



Proved Reserves of Crude Oil and Natural Gas in the United States, Year-End 2021

December 2022

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Contents

Proved Reserves of Crude Oil and Natural Gas in the United States, Year-End 2021	1
Oil highlights	1
Natural gas highlights	2
National