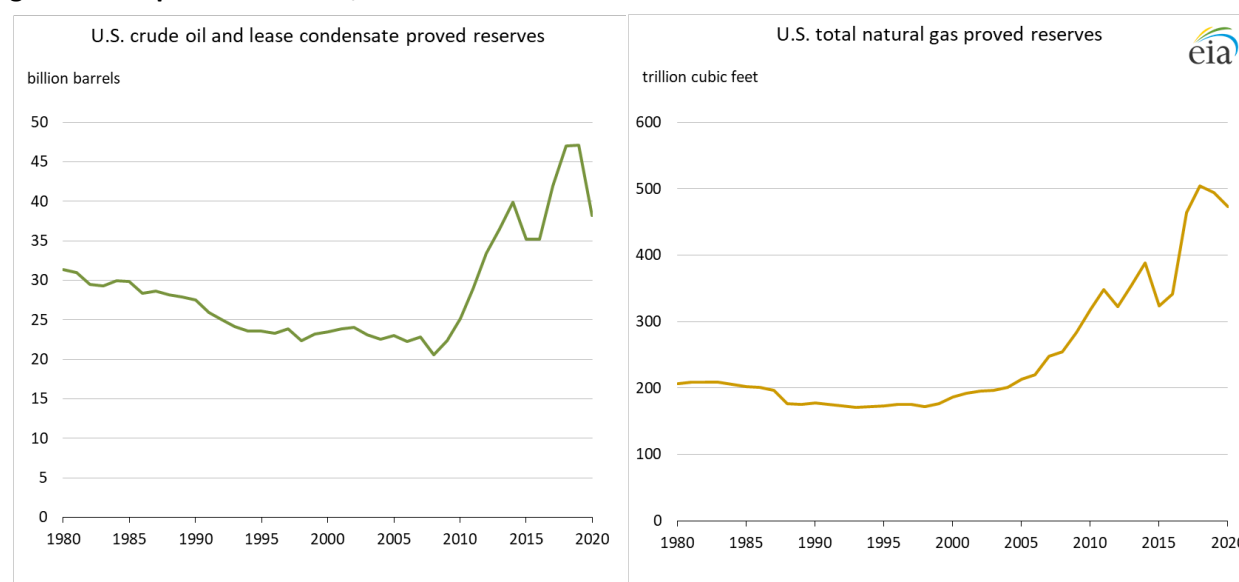
	Crude oil billion barrels	Crude oil and lease condensate billion barrels	Total natural gas trillion cubic feet
U.S. proved reserves as of December 31, 2019	44.2	47.2	495.4
Extensions and discoveries	3.0	3.2	39.8
Net revisions	-8.8	-9.6	-98.2
Net adjustments, sales, and acquisitions	1.2	1.6	73.4
Estimated production	-3.8	-4.2	-37.1
Net additions to U.S. proved reserves	-8.4	-9.0	-22.1
U.S. proved reserves as of December 31, 2020	35.8	38.2	473.3
Percentage change in U.S. proved reserves	-19.0%	-19.0%	-4.5%

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*

Notes: *Total natural gas* includes natural gas plant liquids. Columns may not add to total because of independent rounding.

Between 1980 and 1996, U.S. reserves of natural gas and crude oil experienced a steady decline (Figure 1). In 1997, the downward trend for natural gas reserves reversed as operators introduced innovations in [directional drilling](#) and [hydraulic fracturing](#) techniques that successfully increased proved reserves and production of natural gas from shale formations. In 2008, the downward trend for crude oil reversed when operators applied innovations in directional drilling and hydraulic fracturing to tight oil-bearing formations, such as the Bakken shale of the Williston Basin. The upward reserves and production trends continued until 2015, when the industry experienced a significant drop in prices of both oil and natural gas, and proved reserves were revised downward because the lower prices did not support operators' projections of resource development. From 2016 to 2018, U.S. oil and natural gas prices and reserves both trended upward by at least 9% each year. In 2019, that trend of rising reserves was interrupted, and in 2020, proved reserves declined for both fuels, similar to the drop observed five years before in 2015.

Figure 1. U.S. proved reserves, 1980–2020

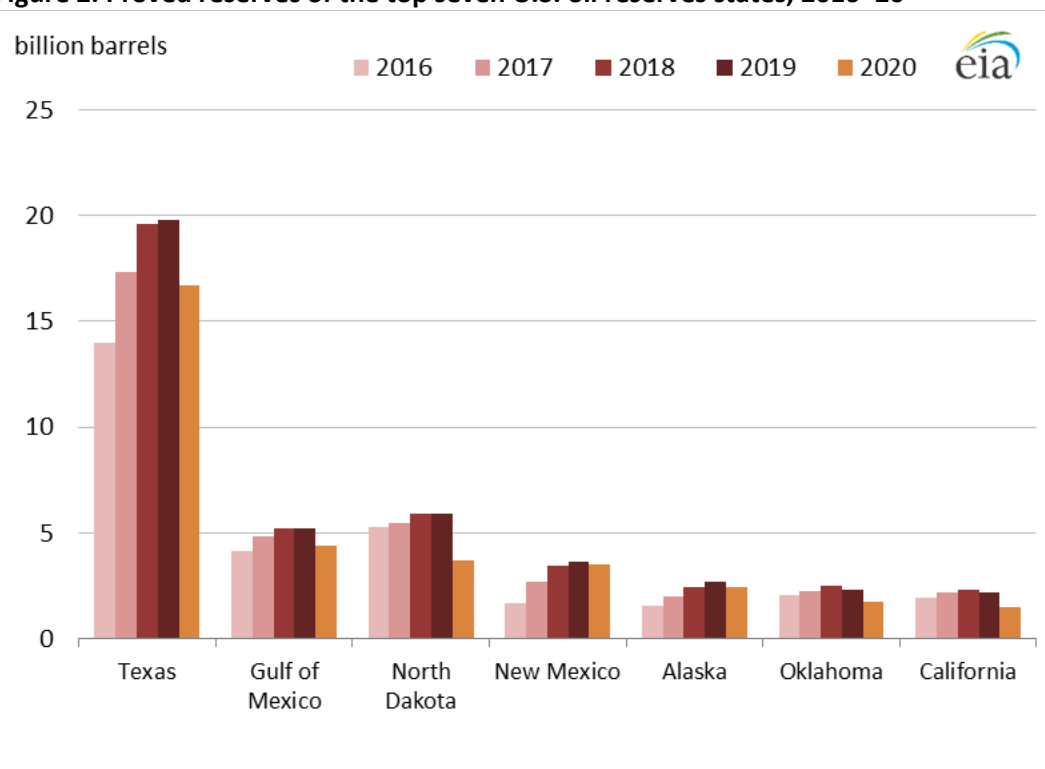


Sources: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 1980–2020

Proved U.S. reserves of crude oil and lease condensate combined decreased in each of the seven states with the most oil reserves in 2020 (Figure 2). In 2020, operators in Texas reported the largest net decrease in its proved reserves of crude oil and lease condensate—a decrease of 3,108 million barrels.

Operators in North Dakota decreased their proved crude oil and lease condensate reserves by the next largest amount in 2020—a net decrease of 2,227 million barrels. The third-largest net decrease in proved reserves of crude oil and lease condensate in 2020 occurred in the Federal Offshore Gulf of Mexico, a net decrease of 818 million barrels.

Figure 2. Proved reserves of the top seven U.S. oil reserves states, 2016–20



Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves, 2016–20*

Notes: Oil reserves include crude oil and lease condensate. Gulf of Mexico represents the federally owned offshore portion of the Gulf of Mexico. Although not a state, it is an important U.S. oil and natural gas production area.

Proved natural gas reserves decreased in five of the eight states with the most reserves in 2020 (Figure 3), but one state actually added a substantial new volume of proved reserves. In Alaska, a large-scale liquefied natural gas development project received federal approval in May 2020.² This project included a new pipeline to bring natural gas from the north slope of Alaska to liquefaction and export facilities on the southern coast. With the pipeline, a large volume of previously stranded natural gas resources began to meet the definition of proved reserves. Proved natural gas reserves increased in Alaska in 2020 by 27 trillion cubic feet (Tcf), quadrupling the state's total from 9 Tcf to 36 Tcf.

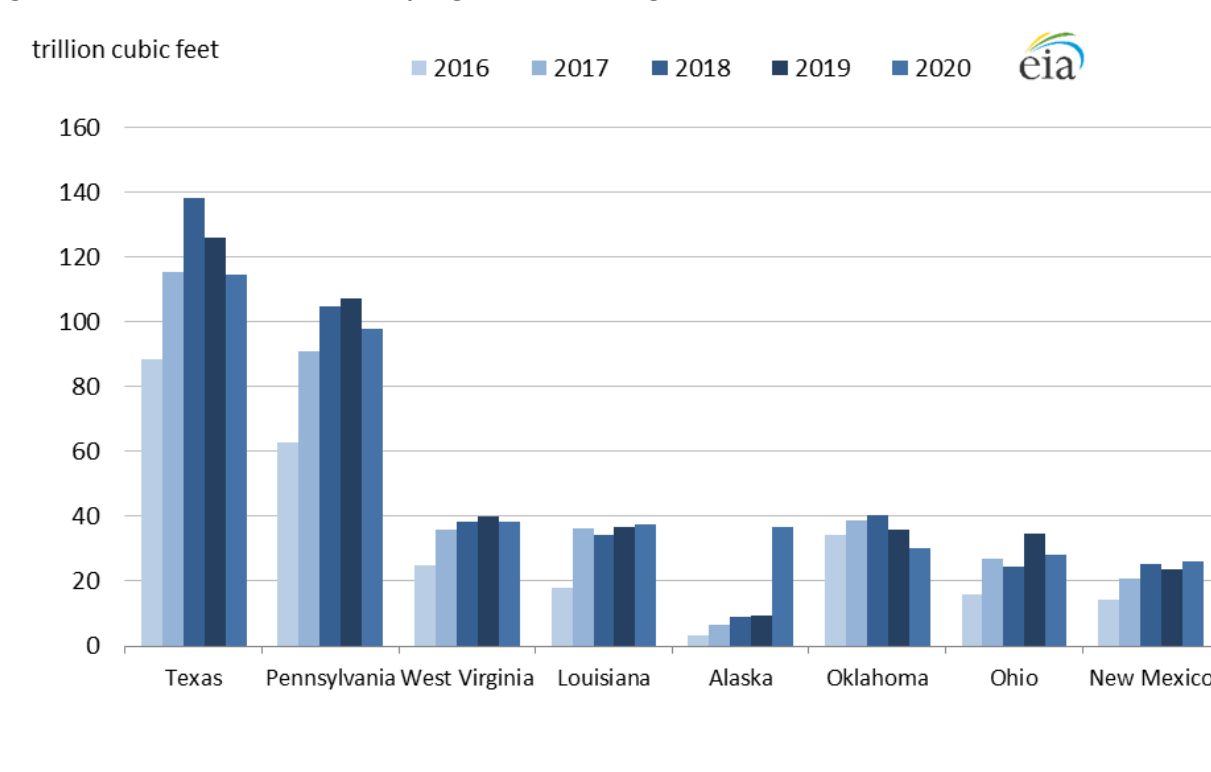
Operators in Texas reported the largest net decrease in proved natural gas reserves of any state, down 11.4 Tcf. Operators in Pennsylvania reported the second-largest net decrease in proved natural gas reserves in 2020,

² ORDER GRANTING AUTHORIZATION UNDER SECTION 3 OF THE NATURAL GAS ACT, <http://alaska-lng.com/wp-content/uploads/2020/05/20200521-3111-34088269-FERC-Order.pdf>

down by 9.6 Tcf. These decreases resulted from net downward revisions to proved reserves of natural gas due to low prices. The average U.S. natural gas price³ declined 24% in 2020, curtailing development plans and reducing the economically recoverable volume of existing proved reserves.

Operators in New Mexico added the second-most proved reserves of natural gas in 2020, an increase of 1.8 Tcf, largely from development in the Bone Spring/Wolfcamp shale play in the Delaware Basin in the eastern subdivision of the state. Operators in Louisiana increased their proved natural gas reserves by the third-largest amount—a net addition of 0.8 Tcf, where extensions in the Haynesville shale play exceeded net downward revisions of proved natural gas reserves.

Figure 3. Proved reserves of the top eight U.S. natural gas reserves states, 2016–20



Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2016–20

Note: Total natural gas includes natural gas plant liquids that have yet to be extracted downstream and does not include lease condensate.

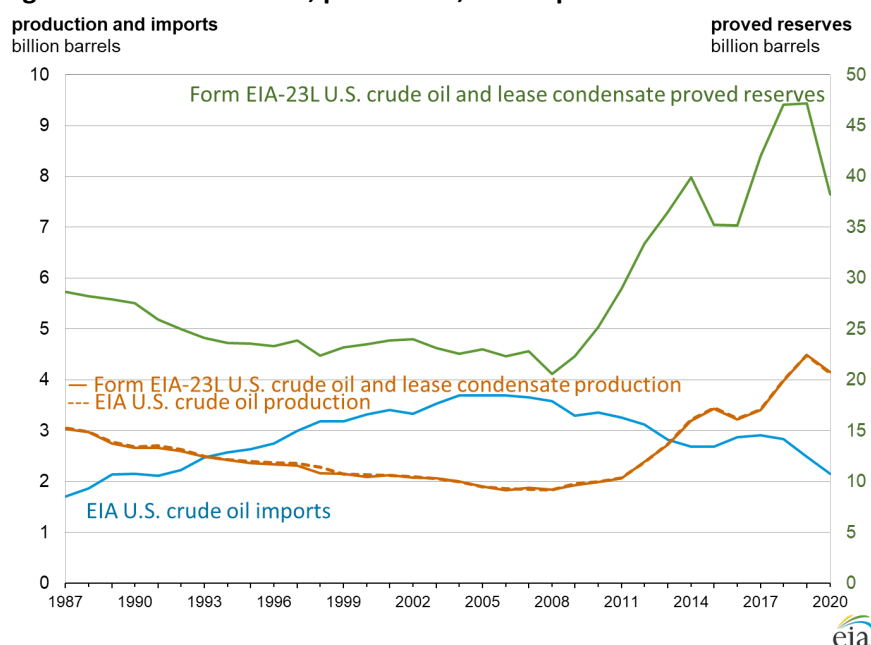
Official oil and natural gas production data

We publish official production volumes in the [Petroleum Supply Annual 2020](#), DOE/EIA-0340(20) and the [Natural Gas Annual 2020](#), DOE/EIA-0131(20). We base these volumes on the Form EIA-914, *Monthly Crude Oil and Lease Condensate, and Natural Gas Production* report data. The production numbers in the tables and figures of this report represent data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. We use these numbers because they are consistent with our calculations of U.S. reserves. The data may differ from our official production numbers; this report includes them as an indicator of production trends. So, they should not be cited as our official production statistics.

³ The 12-month, 1st-of-the-month, average spot price of natural gas at the Louisiana Henry Hub.

In 2020, annual production of crude oil and lease condensate decreased in the United States by 7% (336 million barrels). Crude oil imports decreased 13% (332 million barrels) from 2019 (Figure 4).

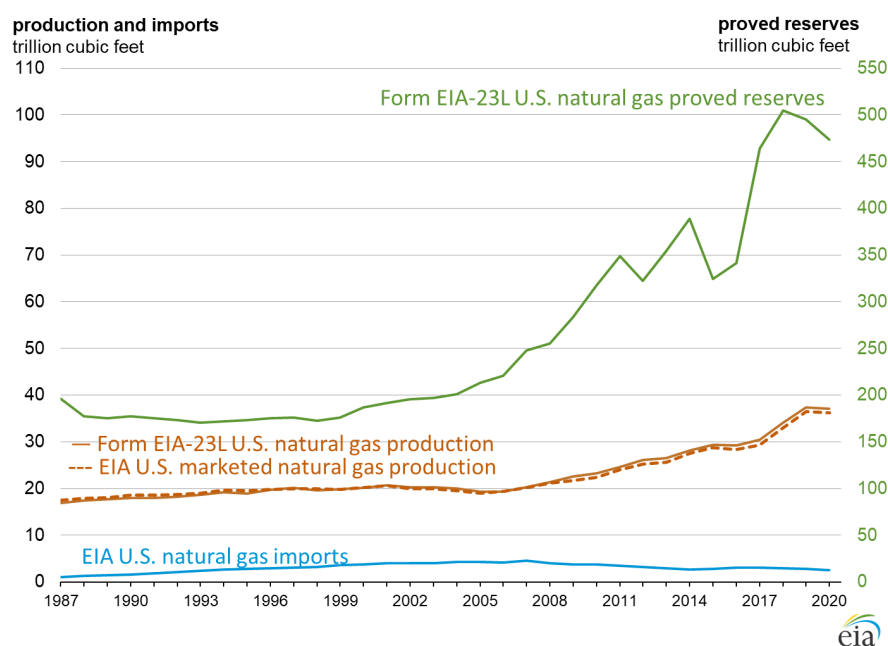
Figure 4. Proved reserves, production, and imports of U.S. crude oil and lease condensate, 1987–2020



Sources: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*; Form EIA-814, *Monthly Imports Report*; *Petroleum Supply Annual 2020*, DOE/EIA-0340(20)

U.S. natural gas production decreased by 1% (350 billion cubic feet [Bcf]) in 2020, and natural gas imports decreased by 7% (191 Bcf) from the 2019 level (Figure 5).

Figure 5. Proved reserves, production, and imports of U.S. natural gas, 1987–2020



Sources: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*; U.S. Department of Energy, Office of Fossil Energy, *Natural Gas Imports and Exports*; *Natural Gas Annual 2020*, DOE/EIA-0131(20)

Background

This report provides estimates of U.S. proved reserves of crude oil and lease condensate and proved reserves of natural gas as of the end of 2020. We measure changes for 2020 as the difference between year-end 2019 and year-end 2020 estimates. We process data filed on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, submitted by 371 of the 404 sampled operators of U.S. oil and natural gas fields. We then estimated the portion of proved reserves that is not reported for the United States, each state, and some federal offshore and state subdivisions. *State subdivisions* (for example, California Coastal Region Onshore, Louisiana North, Texas Railroad Commission District 1) are defined geographic areas within a large producing state or offshore area. State subdivision boundaries typically align with the boundaries of internal state conservation commission districts that collect production data. Within this report, we provide proved reserves for state subdivisions of California, Louisiana, New Mexico, Texas, and the Federal Offshore Gulf of Mexico.

Proved reserves are estimated volumes of hydrocarbon resources that analysis of geologic and engineering data demonstrates with reasonable certainty are recoverable under existing economic and operating conditions. Reserves estimates change from year to year because of:

- New discoveries
- Thorough appraisals of existing fields
- Production of existing reserves
- Changes in prices, costs, ownership, or planned infrastructure
- New and improved techniques and technologies

Discoveries include new fields, new reservoirs in previously discovered fields, and additional reserves that resulted from drilling and exploration in previously discovered reservoirs (extensions). Extensions typically make up the largest share of total discoveries. Beginning with the 2016 report, operators reported to us on Form EIA-23L their discoveries as a single, combined category—*extensions and discoveries*. Totals for that category are presented in one column on the data tables in this report.

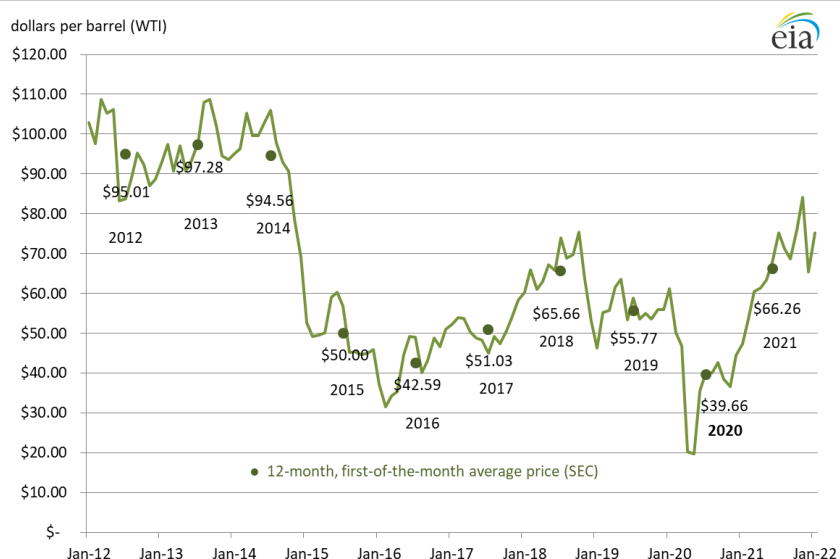
Revisions primarily occur when operators change their estimates of what they will be able to produce from the properties they operate in response to changing prices, costs, or improvements in technology. Higher fuel prices typically increase estimates (positive revisions) as operators consider a broader portion of the resource base economically producible with reasonable certainty, or proved. Lower prices, on the other hand, generally reduce estimates (negative revisions) as operators estimate that less of their resource base is economically producible.

The U.S. Securities and Exchange Commission (SEC) revised its procedure for determining the prices underpinning its proved reserves estimates in 2008 to make reserves estimates less sensitive to price fluctuations. The 2008 SEC rules require companies to use an average of the 12 first-day-of-the-month prices. We require companies to follow the same procedure. SEC and EIA estimates are not exactly the same, however; SEC requires companies to report their owned reserves, and EIA requires companies to report their operated reserves.

Spot market prices are not necessarily the prices used by operators in their reserve estimates because actual prices received by operators depend on their particular contractual arrangements, location, and hydrocarbon quality, among other factors. However, spot prices do provide a benchmark or trend indicator.

The 12-month, first-day-of-the-month average spot price for West Texas Intermediate (WTI) crude oil (the U.S. benchmark location for crude oil) in 2020 was \$39.66 per barrel—a price drop of 28% from 2019 (Figure 6).

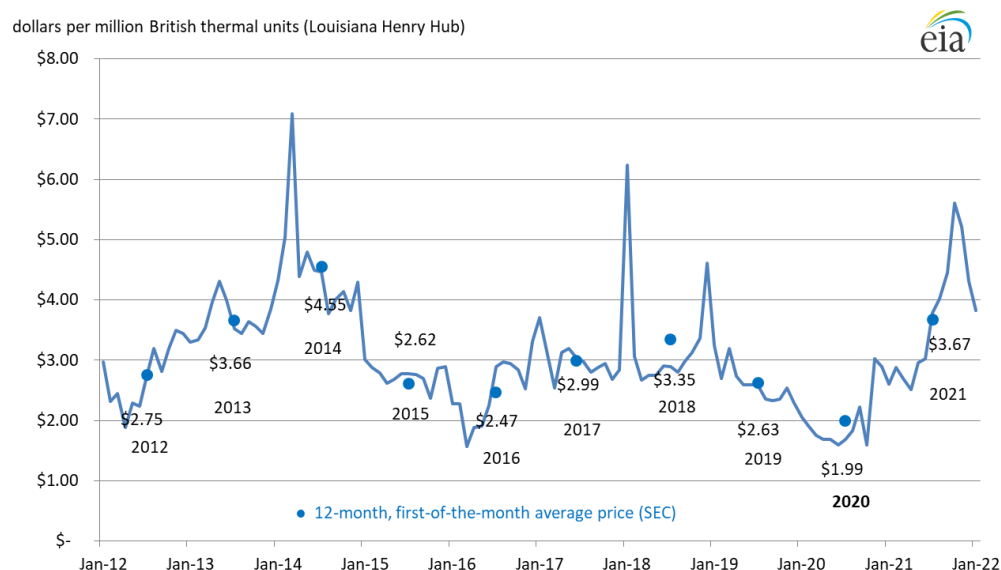
Figure 6. WTI crude oil spot prices, first day of the month, 2012–21



Source: Graph by U.S. Energy Information Administration, based on Refinitiv data
 Note: WTI= West Texas Intermediate. SEC=U.S. Securities and Exchange Commission.

The 12-month, first-day-of-the-month average natural gas spot price at Louisiana’s Henry Hub (the U.S. benchmark location for natural gas) for 2020 was \$1.99 per million British thermal units (MMBtu)—a 24% decrease from the previous year’s average spot price of \$2.63/MMBtu (Figure 7).

Figure 7. Henry Hub natural gas spot prices, first day of the month, 2012–21



Source: Graph by U.S. Energy Information Administration, based on Refinitiv data
 Note: SEC=U.S. Securities and Exchange Commission.

Proved reserves outlook for EIA's next report (2021).

From December 2020 through February 2021, three separate COVID-19 vaccines (Pfizer-BioNTech, Moderna, and Janssen) received Emergency Use Authorization (EUA) from the U.S. Food and Drug Administration (FDA). Approval and distribution of effective vaccines contributed to the end of mandatory lockdowns in the United States and increased demand for transportation fuels.

During 2021, the 12-month, first-of-the-month average [crude oil spot price for WTI at Cushing, Oklahoma](#), and the [natural gas spot price at the Henry Hub](#) in Louisiana both increased from the 2020 level. The oil price rose 67% (from \$39.66 per barrel to \$66.26 per barrel), and the natural gas price rose 84% (from \$1.99/MMBtu to \$3.67/MMBtu). On December 31, 2021, the WTI daily spot price was \$75.99 per barrel, and the natural gas daily spot price at the Henry Hub was \$3.82/MMBtu.

In January 2021, only 374 [rotary rigs](#) were operating in the United States.⁴ As of December 31, 2021, in response to rising prices, the number of rigs operating in the United States rose to 586 rigs.⁵ As a result, we expect operators to report increased additions of proved reserves from extensions and discoveries in 2021.

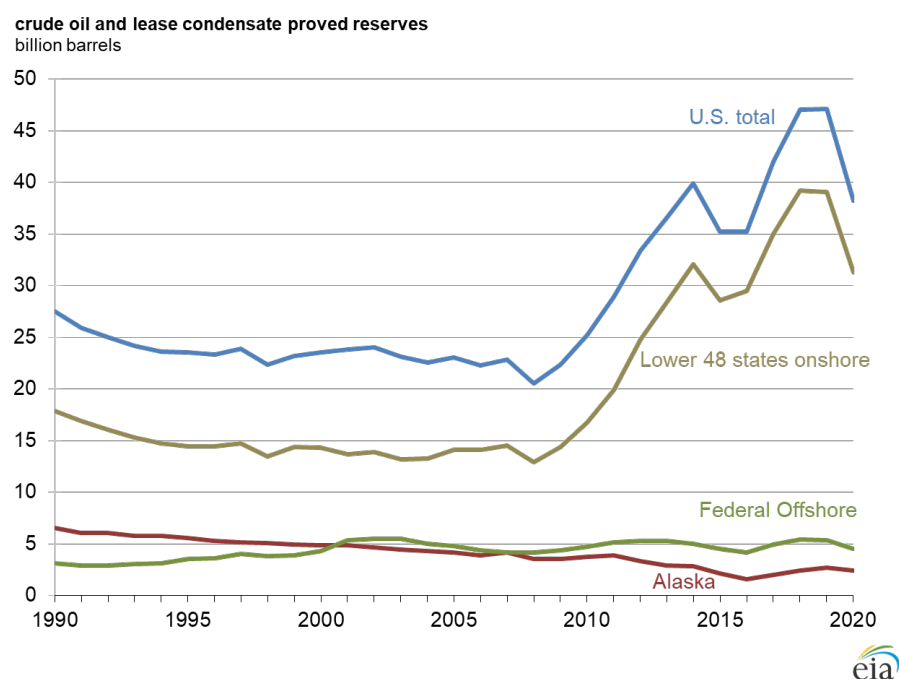
According to our [Short-Term Energy Outlook \(STEO\)](#) forecast, U.S. production in 2022 will increase an estimated 7% for crude oil and 4% for natural gas. When combined with higher prices, increased rig counts, and more annual production, we anticipate that total U.S. proved reserves will rebound in 2021 for both crude oil and natural gas.

Proved reserves of crude oil and lease condensate

We estimate that the United States had 38,212 million barrels of proved reserves of crude oil and lease condensate as of December 31, 2020—a decrease of 19% from year-end 2019. Proved reserves declined 9% in Alaska, declined 20% onshore in the Lower 48 states (excluding Federal Offshore [both Pacific and the Gulf of Mexico]), and declined 16% in the Federal Offshore (both Pacific and the Gulf of Mexico)(Figure 8).

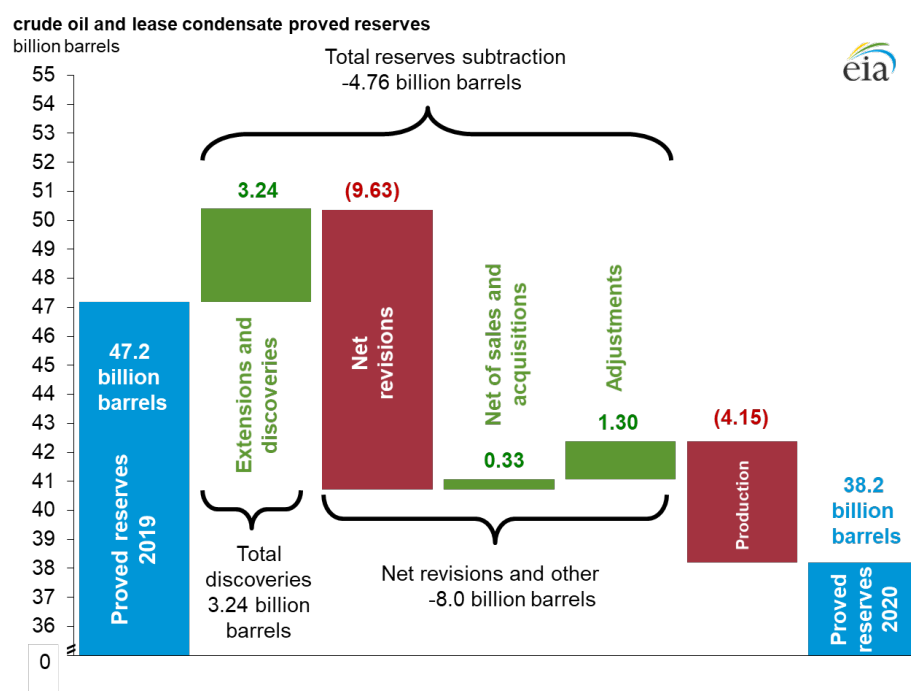
⁴ U.S. Energy Information Administration, *Crude Oil and Natural Gas Drilling Activity*, Graph by U.S. Energy Information Administration, based on data from Baker Hughes, Inc.

⁵ Baker Hughes, Inc.

Figure 8. Proved reserves of U.S. crude oil and lease condensate, 1990–2020

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 1990–2020

U.S. proved reserves of crude oil and lease condensate decreased by almost 9 billion barrels (19%) in 2020, as the downward *net revisions* and *production* each exceeded the 3.24 billion barrels of total discoveries for the year (Figure 9a).

Figure 9a. Changes in the proved reserves of U.S. crude oil and lease condensate, 2019–20

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*

Note: Component columns may not add to total because of independent rounding. Y-axis has a nonstandard scale.

Operators in Texas reported the largest net decrease in proved crude oil and lease condensate reserves (3,108 million barrels) of all states in 2019—a decrease of 16% from 2019.

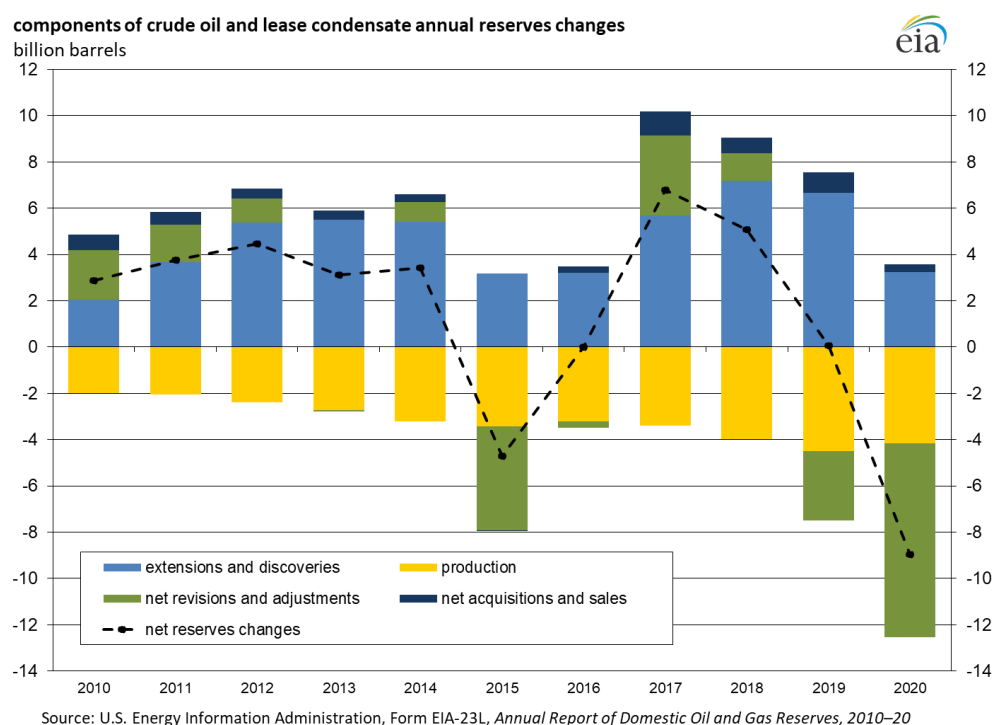
Operators in North Dakota had the second-largest net decrease in 2020 (2,227 million barrels) of proved crude oil and lease condensate reserves—a decrease of 38% from 2019.

Operators in the Federal Offshore Gulf of Mexico reported the third-largest net decrease in proved crude oil and lease condensate reserves (818 million barrels) in 2020—a decrease of 16% from 2019.

Utah experienced the largest net increase in proved crude oil reserves of all states in 2020 at 91 million barrels (31%). Extensions and discoveries of 92 million barrels of new proved crude oil reserves were reported in 2020, mostly from operators drilling horizontal wells in the Uinta Basin.

Figure 9b summarizes the components of changes in U.S. crude oil and lease condensate reserves over time:

Figure 9b. Components of U.S. crude oil and lease condensate annual reserves changes, 2010–20



Extensions and discoveries

Exploration—including discovering new fields, identifying new reservoirs in fields discovered in previous years, and adding reserves that result from additional drilling in previously discovered reservoirs (extensions)—added 3.2 billion barrels to U.S. crude oil and lease condensate reserves in 2020. *Extensions and discoveries* in 2020—which are typically the largest component of proved reserves change in a given year—were the least observed in the past three years (Figure 9b). Both production and net negative revisions to proved reserves in 2020 outweighed any gains.

The largest extensions and discoveries of proved reserves of crude oil and lease condensate in 2020 were in Texas, New Mexico, and North Dakota. Operators in Texas had 1.8 billion barrels, in New Mexico had 0.7 billion barrels, and in North Dakota had 0.2 billion barrels of extensions and discoveries in 2020; however, operators in all three of these states reported net declines in their proved reserves of crude oil and lease condensate in 2020.

Net revisions and other changes

Revisions to reserves occur primarily when operators change their estimates of what they are able to economically produce using existing technology and current economic conditions. Current prices are critical in estimating economically producible reserves. Other changes occur when operators buy and sell properties (revaluing the proved reserves in the process) and when various adjustments are made to reconcile estimated volumes.

Net downward revisions decreased proved reserves of U.S. crude oil and lease condensate by 9.6 billion barrels in 2020. The largest net downward revisions of proved reserves of crude oil and lease condensate occurred in Texas (the state with the most proved reserves of crude oil and lease condensate which was impacted the most by lower prices in 2020.) Net revisions of proved reserves of crude oil and lease condensate accounted for a decrease of 3.8 billion barrels in 2020 in Texas.

The proved reserves of U.S. crude oil and lease condensate associated with buying and selling properties⁶ resulted in a net increase of 334 million barrels in 2020.

Adjustments

Adjustments are the yearly changes in the published reserve estimates that cannot be attributed to the estimates for other reserve change categories because of the survey and statistical estimation methods employed. For example, if last year's year-end reserves for a state or state subdivision don't match this year's beginning year reserves, we must make an adjustment to account for that difference. Other examples that contribute to adjustments include changes in the selected reporting companies from the previous year and imputations for missing or unreported reserve changes.

In 2020, the sum of all of our adjustments for U.S. proved oil reserves was 1,244 million barrels.

Production

Our [official published estimate of total U.S. crude oil production](#) (including lease condensate) is 4,130 million barrels for 2020, a decrease of 8% from 2019. As estimated using Form EIA-23L responses, the United States produced 4,154 million barrels of crude oil and lease condensate in 2020, a decrease of 7% from 2019 (Tables 5 and 6).⁷

⁶ How can acquisitions in a given year exceed sales? When it comes to proved reserves, an exchange of properties is not a zero-sum game. Operators often have differing development plans for oil- and natural gas-bearing properties they purchase from or exchange with other operators. For example, when an operator purchases acreage that is adjacent to its producing wells, the operator can drill longer horizontal laterals and add more proved reserves.

⁷ The oil production estimates in this report use data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They are used to weight estimates used in developing total proved reserves, and they may differ slightly from the official EIA production data for crude oil and lease condensate for 2020 contained in the *Petroleum Supply Annual 2020*, DOE/EIA-0340(20).

Production of crude oil and lease condensate onshore in the Lower 48 states (3,371 million barrels) was 6% lower than in 2019 (3,608 million barrels), and Federal Offshore (both Pacific and Gulf of Mexico) production experienced a 13% decrease based on the Form EIA-23L data (declining from 711 million barrels in 2019 to 621 million barrels in 2020).

Crude oil and lease condensate from U.S. shale plays

As of December 31, 2020, seven major shale plays accounted for 51% of all proved reserves of U.S. crude oil and lease condensate (Table 2). The Wolfcamp/Bone Spring shale play in the Permian Basin remains the largest oil-producing shale play in the United States. We publish a [series of maps](#) showing major U.S. shale plays.

Table 2. Production and proved reserves of crude oil from selected U.S. shale plays, 2019–20 million barrels

Basin	Play	State(s)	2019 production	2019 proved reserves	2020 production	2020 proved reserves	2019-20 reserves change
Permian	Wolfcamp/Bone Spring	New Mexico, Texas	1,209	12,069	1,322	11,870	-199
Williston	Bakken/Three Forks	North Dakota, Montana, South Dakota	517	5,845	431	3,685	-2,160
Western Gulf	Eagle Ford	Texas	451	4,297	399	3,246	-1,051
Anadarko, South Oklahoma	Woodford	Oklahoma	53	524	46	378	-146
Appalachian	Marcellus*	Pennsylvania, West Virginia	21	326	23	247	-79
Denver-Julesburg	Niobrara	Colorado, Kansas, Nebraska, Wyoming	25	235	16	218	-17
Fort Worth	Barnett	Texas	2	19	1	15	-4
Subtotal			2,278	23,240	2,238	19,659	-3,581

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2019 and 2020

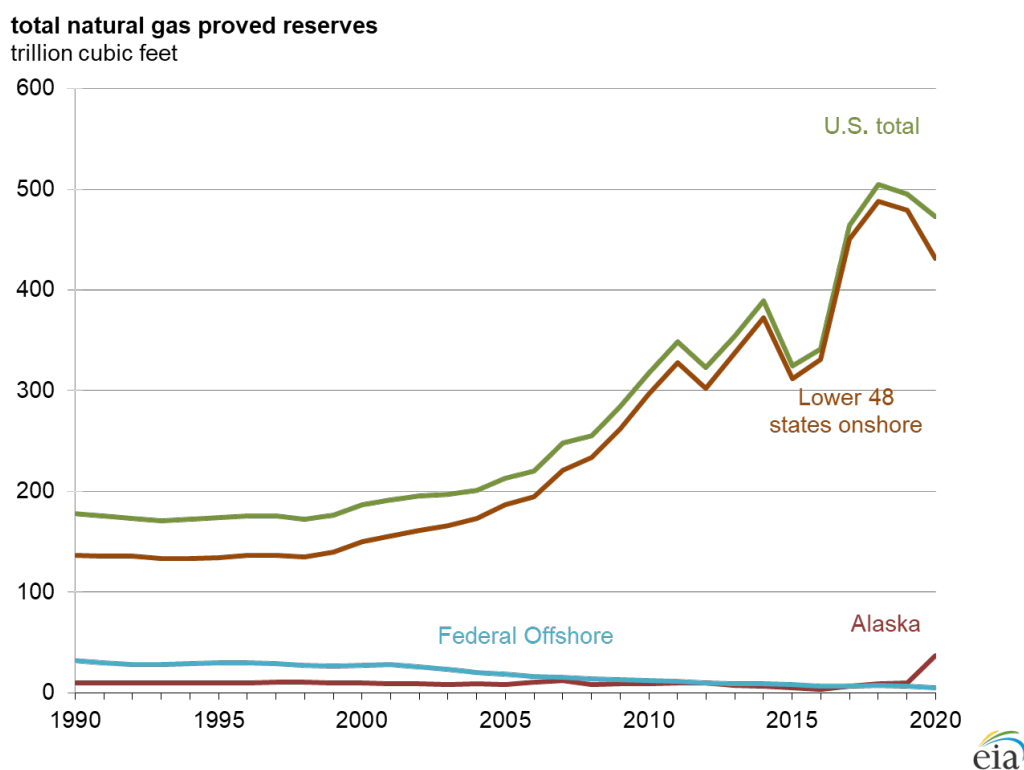
Notes: Includes lease condensate. Bakken/Three Forks oil includes proved reserves from shale or low-permeability formations reported on Form EIA-23L. Wolfcamp/Bone Spring includes proved reserves from shale or low-permeability formations reported on Form EIA-23L in TX RRC 7C, TX RRC 8, TX RRC 8A, and NME.

* The Marcellus play in this table refers only to portions within Pennsylvania and West Virginia.

Proved reserves of natural gas

Operators in the United States reported 473.3 Tcf of proved natural gas reserves as of December 31, 2020. Total U.S. proved reserves of natural gas (including natural gas plant liquids [NGPLs]) decreased by 4% (22.1 Tcf) from 2019 (Figure 10).

Figure 10. Proved reserves of U.S. natural gas, 1990–2020



Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves, 1990–2020*

The average natural gas price⁸ declined 24% in 2020 compared with 2019, causing many operators to revise their proved reserves downward. Extensions and discoveries of natural gas proved reserves in 2020 were slightly (2.7 Tcf) more than the annual production of 37.1 Tcf (Figure 11a), and net downward revisions (98.2 Tcf) drove down the 2020 national total as a result.

Operators in Texas and Pennsylvania, the states with the first- and second-most natural gas proved reserves in the United States, reported a 9% decline in their proved reserves of natural gas in 2020. Proved reserves of natural gas decreased by 11.4 Tcf in Texas and decreased by 9.6 Tcf in Pennsylvania.

Proved natural gas reserves nationwide were on course to decline more than 10%, but on May 21, 2020, the U.S. Federal Regulatory Commission (FERC) announced approval of the Alaskan LNG Project, a large-scale liquefied natural gas development project.⁹ Described in FERC Docket No. CP17-178-000, “The Alaska LNG Project consists of: a gas treatment plant located in the Prudhoe Bay Unit of Alaska’s North Slope, and two natural gas pipelines connecting production units to the gas treatment plant; an approximately 806.9-mile-long, 42-inch-

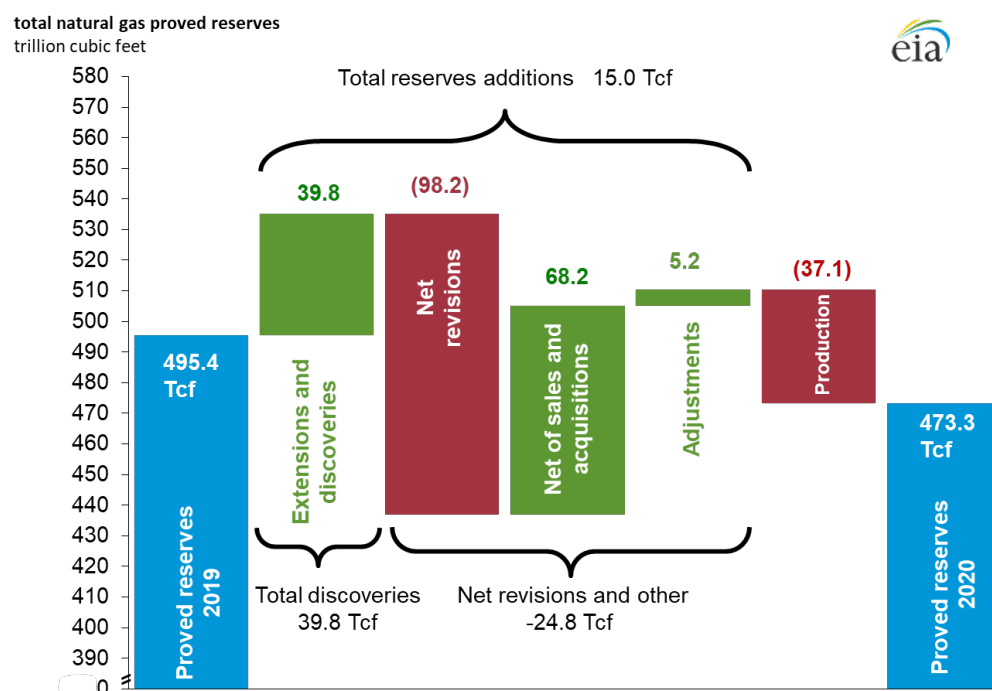
⁸ The 12-month, first-of-the-month average spot price for natural gas at the Louisiana Henry Hub.

⁹ [Order Granting Authorization Under Section 3 Of The Natural Gas Act.](#)

diameter pipeline (Mainline Pipeline) capable of transporting up to 3.9 billion cubic feet per day (Bcf/d) from the gas treatment plant to the liquefaction facilities; 344,000 horsepower of compression located at eight compressor stations along the Mainline Pipeline; and liquefaction facilities on the Kenai Peninsula designed to produce up to 20 million metric tons per year of LNG for export.”

Approval of this project means that a large volume of previously stranded Alaskan natural gas resources now meets the definition of proved reserves. The annual total of natural gas proved reserves in Alaska increased in 2020 by 27 Tcf, quadrupling the state’s total from 9 Tcf to 36 Tcf. Additional upstream production facilities will add more proved reserves in years to come.

Figure 11a. Changes in the proved reserves of U.S. natural gas, 2019–20



Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*

Note: Component columns may not add to total because of independent rounding. Y-axis has a nonstandard scale

Extensions and discoveries

Extensions and discoveries in 2020 added 39.8 Tcf to proved U.S. natural gas reserves (Table 3). Operators in Pennsylvania reported the largest extensions and discoveries of proved natural gas reserves in the United States in 2020, totaling 12.4 Tcf (Table 10). These extensions were part of the continuing development of the Marcellus shale natural gas play of Pennsylvania and West Virginia.

Operators in Texas reported the next-largest volume of extensions and discoveries in 2020 (8.1 Tcf). The largest portion of these extensions and discoveries were from TX RRC Commission District 8 in the Delaware Basin (Wolfcamp shale play).

**Table 3. Changes to proved reserves of U.S. natural gas by source, 2019–20
trillion cubic feet**

Source of natural gas	Year-end 2019 proved reserves	2020 extensions and discoveries	2020 revisions and other changes	2020 estimated production	Year-end 2020 proved reserves
Shale	353.7	32.7	-42.5	-26.1	317.8
Other U.S. natural gas					
Lower 48 states onshore	125.9	7.0	-9.2	-9.8	113.9
Lower 48 states offshore	6.4	0.0	-0.4	-0.9	5.1
Alaska	9.4	0.1	27.3	-0.2	36.5
U.S. total	495.4	39.8	-24.9	-37.1	473.3

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2019 and 2020

Note: The Lower 48 states offshore subtotal in this table includes state offshore and Federal Offshore. Components may not add to total because of independent rounding.

Net revisions and other changes

The most significant change of 2020 in proved natural gas reserves was in Alaska, where approval of the Alaska LNG Project resulted in increased proved reserves (Table 3). In the Lower 48 states, the following states had the next largest changes due to net revisions of 2020, all of which were negative:

- Operators in Texas decreased their proved natural gas reserves more than in any of the Lower 48 states in 2020 due to net revisions (14.1 Tcf)
- Operators in Pennsylvania reported the second-largest net revision decreases (12.0 Tcf)
- Operators in Oklahoma had the third-largest net revision decrease (8.7 Tcf)

Adjustments

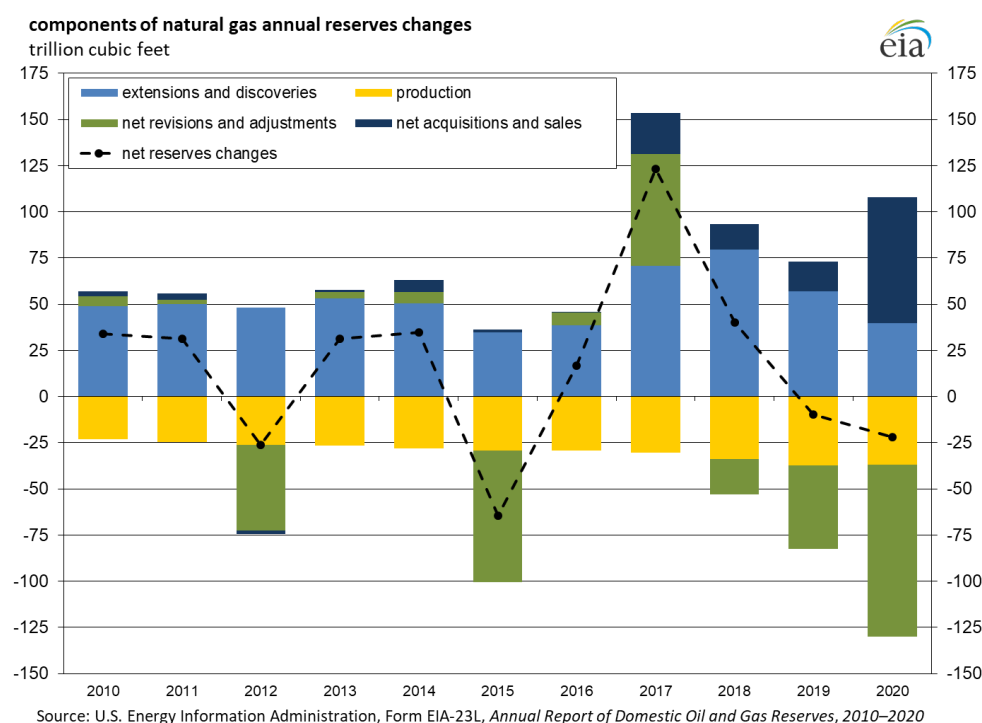
Adjustments are yearly changes in the published reserve estimates that we cannot attribute to other reserve change categories. In 2020, the sum of all of our adjustments for U.S. proved natural gas reserves was 5.2 Tcf.

Production

Our official published estimate of [marketed natural gas production](#) was 36.2 Tcf in 2020, a decrease of less than 1% from 2019 (36.4 Tcf). Using Form EIA-23L responses instead of official statistics, we estimate that U.S. production of total natural gas, wet after lease separation, in 2020 was 37.1 Tcf—also a decrease of 1% from the 2019 estimate (37.4 Tcf) published in last year’s report (Tables 9 and 10).¹⁰

Figure 11b illustrates the components of U.S. natural gas annual reserves changes over time.

¹⁰ The natural gas production estimates in this report are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. Estimates differ from our official production data for natural gas published in the *Natural Gas Annual 2020*, DOE/EIA-0131(20).

Figure 11b. Components of U.S. natural gas annual reserves changes, 2010–20

Nonassociated natural gas

Nonassociated natural gas, also called *gas well gas*, is defined as natural gas not in contact with significant quantities of crude oil in a reservoir. Nonassociated natural gas accounted for 71% of proved natural gas reserves in the United States in 2020. The U.S. total of proved reserves of nonassociated natural gas decreased from 373.1 Tcf in 2019 to 336.9 Tcf in 2020—a decrease of 10% (Table 11). Using Form EIA-23L responses, estimated production of U.S. nonassociated natural gas decreased 2%—from 27.3 Tcf in 2019 to 26.7 Tcf in 2020. The largest decrease in 2020 proved nonassociated natural gas reserves (9.6 Tcf) was in Pennsylvania. The largest increase in 2020 proved nonassociated natural gas reserves (1.6 Tcf) was in Louisiana.

Associated-dissolved natural gas

Associated-dissolved natural gas, also called *casinghead gas*, is defined as the combined volume of natural gas that occurs in crude oil reservoirs either as free gas (associated) or as natural gas in solution with crude oil (dissolved). Associated-dissolved natural gas accounted for 29% of proved natural gas reserves in the United States in 2020. The U.S. total proved reserves of associated-dissolved natural gas increased from 122.2 Tcf in 2019 to 136.4 Tcf in 2020—an increase of 11.6% (Table 12). Using Form EIA-23L responses, estimated production of associated-dissolved natural gas increased 2%—from 10.2 Tcf in 2019 to 10.4 Tcf in 2020. The largest increase of proved reserves of associated-dissolved natural gas in 2020 occurred in Alaska (27.4 Tcf). The largest decrease of associated dissolved natural gas in 2020 occurred in North Dakota (4.5 Tcf).

Coalbed natural gas (discontinued since the 2018 report)

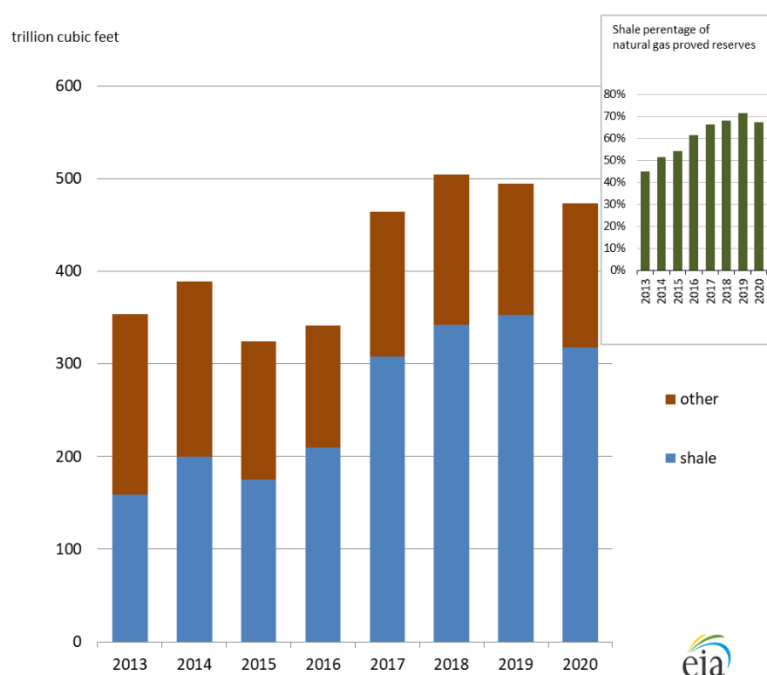
At year-end 2017, proved reserves of coalbed methane represented 2.6% of total U.S. proved natural gas reserves.¹¹ We have not published proved coalbed methane reserves as a separate data category since the 2017 report. They are now included as conventional natural gas.

Natural gas from U.S. shale plays

Shale formations can be both the *source rock* (where the oil and natural gas are generated from organic matter in the rock) and the *producing formation* (the rock from which the oil and natural gas are produced). When a sandstone or carbonate formation produces oil and natural gas, these rock layers are typically permeable enough to allow oil and natural gas to easily flow to a nearby wellbore. Shale formations have very low permeability and must typically be hydraulically fractured to produce natural gas at economical rates. Horizontally-drilled wells perform substantially better than vertical wells, although they are more expensive to drill and complete at the same depth because they are longer and the drilling process is more complex.¹² Proved reserves of U.S. natural gas from shale decreased 10%, from 353.7 Tcf in 2019 to 317.8 Tcf in 2020 (Table 13).

The share of total U.S. natural gas reserves made up by natural gas reserves from shale decreased from 71% in 2019 to 67% in 2020 (Figure 12). Estimated production of natural gas from shale increased 2%—from 25.6 Tcf in 2019 to 26.1 Tcf in 2020 (Table 13).

Figure 12. Proved reserves of U.S. natural gas (from shale and other sources), 2013–20



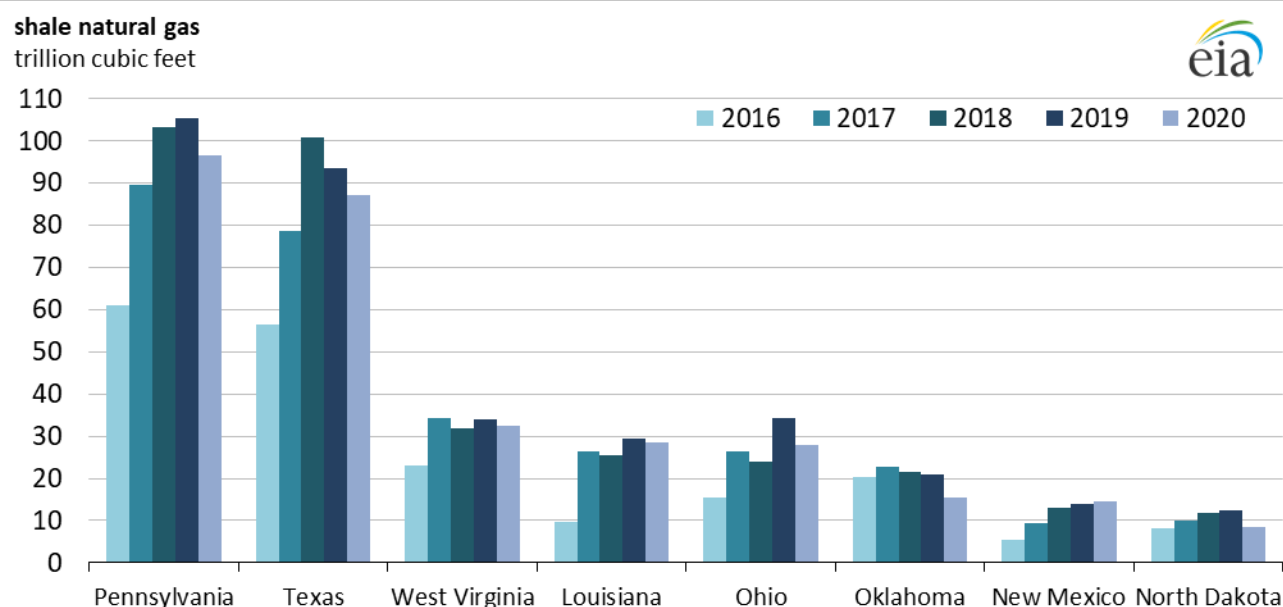
Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2013–20

¹¹ U.S. Energy Information Administration, *U.S. Crude Oil and Natural Gas Proved Reserves, Year-End 2017*, November 2018, pg. 18.

¹² U.S. Energy Information Administration, *Today in Energy*, Hydraulically fractured horizontal wells account for most new oil and natural gas wells, January 30, 2018.

The eight states that reported the most proved reserves of shale natural gas in 2020 are shown in Figure 13. Operators in Pennsylvania reported the most proved reserves of shale natural gas in 2020 with 96.7 Tcf. Operators in Texas reported the second-largest reserves with 87.3 Tcf. Proved shale natural gas reserves located in West Virginia totalled 32.3 Tcf, making it the state with the third-most proved shale natural gas reserves in 2020. Of these eight states, only operators in New Mexico reported an increase (albeit slight) in statewide proved reserves of shale natural gas in 2020. Downward revisions were countered by extensions and discoveries in eastern New Mexico's Delaware Basin.

Figure 13. Proved shale gas reserves of the top eight U.S. shale gas reserves states, 2016–20



Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves, 2016–20*

We collected production and proved reserves data for nine major U.S. shale plays in 2020 (Table 4). The Marcellus shale play remained the play with the largest amount of proved reserves of natural gas from shale in 2020. Proved reserves in the Marcellus shale play decreased by 10.4 Tcf (7%) in 2020. The second-largest shale play in 2020 was the Wolfcamp/Bone Spring shale play of the Permian Basin. Proved shale natural gas reserves in the Wolfcamp/Bone Spring shale play increased by 2.6 Tcf (5%) in 2020.

Table 4. U.S. shale plays: production and proved reserves of natural gas, 2019–20 trillion cubic feet

Basin	Shale play	State(s)	2019		2020		Change in	
			2019 Production	2019 Proved Reserves	2020 Production	2020 Proved Reserves	Change in Production	Change in Proved Reserves
Appalachian	Marcellus*	Pennsylvania, West Virginia	8.7	139.4	9.3	129.0	0.6	-10.4
Permian Basin	Wolfcamp/Bone Spring	New Mexico, Texas	4.5	49.9	5.2	52.5	0.7	2.6
TX-LA Salt	Haynesville/Bossier	Louisiana, Texas	3.4	46.7	3.6	44.8	0.2	-1.9
Western Gulf	Eagle Ford	Texas	2.1	26.6	1.9	22.3	-0.2	-4.3
Appalachian	Utica/Pt. Pleasant	Ohio	2.6	34.4	2.3	27.8	-0.3	-6.6
Anadarko, S. OK	Woodford	Oklahoma	1.5	20.9	1.2	15.5	-0.3	-5.4
Fort Worth	Barnett	Texas	1.1	14.1	1.0	10.8	-0.1	-3.3
Williston	Bakken/Three Forks	Montana, North Dakota	1.0	12.2	1.0	8.6	0.0	-3.6
Arkoma	Fayetteville	Arkansas	0.5	5.1	0.4	4.2	-0.1	-0.9
Subtotal			25.4	349.3	25.9	315.5	0.5	-33.8
Other shale			0.1	3.8	0.2	2.2	0.1	-1.6
All U.S. shale			25.5	353.1	26.1	317.7	0.6	-35.4

Sources: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2019 and 2020

Note: Table values are based on natural gas proved reserves and production volumes from shale reported and imputed from data on Form EIA-23L. * In this table, the Marcellus shale play refers only to portions within Pennsylvania and West Virginia. *Other shale* includes proved reserves and production reported from shale on Form EIA-23L that we assign to the Niobrara, Antrim, and Monterey shale plays.

Columns may not add to subtotals because of independent rounding.

EIA publishes a [series of maps](#) showing the nation's shale natural gas resources for both shale plays and geologic basins.

Proved U.S. reserves of dry natural gas

Dry natural gas is the volume of natural gas that remains after natural gas liquids and non-hydrocarbon impurities are removed from the natural gas stream, usually downstream at a natural gas processing plant. Not all produced natural gas has to be processed at a natural gas processing plant. Some produced natural gas is sufficiently dry and satisfies pipeline transportation standards without processing.

We calculate our estimate of the proved reserves of dry natural gas in the United States by first estimating the expected yield of NGPLs from total natural gas proved reserves and by then subtracting the natural gas equivalent volume of the NGPLs from total natural gas proved reserves.

Proved reserves of dry natural gas in the United States decreased by 4% from an estimated 465.4 Tcf in 2019 to 445.3 Tcf in 2020.¹³

¹³ U.S. Energy Information Administration, *U.S. Crude Oil and Natural Gas Proved Reserves, Year-End 2019*, January 2021, Table 15.

Proved reserves of lease condensate and NGPLs

Operators of natural gas fields report their estimates of lease condensate reserves and production to us on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. We determine data for NGPLs from data reported on Form EIA-64A, *Annual Report of the Origin of Natural Gas Liquids Production*. We calculate the expected yield of NGPLs by using estimates of total natural gas reserves and a recovery factor determined for each area of origin based on Form EIA-64A data.

Lease condensate

[Lease condensate](#) is a mixture consisting primarily of hydrocarbons heavier than pentanes that is recovered as a liquid from natural gas in lease separation facilities. This category excludes NGPLs, such as propane, butane, and natural gasoline, which are recovered at downstream natural gas processing plants. Lease condensate usually enters the crude oil stream.

As of December 31, 2020, the United States had proved reserves of 2,377 million barrels of lease condensate, a decrease of 560 million barrels from 2019 (19%) (Table 8). U.S. lease condensate production decreased 4%—from 321 million barrels in 2019 to 308 million barrels in 2020.

NGPLs

[Natural gas plant liquids](#) (NGPLs) (unlike lease condensate) remain within the natural gas after it passes through lease separation equipment. These liquids are normally separated from the natural gas at processing plants, fractionators, and cycling plants. NGPLs that are extracted include ethane, propane, butane, isobutane, natural gasoline, and plant condensate. Plant condensate is similar to lease condensate in that it usually enters the crude oil stream, but is recovered at a natural gas processing plant rather than lease separation facilities.

The estimated volume of NGPLs contained in proved reserves of total natural gas decreased 4% from 21,650 million barrels in 2019 to 20,695 million barrels in 2020 (Table 15).¹⁴

Reserves in nonproducing reservoirs

Not all proved reserves are contained in actively producing reservoirs. Reserves within actively producing reservoirs are known as *proved, developed, producing reserves*. Two additional categories for proved reserves exist: *proved, developed, nonproducing reserves (PDNPs)*, and *proved, undeveloped reserves (PUDs)*.

Examples of PDNPs include existing producing wells that are shut in awaiting well workovers, drilled wells that await completion, drilled well sites that require installation of production equipment or pipeline facilities, and behind-the-pipe reserves that require the depletion of other zones or reservoirs before they can be placed on production (by recompleting the well).

An example of PUDs are undrilled offset well locations (acreage adjacent to an existing producing well that is scheduled to have wells drilled on it). However, additional conditions must be met to satisfy the definition of proved reserves. These locations must:

¹⁴ U.S. Energy Information Administration, *U.S. Crude Oil and Natural Gas Proved Reserves, Year-End 2019*, January 2021, Table 15.

- be directly offset to wells that have production in the objective formation
- be reasonably certain to be within the known proved productive limits of the objective formation
- conform to existing well spacing regulations where applicable, and
- be reasonably certain to be developed within a five-year period

Reserves from other locations beyond direct offset wells are categorized as *proved, undeveloped reserves* only where interpretations of geological and engineering data from wells indicate with reasonable certainty that the objective formation is laterally continuous and contains commercially recoverable petroleum at that location.

As of December 31, 2020, the United States had 10.6 billion barrels of crude oil proved reserves and 140.2 Tcf of natural gas proved reserves in nonproducing reservoirs (Table 16). These volumes are a 35% decrease for crude oil and a 24% decrease for total natural gas in nonproducing reservoirs from the 2019 levels published in our previous report.¹⁵

Maps and additional data tables

Maps

Figure 14. Proved reserves of U.S. crude oil and lease condensate by state/area, 2020

Figure 15. Changes in proved reserves of crude oil and lease condensate by state/area, 2019–20

Figure 16. Proved reserves of U.S. natural gas by state/area, 2020

Figure 17. Changes in proved reserves of natural gas by state/area, 2019–20

Oil tables

Table 5. U.S. proved reserves of crude oil and lease condensate, crude oil, and lease condensate, 2010–20

Table 6. Proved reserves, reserves changes, and production of crude oil and lease condensate, 2020

Table 7. Proved reserves, reserves changes, and production of crude oil, 2020

Table 8. Proved reserves, reserves changes, and production of lease condensate, 2020

Natural gas tables

Table 9. U.S. proved reserves of total natural gas, wet after lease separation, 2001–20

Table 10. Proved reserves, reserves changes, and production of natural gas, wet after lease separation, 2020

Table 11. Proved reserves, reserves changes, and production of nonassociated natural gas, wet after lease separation, 2020

Table 12. Proved reserves, reserves changes, and production of associated-dissolved natural gas, wet after lease separation, 2020

Table 13. Proved reserves and production of shale natural gas, 2017–20

Table 14. Proved reserves, reserves changes, and production of shale natural gas, 2020

Table 15. Estimated proved reserves of natural gas plant liquids and dry natural gas, 2020

Miscellaneous tables

Table 16. Reported proved nonproducing reserves of crude oil, lease condensate, nonassociated gas, associated-dissolved gas, and total gas, wet after lease separation, 2020

¹⁵ U.S. Energy Information Administration, *U.S. Crude Oil and Natural Gas Proved Reserves, Year-End 2019*, January 2021, Table 16.

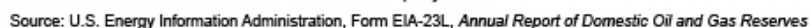
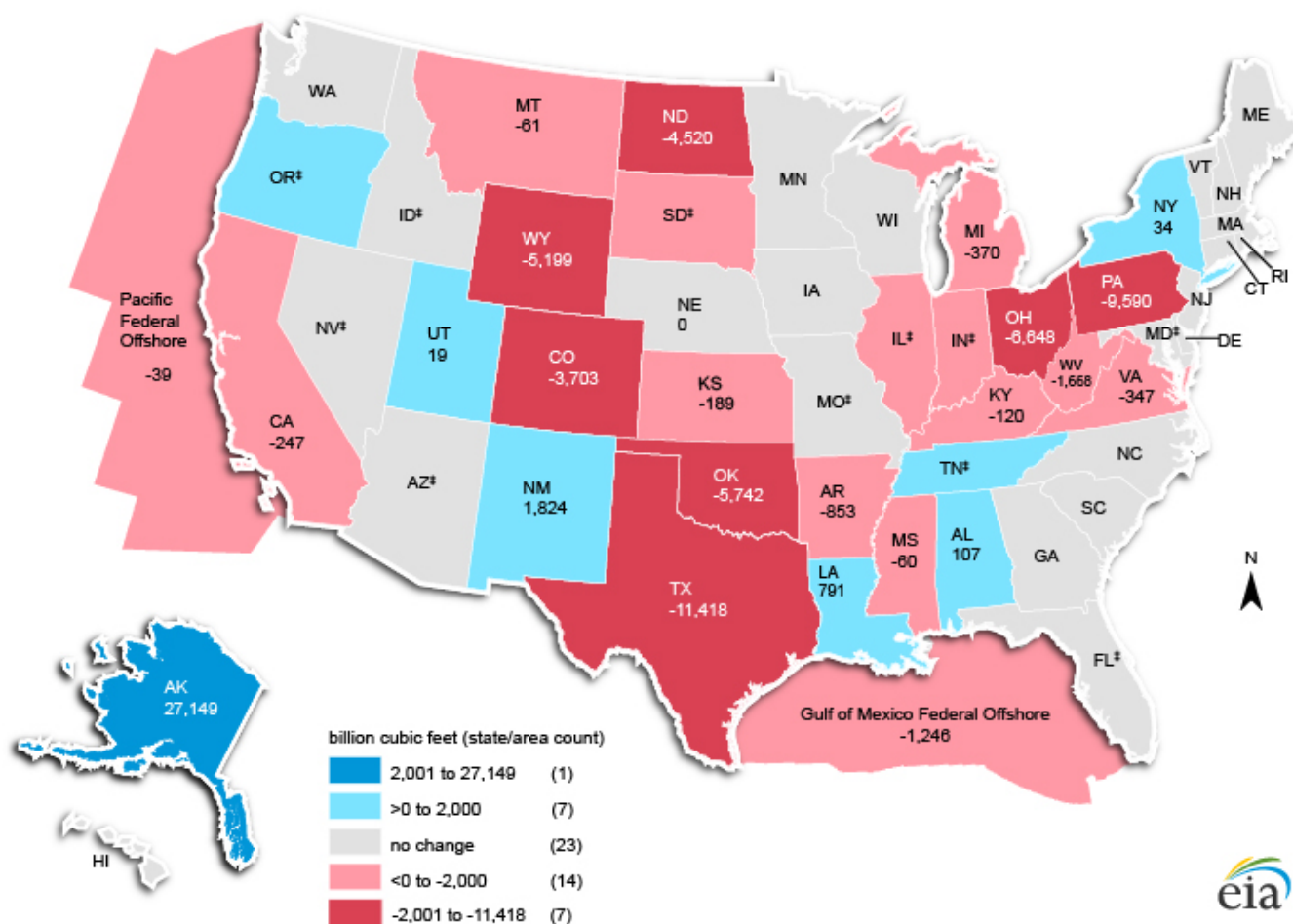


Figure 17. Changes in proved reserves of natural gas by state/area, 2019–20

Total U.S. decrease: 4% (22,095 billion cubic feet)



* Data withheld to avoid disclosure of individual company data

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*



Table 5. U.S. proved reserves of crude oil and lease condensate, 2010–20

million barrels

Year	Adjustments (1)	Net revisions (2)	Revisions ^a and adjustments (3)	Net of sales ^b and acquisitions (4)	Extensions and discoveries (5)	Estimated Production (6)	Proved ^c reserves 12/31 (7)	Change in reserves from previous year (8)
Crude oil and lease condensate (million barrels)								
2010	188	1,943	2,131	667	2,059	1,991	25,181	2,866
2011	207	1,414	1,621	537	3,676	2,065	28,950	3,769
2012	137	912	1,049	415	5,375	2,386	33,403	4,453
2013	-595	545	-50	389	5,507	2,729	36,520	3,117
2014	440	416	856	353	5,404	3,200	39,933	3,413
2015	1,115	-5,608	-4,493	-30	3,247	3,427	35,230	-4,703
2016	206	-468	-262	264	3,204	3,223	35,213	-17
2017	752	2,712	3,464	1,035	5,679	3,401	41,990	6,777
2018	764	413	1,117	676	7,194	3,984	47,053	5,063
2019	-630	-2,379	-3,009	884	6,669	4,490	47,172	119
2020	1,244	-9,626	-8,382	334	3,242	4,154	38,212	-8,960
Crude oil (million barrels)								
2010	144	1,859	2,003	605	1,744	1,767	23,267	2,585
2011	199	1,325	1,524	480	3,107	1,834	26,544	3,277
2012	109	935	1,044	416	4,637	2,112	30,529	3,985
2013	-620	518	-102	460	4,902	2,418	33,371	2,842
2014	516	321	837	263	4,788	2,874	36,385	3,014
2015	1,155	-4,900	-3,745	-87	2,869	3,104	32,318	-4,067
2016	262	17	279	335	2,794	2,953	32,773	455
2017	822	2,617	3,439	1,000	5,105	3,157	39,160	6,387
2018	551	607	1,158	635	6,567	3,696	43,824	4,664
2019	-573	-1,879	-2,452	910	6,078	4,169	44,235	411
2020	933	-8,787	-7,854	298	3,002	3,846	35,835	-8,400
Lease condensate (million barrels)								
2010	44	84	128	62	315	224	1,914	281
2011	8	89	97	57	569	231	2,406	492
2012	28	-23	5	-1	738	274	2,874	468
2013	25	27	52	-71	605	311	3,149	275
2014	-76	95	19	90	616	326	3,548	399
2015	-40	-708	-748	57	378	323	2,912	-636
2016	-56	-485	-541	-71	410	270	2,440	-472
2017	-70	95	25	35	574	244	2,830	390
2018	213	-194	19	41	627	288	3,229	399
2019	-57	-500	-557	-26	591	321	2,937	-292
2020	311	-839	-528	36	240	308	2,377	-560

^a Revisions and adjustments = Column 1 plus Column 2.^b Net of sales and acquisitions = acquisitions minus sales^c Proved reserves = Column 7 from previous year plus Column 3 plus Column 4 plus Column 5 minus Column 6Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2010–20Notes: The production estimates in this table are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official U.S. EIA production data for crude oil and lease condensate for 2020 contained in the *Petroleum Supply Annual 2020*, DOE/EIA-0340(20).One barrel = 42 U.S. gallons. See EIA petroleum and other liquids data at <https://www.eia.gov/petroleum/data.php>.

Table 6. Proved reserves, reserves changes, and production of crude oil and lease condensate, 2020

million barrels

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020						Estimated production (-)	Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)		
Alaska	2,680	387	3	568	1,369	1,353	101	162	2,425
Lower 48 states	44,492	857	3,018	12,079	792	1,142	3,141	3,992	35,787
Alabama	48	0	2	8	0	2	0	5	39
Arkansas	34	-1	8	7	0	0	0	4	30
California	2,213	-129	130	655	1	0	84	145	1,497
Coastal Region Onshore	422	-96	3	142	0	0	1	17	171
Los Angeles Basin Onshore	163	13	1	54	0	0	3	10	116
San Joaquin Basin Onshore	1,450	-61	126	390	1	0	75	109	1,090
State Offshore	178	15	0	69	0	0	5	9	120
Colorado	1,557	-29	240	619	216	366	41	171	1,169
Kansas	327	-1	13	20	0	0	0	29	290
Kentucky	8	-4	0	1	0	1	0	0	4
Louisiana	449	26	67	142	13	15	10	37	375
North	92	10	42	57	10	5	0	9	73
South Onshore	298	20	13	60	2	10	10	22	267
State Offshore	59	-4	12	25	1	0	0	6	35
Michigan	49	4	6	15	0	0	0	4	40
Mississippi	117	25	7	42	0	0	0	14	93
Montana	323	-7	81	115	0	0	2	22	262
Nebraska	12	0	2	0	0	0	0	2	12
New Mexico	3,738	190	82	802	33	41	694	371	3,539
East	3,650	160	77	794	31	39	682	363	3,420
West	88	30	5	8	2	2	12	8	119
North Dakota	5,899	133	574	2,719	2	0	219	432	3,672
Ohio	316	-55	31	42	7	29	31	24	279
Oklahoma	2,342	60	160	759	77	109	94	171	1,758
Pennsylvania	130	-5	2	30	0	0	6	6	97
South Dakota	9	1	1	3	0	0	0	1	7
Texas	19,797	559	1,135	4,954	389	542	1,787	1,788	16,689
RRC District 1	2,845	-155	190	762	16	4	82	204	1,984
RRC District 2 Onshore	1,536	24	115	270	0	0	120	187	1,338
RRC District 3 Onshore	658	43	64	279	6	3	21	51	453
RRC District 4 Onshore	165	64	10	91	11	10	20	17	150
RRC District 5	55	3	18	11	1	0	0	4	60
RRC District 6	189	30	14	75	1	9	0	14	152
RRC District 7B	115	0	3	15	8	0	2	9	88
RRC District 7C	1,260	9	110	234	9	11	120	142	1,125
RRC District 8	11,155	518	575	2,856	236	442	1,415	1,039	9,974
RRC District 8A	1,498	12	18	249	94	32	4	98	1,123
RRC District 9	128	-4	9	20	7	1	0	10	97
RRC District 10	192	15	9	92	0	30	3	13	144
State Offshore	1	0	0	0	0	0	0	0	1

Table 6. Proved reserves, reserves changes, and production of crude oil and lease condensate, 2020 (cont.)

million barrels

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020						Estimated production (-)	Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)		
Utah	298	113	75	158	5	5	92	31	389
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	233	-4	16	87	6	4	32	19	169
Wyoming	1,151	-30	52	308	34	20	33	89	795
Federal Offshore	5,350	-17	330	551	9	8	15	621	4,505
Pacific (California)	165	-2	3	23	0	0	0	5	138
Gulf of Mexico (Central and Eastern) ^a	4,987	-88	325	510	9	8	15	562	4,166
Gulf of Mexico (Western)	198	73	2	18	0	0	0	54	201
Other states ^b	102	6	5	18	0	0	1	7	89
U.S. Total	47,172	1,244	3,021	12,647	2,161	2,495	3,242	4,154	38,212

^a Includes Federal Offshore Louisiana, Alabama, Mississippi, and Florida.^b Other states include Arizona, Florida, Idaho, Illinois, Indiana, Maryland, Missouri, Nevada, New York, Oregon, and Tennessee. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*Notes: The production estimates in this table are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official U.S. EIA production data for crude oil and lease condensate for 2020 contained in the *Petroleum Supply Annual 2020*, DOE/EIA-0340(20). One barrel = 42 U.S. gallons. See EIA petroleum and other liquids data at <https://www.eia.gov/petroleum/data.php>.

Table 7. Proved reserves, reserves changes, and production of crude oil, 2020

million barrels

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020							Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Alaska	2,674	387	0	564	1,369	1,353	101	159	2,423
Lower 48 states	41,561	546	2,797	11,020	650	964	2,901	3,687	33,412
Alabama	39	0	2	5	0	2	0	4	34
Arkansas	33	-1	8	7	0	0	0	4	29
California	2,213	-129	129	655	1	0	84	145	1,496
Coastal Region Onshore	422	-96	3	142	0	0	1	17	171
Los Angeles Basin Onshore	163	13	0	54	0	0	3	10	115
San Joaquin Basin Onshore	1,450	-61	126	390	1	0	75	109	1,090
State Offshore	178	15	0	69	0	0	5	9	120
Colorado	1,414	-27	238	582	127	274	33	162	1,061
Kansas	313	0	12	20	0	0	0	28	277
Kentucky	8	-4	0	1	0	1	0	0	4
Louisiana	389	5	58	118	1	7	7	30	317
North	69	10	33	52	1	1	0	7	53
South Onshore	266	3	13	43	0	6	7	18	234
State Offshore	54	-8	12	23	0	0	0	5	30
Michigan	48	3	6	14	0	0	0	4	39
Mississippi	114	25	7	42	0	0	0	14	90
Montana	318	-9	81	115	0	0	2	21	256
Nebraska	12	0	2	0	0	0	0	2	12
New Mexico	3,519	139	70	707	31	39	687	351	3,365
East	3,466	108	65	700	31	39	675	345	3,277
West	53	31	5	7	0	0	12	6	88
North Dakota	5,897	136	570	2,719	2	0	219	432	3,669
Ohio	88	-12	21	13	5	0	0	5	74
Oklahoma	2,047	25	120	671	72	97	79	142	1,483
Pennsylvania	16	-4	2	1	0	0	0	2	11
South Dakota	9	1	1	3	0	0	0	1	7
Texas	18,623	382	1,013	4,570	375	509	1,652	1,622	15,612
RRC District 1	2,697	-153	181	698	14	0	82	186	1,909
RRC District 2 Onshore	1,289	-5	90	204	0	0	77	142	1,105
RRC District 3 Onshore	611	21	49	269	6	3	7	44	372
RRC District 4 Onshore	26	7	0	10	0	0	0	3	20
RRC District 5	53	2	18	11	1	0	0	4	57
RRC District 6	93	22	5	49	1	8	0	10	68
RRC District 7B	113	0	3	14	8	0	2	9	87
RRC District 7C	1,255	12	106	234	9	11	120	141	1,120
RRC District 8	10,729	465	531	2,724	236	441	1,358	968	9,596
RRC District 8A	1,498	12	18	249	94	32	4	98	1,123
RRC District 9	112	-2	8	19	6	0	0	9	84
RRC District 10	147	1	4	89	0	14	2	8	71
State Offshore	0	0	0	0	0	0	0	0	0

Table 7. Proved reserves, reserves changes, and production of crude oil, 2020 (cont.)

million barrels

State and subdivision	Changes in reserves during 2020								Proved reserves 12/31/20
	Published proved reserves 12/31/19	Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Utah	275	98	75	136	2	5	92	29	378
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	13	-9	2	1	0	4	0	1	8
Wyoming	1,013	-32	50	267	34	20	30	77	703
Federal Offshore	5,069	-69	326	332	0	6	15	605	4,410
Pacific (California)	165	-2	3	23	0	0	0	5	138
Gulf of Mexico (Central and Eastern) ^a	4,712	-139	321	293	0	6	15	547	4,075
Gulf of Mexico (Western)	192	72	2	16	0	0	0	53	197
Other states ^b	86	7	4	17	0	0	1	6	75
U.S. Total	44,235	933	2,797	11,584	2,019	2,317	3,002	3,846	35,835

^a Includes Federal Offshore Louisiana, Alabama, Mississippi, and Florida.^b Other states include Arizona, Florida, Idaho, Illinois, Indiana, Maryland, Missouri, Nevada, New York, Oregon, and Tennessee. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*Notes: The production estimates in this table are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official U.S. EIA production data for crude oil for 2020 contained in the *Petroleum Supply Annual 2020*, DOE/EIA-0340(20).One barrel = 42 U.S. gallons. See EIA petroleum and other liquids data at <https://www.eia.gov/petroleum/data.php>.

Table 8. Proved reserves, reserves changes, and production of lease condensate, 2020

million barrels

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020							Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Alaska	6	0	3	4	0	0	0	3	2
Lower 48 states	2,931	311	221	1,059	142	178	240	305	2,375
Alabama	9	0	0	3	0	0	0	1	5
California	0	0	1	0	0	0	0	0	1
Coastal Region Onshore	0	0	0	0	0	0	0	0	0
Los Angeles Basin Onshore	0	0	1	0	0	0	0	0	1
San Joaquin Basin Onshore	0	0	0	0	0	0	0	0	0
State Offshore	0	0	0	0	0	0	0	0	0
Colorado	143	-2	2	37	89	92	8	9	108
Kentucky	0	0	0	0	0	0	0	0	0
Louisiana	60	21	9	24	12	8	3	7	58
North	23	0	9	5	9	4	0	2	20
South Onshore	32	17	0	17	2	4	3	4	33
State Offshore	5	4	0	2	1	0	0	1	5
Michigan	1	1	0	1	0	0	0	0	1
Mississippi	3	0	0	0	0	0	0	0	3
Montana	5	2	0	0	0	0	0	1	6
Nebraska	0	0	0	0	0	0	0	0	0
New Mexico	219	51	12	95	2	2	7	20	174
East	184	52	12	94	0	0	7	18	143
West	35	-1	0	1	2	2	0	2	31
North Dakota	2	-3	4	0	0	0	0	0	3
Ohio	228	-43	10	29	2	29	31	19	205
Oklahoma	295	35	40	88	5	12	15	29	275
Pennsylvania	114	-1	0	29	0	0	6	4	86
South Dakota	0	0	0	0	0	0	0	0	0
Texas	1,174	177	122	384	14	33	135	166	1,077
RRC District 1	148	-2	9	64	2	4	0	18	75
RRC District 2 Onshore	247	29	25	66	0	0	43	45	233
RRC District 3 Onshore	47	22	15	10	0	0	14	7	81
RRC District 4 Onshore	139	57	10	81	11	10	20	14	130
RRC District 5	2	1	0	0	0	0	0	0	3
RRC District 6	96	8	9	26	0	1	0	4	84
RRC District 7B	2	0	0	1	0	0	0	0	1
RRC District 7C	5	-3	4	0	0	0	0	1	5
RRC District 8	426	53	44	132	0	1	57	71	378
RRC District 8A	0	0	0	0	0	0	0	0	0
RRC District 9	16	-2	1	1	1	1	0	1	13
RRC District 10	45	14	5	3	0	16	1	5	73
State Offshore	1	0	0	0	0	0	0	0	1

Table 8. Proved reserves, reserves changes, and production of lease condensate, 2020 (cont.)

million barrels

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020							Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Utah	23	15	0	22	3	0	0	2	11
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	220	5	14	86	6	0	32	18	161
Wyoming	138	2	2	41	0	0	3	12	92
Federal Offshore	281	52	4	219	9	2	0	16	95
Pacific (California)	0	0	0	0	0	0	0	0	0
Gulf of Mexico (Central and Eastern) ^a	275	51	4	217	9	2	0	15	91
Gulf of Mexico (Western)	6	1	0	2	0	0	0	1	4
Other states ^b	16	-1	1	1	0	0	0	1	14
U.S. Total	2,937	311	224	1,063	142	178	240	308	2,377

^a Includes Federal Offshore Louisiana, Alabama, Mississippi, and Florida.^b Other states include Arizona, Arkansas, Florida, Idaho, Illinois, Indiana, Kansas, Maryland, Missouri, Nevada, New York, Oregon, and Tennessee. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*Notes: The production estimates in this table are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official U.S. EIA production data for lease condensate for 2020 contained in the *Petroleum Supply Annual 2020*, DOE/EIA-0340(20). One barrel = 42 U.S. gallons. See EIA petroleum and other liquids data at <https://www.eia.gov/petroleum/data.php>.

Table 9. U.S. proved reserves of total natural gas, wet after lease separation, 2001–20

billion cubic feet

Year	Adjustments (1)	Net revisions (2)	Revisions ^a and adjustments (3)	Net of sales ^b and acquisitions (4)	Extensions and discoveries (5)	Estimated production (6)	Proved ^c reserves 12/31 (7)	Change from previous year (8)
Total natural gas (billion cubic feet)								
2001	1,849	-2,438	-589	2,715	23,749	20,642	191,743	5,233
2002	4,006	1,038	5,044	428	18,594	20,248	195,561	3,818
2003	2,323	-1,715	608	1,107	20,100	20,231	197,145	1,584
2004	170	825	995	1,975	21,102	20,017	201,200	4,055
2005	1,693	2,715	4,408	2,674	24,285	19,259	213,308	12,108
2006	946	-2,099	-1,153	3,178	24,456	19,373	220,416	7,108
2007	990	15,936	16,926	452	30,313	20,318	247,789	27,373
2008	271	-3,254	-2,983	937	30,707	21,415	255,035	7,246
2009	5,923	-1,899	4,024	-222	47,579	22,537	283,879	28,844
2010	1,292	4,055	5,347	2,766	48,879	23,224	317,647	33,768
2011	2,715	-112	2,603	3,298	49,882	24,621	348,809	31,162
2012	-810	-45,614	-46,424	-1,859	48,241	26,097	322,670	-26,139
2013	693	2,794	3,487	1,287	53,017	26,467	353,994	31,324
2014	4,905	984	5,889	6,565	50,487	28,094	388,841	34,847
2015	9,430	-80,762	-71,332	1,417	34,706	29,329	324,303	-64,538
2016	7,086	94	7,180	432	38,371	29,153	341,133	16,830
2017	19,326	41,318	60,644	22,123	70,783	30,391	464,292	123,159
2018	8,770	-27,687	-18,917	13,746	79,457	34,077	504,501	40,209
2019	-9,794	-35,279	-45,073	16,171	56,724	37,412	495,380	-9,121
2020	5,170	-98,236	-93,066	68,204	39,829	37,062	473,285	-22,095

^a Revisions and adjustments = Col. 1 plus Col. 2.^b Net of sales and acquisitions = acquisitions minus sales^c Proved reserves = Col. 7 from previous year plus Col. 3 plus Col. 4 plus Col. 5 minus Col. 6.Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2001–20

Notes: The production estimates in this table are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official U.S. EIA production data for natural gas for 2020 contained in the *Natural Gas Annual* 2020, DOE/EIA-0131(20). Natural gas is measured at 60 degrees Fahrenheit and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia). See EIA natural gas data at <https://www.eia.gov/naturalgas/data.php>.

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Table 10. Proved reserves, reserves changes, and production of natural gas, wet after lease separation, 2020

billion cubic feet

State and subdivision	Changes in reserves during 2020								Proved reserves 12/31/20
	Published proved reserves 12/31/19	Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Alaska	9,380	774	18	36,009	4,729	67,242	101	248	36,529
Lower 48 states	486,000	4,396	35,044	97,289	15,654	21,345	39,728	36,814	436,756
Alabama	1,423	184	156	127	0	9	0	115	1,530
Arkansas	5,836	88	143	599	0	0	0	485	4,983
California	1,369	120	71	326	2	0	43	153	1,122
Coastal Region Onshore	157	11	6	61	0	0	0	10	103
Los Angeles Basin Onshore	60	14	0	16	0	0	1	5	54
San Joaquin Basin Onshore	1,096	86	65	231	2	0	42	135	921
State Offshore	56	9	0	18	0	0	0	3	44
Colorado	24,115	-819	3,163	6,065	3,476	4,885	553	1,944	20,412
Kansas	2,303	7	76	108	2	0	0	162	2,114
Kentucky	1,369	-47	21	61	0	28	0	61	1,249
Louisiana	36,779	951	6,502	8,685	1,063	1,152	5,176	3,242	37,570
North	34,970	675	6,425	8,024	1,010	948	5,118	3,053	36,049
South Onshore	1,433	124	54	531	47	204	58	145	1,150
State Offshore	376	152	23	130	6	0	0	44	371
Michigan	1,261	-118	81	190	80	1	0	64	891
Mississippi	227	-40	25	18	0	0	0	27	167
Montana	631	-32	160	148	0	0	1	42	570
Nebraska	2	0	0	0	0	0	0	0	2
New Mexico	24,305	2,808	1,158	2,963	1,097	434	3,457	1,973	26,129
East	15,353	1,956	631	2,865	132	117	3,279	1,449	16,890
West	8,952	852	527	98	965	317	178	524	9,239
New York	81	56	44	54	0	0	0	12	115
North Dakota	13,083	240	1,991	6,189	3	0	426	985	8,563
Ohio	34,748	-2,973	2,535	7,282	51	2,598	887	2,362	28,100
Oklahoma	35,823	3,703	3,059	11,724	1,400	2,228	1,105	2,703	30,091
Pennsylvania	107,392	-3,104	1,774	13,757	2,609	2,845	12,415	7,154	97,802
Texas	126,150	4,590	11,006	25,152	4,475	4,973	8,075	10,435	114,732
RRC District 1	10,276	325	405	3,530	56	106	117	728	6,915
RRC District 2 Onshore	5,406	264	589	1,310	3	0	656	720	4,882
RRC District 3 Onshore	2,147	202	140	650	18	10	139	262	1,708
RRC District 4 Onshore	16,497	1,639	159	2,541	468	412	285	952	15,031
RRC District 5	8,831	174	177	1,328	359	270	15	718	7,062
RRC District 6	22,565	373	2,067	4,210	6	47	1,393	1,489	20,740
RRC District 7B	1,411	209	122	682	93	51	2	113	907
RRC District 7C	8,743	-447	1,496	1,363	53	261	510	845	8,302
RRC District 8	36,887	1,268	4,976	6,219	546	1,000	4,892	3,753	38,505
RRC District 8A	1,496	112	9	204	81	15	3	126	1,224
RRC District 9	6,853	186	765	1,585	2,791	2,129	0	391	5,166
RRC District 10	5,011	288	101	1,530	1	671	63	335	4,268
State Offshore	27	-3	0	0	0	1	0	3	22

Table 10. Proved reserves, reserves changes, and production of natural gas, wet after lease separation, 2020 (cont.)

billion cubic feet

State and subdivision	Changes in reserves during 2020							Estimated production (-)	Proved reserves 12/31/20
	Published proved reserves 12/31/19	Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)		
Utah	2,362	70	308	538	812	1,122	114	245	2,381
Virginia	2,298	-22	81	308	0	2	2	102	1,951
West Virginia	40,130	-1,123	1,428	7,161	469	909	7,312	2,564	38,462
Wyoming	18,325	-1	916	5,119	20	29	149	1,153	13,126
Federal Offshore	5,939	-127	346	700	95	106	13	828	4,654
Pacific (California)	188	-1	0	35	0	0	0	3	149
Gulf of Mexico (Central and Eastern) ^a	5,403	-266	316	623	92	106	13	723	4,134
Gulf of Mexico (Western)	348	140	30	42	3	0	0	102	371
Other states ^b	49	-15	0	15	0	24	0	3	40
U.S. Total	495,380	5,170	35,062	133,298	20,383	88,587	39,829	37,062	473,285

^a Includes Federal Offshore Louisiana, Alabama, Mississippi, and Florida.^b Other states include Arizona, Florida, Idaho, Illinois, Indiana, Maryland, Missouri, Nevada, Oregon, South Dakota, and Tennessee. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*

Notes: The production estimates in this table are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official U.S. EIA production data for natural gas for 2020 contained in the *Natural Gas Annual 2020*, DOE/EIA-0131(20). Natural gas is measured at 60 degrees Fahrenheit and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia). See EIA natural gas data at <https://www.eia.gov/naturalgas/data.php>.

Table 11. Proved reserves, reserves changes, and production of nonassociated natural gas, wet after lease separation, 2020

billion cubic feet

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020							Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Alaska	1,376	66	18	363	0	0	94	75	1,116
Lower 48 states	371,761	3,033	22,250	68,087	13,785	17,509	29,658	26,588	335,751
Alabama	1,316	185	123	126	0	3	0	105	1,396
Arkansas	5,784	71	87	557	0	0	0	478	4,907
California	165	1	49	98	0	0	0	12	105
Coastal Region Onshore	0	0	0	0	0	0	0	0	0
Los Angeles Basin Onshore	0	0	0	0	0	0	0	0	0
San Joaquin Basin Onshore	165	1	49	98	0	0	0	12	105
State Offshore	0	0	0	0	0	0	0	0	0
Colorado	13,086	114	1,065	2,236	2,585	3,225	370	906	12,133
Kansas	2,056	14	69	69	0	0	0	145	1,925
Kentucky	1,362	-40	21	61	0	28	0	61	1,249
Louisiana	35,538	767	6,404	7,661	1,062	1,136	5,168	3,198	37,092
North	34,271	388	6,366	7,124	1,009	936	5,118	3,042	35,904
South Onshore	1,020	185	38	448	47	200	50	118	880
State Offshore	247	194	0	89	6	0	0	38	308
Michigan	1,159	-113	69	166	80	1	0	57	813
Mississippi	196	-48	25	15	0	0	0	17	141
Montana	304	-9	39	1	0	0	0	23	310
Nebraska	2	0	0	0	0	0	0	0	2
New Mexico	10,649	2,154	617	622	972	329	121	734	11,542
East	1,961	1,403	97	599	7	12	113	234	2,746
West	8,688	751	520	23	965	317	8	500	8,796
New York	77	57	44	54	0	0	0	12	112
North Dakota	31	-16	29	0	0	0	0	4	40
Ohio	34,255	-2,878	2,424	7,211	37	2,598	887	2,340	27,698
Oklahoma	23,899	2,664	1,923	7,547	1,230	1,531	546	1,743	20,043
Pennsylvania	107,268	-3,107	1,768	13,757	2,580	2,839	12,415	7,143	97,703
Texas	71,483	4,113	5,141	14,707	3,848	3,641	2,768	5,528	63,063
RRC District 1	4,563	291	132	1,646	35	106	5	326	3,090
RRC District 2 Onshore	2,401	199	363	876	3	0	478	375	2,187
RRC District 3 Onshore	1,313	241	111	335	0	0	91	190	1,231
RRC District 4 Onshore	16,401	1,539	158	2,496	468	412	285	937	14,894
RRC District 5	8,782	70	161	1,296	358	270	15	683	6,961
RRC District 6	21,027	1,280	2,007	3,957	3	38	1,393	1,414	20,371
RRC District 7B	1,236	132	117	535	68	50	0	100	832
RRC District 7C	981	-256	262	168	6	29	0	85	757
RRC District 8	4,782	400	1,033	1,035	115	37	449	837	4,714
RRC District 8A	20	-1	2	1	2	0	0	2	16
RRC District 9	5,648	65	718	1,035	2,789	2,129	0	317	4,419
RRC District 10	4,302	156	77	1,327	1	569	52	259	3,569
State Offshore	27	-3	0	0	0	1	0	3	22

Table 11. Proved reserves, reserves changes, and production of nonassociated natural gas, wet after lease separation, 2020 (cont.)

billion cubic feet

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020							Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Utah	1,781	182	92	449	808	1,122	9	199	1,730
Virginia	2,298	-22	81	308	0	2	2	102	1,951
West Virginia	40,100	-1,143	1,413	7,158	469	908	7,312	2,559	38,404
Wyoming	17,037	199	726	4,813	19	24	60	1,035	12,179
Federal Offshore	1,880	-100	41	456	95	98	0	184	1,184
Pacific (California)	0	0	0	0	0	0	0	0	0
Gulf of Mexico (Central and Eastern) ^a	1,780	-112	28	434	92	98	0	169	1,099
Gulf of Mexico (Western)	100	12	13	22	3	0	0	15	85
Other states ^b	35	-12	0	15	0	24	0	3	29
U.S. Total	373,137	3,099	22,268	68,450	13,785	17,509	29,752	26,663	336,867

^a Includes Federal Offshore Louisiana, Alabama, Mississippi, and Florida.^b Other states include Arizona, Florida, Idaho, Illinois, Indiana, Maryland, Missouri, Nevada, Oregon, South Dakota, and Tennessee. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*Notes: The production estimates in this table are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official U.S. EIA production data for nonassociated natural gas for 2020 contained in the *Natural Gas Annual 2020*, DOE/EIA-0131(20). Natural gas is measured at 60 degrees Fahrenheit and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia).See EIA natural gas data at <https://www.eia.gov/naturalgas/data.php>.

Table 12. Proved reserves, reserves changes, and production of associated-dissolved natural gas, wet after lease separation, 2020

billion cubic feet

State and subdivision	Published Proved Reserves 12/31/19	Changes in reserves during 2020							Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Alaska	8,004	708	0	35,646	4,729	67,242	7	173	35,413
Lower 48 states	114,239	1,363	12,794	29,202	1,869	3,836	10,070	10,226	101,005
Alabama	107	-1	33	1	0	6	0	10	134
Arkansas	52	17	56	42	0	0	0	7	76
California	1,204	119	22	228	2	0	43	141	1,017
Coastal Region Onshore	157	11	6	61	0	0	0	10	103
Los Angeles Basin Onshore	60	14	0	16	0	0	1	5	54
San Joaquin Basin Onshore	931	85	16	133	2	0	42	123	816
State Offshore	56	9	0	18	0	0	0	3	44
Colorado	11,029	-933	2,098	3,829	891	1,660	183	1,038	8,279
Kansas	247	-7	7	39	2	0	0	17	189
Kentucky	7	-7	0	0	0	0	0	0	0
Louisiana	1,241	184	98	1,024	1	16	8	44	478
North	699	287	59	900	1	12	0	11	145
South Onshore	413	-61	16	83	0	4	8	27	270
State Offshore	129	-42	23	41	0	0	0	6	63
Michigan	102	-5	12	24	0	0	0	7	78
Mississippi	31	8	0	3	0	0	0	10	26
Montana	327	-23	121	147	0	0	1	19	260
New Mexico	13,656	654	541	2,341	125	105	3,336	1,239	14,587
East	13,392	553	534	2,266	125	105	3,166	1,215	14,144
West	264	101	7	75	0	0	170	24	443
New York	4	-1	0	0	0	0	0	0	3
North Dakota	13,052	256	1,962	6,189	3	0	426	981	8,523
Ohio	493	-95	111	71	14	0	0	22	402
Oklahoma	11,924	1,039	1,136	4,177	170	697	559	960	10,048
Pennsylvania	124	3	6	0	29	6	0	11	99
Texas	54,667	477	5,865	10,445	627	1,332	5,307	4,907	51,669
RRC District 1	5,713	34	273	1,884	21	0	112	402	3,825
RRC District 2 Onshore	3,005	65	226	434	0	0	178	345	2,695
RRC District 3 Onshore	834	-39	29	315	18	10	48	72	477
RRC District 4 Onshore	96	100	1	45	0	0	0	15	137
RRC District 5	49	104	16	32	1	0	0	35	101
RRC District 6	1,538	-907	60	253	3	9	0	75	369
RRC District 7B	175	77	5	147	25	1	2	13	75
RRC District 7C	7,762	-191	1,234	1,195	47	232	510	760	7,545
RRC District 8	32,105	868	3,943	5,184	431	963	4,443	2,916	33,791
RRC District 8A	1,476	113	7	203	79	15	3	124	1,208
RRC District 9	1,205	121	47	550	2	0	0	74	747
RRC District 10	709	132	24	203	0	102	11	76	699
State Offshore	0	0	0	0	0	0	0	0	0

Table 12. Proved reserves, reserves changes, and production of associated-dissolved natural gas, wet after lease separation, 2020 (cont.)

billion cubic feet

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020							Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Utah	581	-112	216	89	4	0	105	46	651
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	30	20	15	3	0	1	0	5	58
Wyoming	1,288	-200	190	306	1	5	89	118	947
Federal Offshore	4,059	-27	305	244	0	8	13	644	3,470
Pacific (California)	188	-1	0	35	0	0	0	3	149
Gulf of Mexico (Central and Eastern) ^a	3,623	-154	288	189	0	8	13	554	3,035
Gulf of Mexico (Western)	248	128	17	20	0	0	0	87	286
Other states ^b	14	-3	0	0	0	0	0	0	11
U.S. Total	122,243	2,071	12,794	64,848	6,598	71,078	10,077	10,399	136,418

^a Includes Federal Offshore Louisiana, Alabama, Mississippi, and Florida.^b Other states include Arizona, Florida, Idaho, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*Notes: The production estimates in this table are based on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official U.S. EIA production data for associated-dissolved natural gas for 2020 contained in the *Natural Gas Annual 2020*, DOE/EIA-0131(20). Natural gas is measured at 60 degrees Fahrenheit and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia).See EIA natural gas data at <https://www.eia.gov/naturalgas/data.php>.

Table 13. Proved reserves and production of shale natural gas, 2017–2020

billion cubic feet

State and subdivision	Reserves				Production			
	2017	2018	2019	2020	2017	2018	2019	2020
Alaska	0	0	0	0	0	0	0	0
Lower 48 states	307,903	342,135	353,682	317,756	18,589	22,054	25,556	26,139
Arkansas	7,090	5,970	5,093	4,210	618	521	471	419
California	62	41	-	-	6	4	-	-
Colorado	1,885	2,727	2,500	1,331	97	126	149	116
Florida	0	0	0	0	0	0	0	0
Kansas	0	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	0	0
Louisiana	26,484	25,598	29,553	28,533	1,450	2,044	2,518	2,555
North	26,316	25,598	29,553	28,533	1,414	2,044	2,518	2,555
South	168	0	0	0	36	0	0	0
State Offshore	0	0	0	0	0	0	0	0
Michigan	942	1,457	1,138	823	63	77	72	57
Mississippi	8	0	0	0	2	0	0	0
Montana	258	221	268	227	18	18	21	16
New Mexico	9,451	13,082	14,413	14,667	592	785	1,101	1,337
North Dakota	9,984	11,737	12,542	8,376	664	840	1,043	970
Ohio	26,468	23,956	34,376	27,775	1,747	2,337	2,558	2,320
Oklahoma	22,675	21,396	20,897	15,483	1,290	1,325	1,490	1,195
Pennsylvania	89,478	103,388	105,394	96,699	5,365	6,079	6,782	7,040
Texas	78,666	100,789	93,487	87,296	5,171	6,392	7,440	7,844
RRC District 1	8,895	11,434	9,511	6,517	652	693	729	688
RRC District 2 Onshore	4,900	4,993	4,345	4,290	584	654	631	621
RRC District 3 Onshore	744	451	328	135	23	21	23	21
RRC District 4 Onshore	12,861	13,953	12,486	11,396	677	689	682	599
RRC District 5	10,636	8,431	6,728	5,344	730	680	586	516
RRC District 6	8,909	18,690	17,026	16,224	333	515	895	1,046
RRC District 7B	1,736	1,673	1,090	679	110	118	93	84
RRC District 7C	7,156	7,454	7,747	7,688	494	597	705	798
RRC District 8	15,317	26,116	27,657	30,026	1,115	1,960	2,683	3,088
RRC District 8A	50	104	115	141	1	6	9	15
RRC District 9	7,462	7,490	6,454	4,856	452	459	404	368
RRC District 10	0	0	0	0	0	0	0	0
State Offshore	0	0	0	0	0	0	0	0
Virginia	66	0	0	0	4	0	0	0
West Virginia	34,296	31,748	34,020	32,335	1,486	1,504	1,911	2,270
Wyoming	28	0	0	0	6	0	0	0
Federal Offshore	0	0	0	0	0	0	0	0
Other states ^a	62	25	1	1	10	2	0	0
U.S. Total	307,903	342,135	353,682	317,756	18,589	22,054	25,556	26,139

^aOther states include Indiana, Missouri, New York, South Dakota, Tennessee, and Utah. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2017–20

Notes: The above table is based on proved reserves and production volumes of shale natural gas reported and imputed from data on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. For certain reasons (e.g. incorrect or incomplete respondent submissions, respondent misidentification of shale versus non-shale reservoirs) the actual proved reserves and production of natural gas from shales may be higher or lower. The production estimates are provided as an indicator of production trends and may differ slightly from official U.S. EIA production volumes listed elsewhere on the U.S. EIA web page. Natural gas is measured at 60 degrees Fahrenheit and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia).

Table 14. Proved reserves, reserves changes, and production of shale natural gas, 2020

billion cubic feet

State and subdivision	Published proved reserves 12/31/19	Changes in reserves during 2020							Proved reserves 12/31/20
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Sales (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Alaska	0	0	0	0	0	0	0	0	0
Lower 48 states	353,682	1,234	22,724	69,053	7,443	10,067	32,684	26,139	317,756
Arkansas	5,093	-1	18	481	0	0	0	419	4,210
Colorado	2,500	-1,262	569	742	16	384	14	116	1,331
Kansas	0	0	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	0	0	0
Louisiana	29,553	83	4,744	6,022	59	224	2,565	2,555	28,533
North Onshore	29,553	83	4,744	6,022	59	224	2,565	2,555	28,533
South Onshore	0	0	0	0	0	0	0	0	0
Michigan	1,138	-104	65	177	43	1	0	57	823
Mississippi	0	0	0	0	0	0	0	0	0
Montana	268	-14	110	122	0	0	1	16	227
New Mexico	14,413	607	533	2,727	120	115	3,183	1,337	14,667
North Dakota	12,542	145	1,939	5,701	3	0	424	970	8,376
Ohio	34,376	-3,037	2,481	7,199	5	2,598	881	2,320	27,775
Oklahoma	20,897	2,313	494	7,373	414	41	720	1,195	15,483
Pennsylvania	105,394	-2,388	1,700	13,576	2,563	2,839	12,333	7,040	96,699
Texas	93,487	5,394	8,747	18,371	3,792	3,383	6,292	7,844	87,296
RRC District 1	9,511	750	313	3,449	42	10	112	688	6,517
RRC District 2 Onshore	4,345	581	514	1,100	0	0	571	621	4,290
RRC District 3 Onshore	328	-22	2	152	0	0	0	21	135
RRC District 4 Onshore	12,486	1,681	90	1,926	382	6	40	599	11,396
RRC District 5	6,728	-208	146	721	356	270	1	516	5,344
RRC District 6	17,026	554	1,595	3,173	3	0	1,271	1,046	16,224
RRC District 7B	1,090	164	109	589	61	50	0	84	679
RRC District 7C	7,747	-120	1,236	1,077	8	250	458	798	7,688
RRC District 8	27,657	1,807	3,993	4,635	213	668	3,837	3,088	30,026
RRC District 8A	115	65	0	26	0	0	2	15	141
RRC District 9	6,454	142	749	1,523	2,727	2,129	0	368	4,856
RRC District 10	0	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	34,020	-502	1,324	6,562	428	482	6,271	2,270	32,335
Wyoming	0	0	0	0	0	0	0	0	0
Federal Offshore	0	0	0	0	0	0	0	0	0
Other states ^a	2	-1	0	0	0	0	0	0	1
U.S. Total	353,682	1,234	22,724	69,053	7,443	10,067	32,684	26,139	317,756

^a Other states include California, Illinois, Indiana, Missouri, New York, South Dakota, Tennessee, and Utah. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*

Notes: The above table is based on proved reserves and production volumes of shale natural gas reported and imputed from data on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. For certain reasons (e.g. incorrect or incomplete respondent submissions, respondent misidentification of shale versus non-shale reservoirs) the actual proved reserves and production of natural gas from shales may be higher or lower. The production estimates are provided as an indicator of production trends and may differ slightly from official U.S. EIA production volumes listed elsewhere on the U.S. EIA website. Natural gas is measured at 60 degrees Fahrenheit and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia).

Table 15. Estimated proved reserves of natural gas plant liquids and dry natural gas, 2020

million barrels and billion cubic feet

State and subdivision	Total proved natural gas reserves	Estimated yield from total proved natural gas reserves	
	2020 billion cubic feet	Natural gas plant liquids million barrels	Dry natural gas billion cubic feet
Alaska	36,529	229	36,176
Lower 48 states	436,756	20,466	409,123
Alabama	1,530	31	1,493
Arkansas	4,983	2	4,981
California	1,122	43	1,065
Coastal Region Onshore	103	4	98
Los Angeles Basin Onshore	54	3	51
San Joaquin Basin Onshore	921	35	873
State Offshore	44	1	43
Colorado	20,412	1,362	18,653
Kansas	2,114	130	1,989
Kentucky	1,249	72	1,158
Louisiana	37,570	167	37,397
North	36,049	68	35,958
South Onshore	1,150	66	1,090
State Offshore	371	33	349
Michigan	891	8	881
Mississippi	167	0	167
Montana	570	11	555
New Mexico	26,129	1,720	23,698
East	16,890	1,230	15,137
West	9,239	490	8,561
New York	115	0	115
North Dakota	8,563	1,030	7,133
Ohio	28,100	416	27,514
Oklahoma	30,091	2,014	27,227
Pennsylvania	97,802	916	96,463
Texas	114,732	9,467	102,370
RRC District 1	6,915	150	6,701
RRC District 2 Onshore	4,882	840	4,085
RRC District 3 Onshore	1,708	142	1,495
RRC District 4 Onshore	15,031	498	14,308
RRC District 5	7,062	258	6,685
RRC District 6	20,740	359	20,233
RRC District 7B	907	89	782
RRC District 7C	8,302	822	7,125
RRC District 8	38,505	5,283	31,282
RRC District 8A	1,224	169	1,190
RRC District 9	5,166	411	4,563
RRC District 10	4,268	446	3,899
State Offshore	22	0	22
Utah	2,381	63	2,296
Virginia	1,951	0	1,950
West Virginia	38,462	2,259	35,247
Wyoming	13,126	466	12,484
Federal Offshore	4,654	289	4,245
Pacific (California)	149	1	148
Gulf of Mexico (Central and Eastern) ^a	4,134	271	3,749
Gulf of Mexico (Western)	371	17	348
Other states ^b	40	0	42
U.S. Total	473,285	20,695	445,299

^a Includes Federal Offshore Louisiana, Mississippi, Alabama, and Florida.^b Other states include Arizona, Florida, Idaho, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, and Form EIA-64A, *Annual Report of the Origin of Natural Gas Liquids Production*

Notes: One barrel = 42 U.S. gallons. Natural gas is measured at 60 degrees Fahrenheit and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia).

Table 16. Reported proved nonproducing reserves of crude oil, lease condensate, nonassociated gas, associated-dissolved gas, and total gas, wet after lease separation, 2020

State and subdivision	Crude oil (million barrels)	Lease condensate (million barrels)	Nonassociated gas (billion cubic feet)	Associated- dissolved gas (billion cubic feet)	Total gas (billion cubic feet)
Alaska	473	0	585	3022	3,607
Lower 48 states	10,086	778	104,450	32,156	136,606
Alabama	4	2	49	8	57
Arkansas	2	0	252	17	269
California	260	0	54	199	253
Coastal Region Onshore	37	0	0	31	31
Los Angeles Basin Onshore	21	0	0	6	6
San Joaquin Basin Onshore	173	0	54	154	208
State Offshore	29	0	0	8	8
Colorado	427	71	3,677	3,062	6,739
Kansas	11	6	158	22	180
Kentucky	0	0	3	0	3
Louisiana	91	15	12,537	88	12,625
North	2	3	12,087	6	12,093
South Onshore	84	12	450	80	530
State Offshore	5	0	0	2	2
Michigan	3	0	0	4	4
Mississippi	21	0	36	1	37
Montana	75	0	16	89	105
New Mexico	1,789	31	3,638	8,047	11,685
New York	0	0	0	0	0
North Dakota	807	0	2	1,688	1,690
Ohio	44	120	14,244	263	14,507
Oklahoma	405	66	3,278	2,855	6,133
Pennsylvania	0	52	27,478	0	27,478
Texas	4,951	291	23,507	14,440	37,947
RRC District 1	572	4	1,617	951	2,568
RRC District 2 Onshore	411	101	759	803	1,562
RRC District 3 Onshore	13	20	186	7	193
RRC District 4 Onshore	0	42	7,315	34	7,349
RRC District 5	4	1	502	4	506
RRC District 6	3	40	10,780	167	10,947
RRC District 7B	6	0	9	9	18
RRC District 7C	282	0	49	1,380	1,429
RRC District 8	3,433	51	521	10,789	11,310
RRC District 8A	213	0	0	211	211
RRC District 9	5	4	590	4	594
RRC District 10	9	28	1,179	81	1,260
State Offshore	0	0	0	0	0
Utah	188	1	181	314	495
Virginia	0	0	368	0	368
West Virginia	0	82	13,919	0	13,919
Wyoming	106	9	478	183	661
Federal Offshore	882	32	574	876	1,450
Pacific (California)	113	0	0	127	127
Gulf of Mexico (Central and Eastern) ^a	695	30	512	632	1,144
Gulf of Mexico (Western)	74	2	62	117	179
Other states ^b	4	0	0	0	0
U.S. Total	10,559	778	105,035	35,178	140,213

^a Includes Federal Offshore Louisiana, Mississippi, Alabama, and Florida.

^b Other states include Arizona, Florida, Idaho, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee. Individual state volumes are withheld to avoid disclosure of operator-level reserves data, or because of other statistical precision or data quality reasons.

Source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*

Notes: One barrel = 42 U.S. gallons. Natural gas is measured at 60 degrees Fahrenheit and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia).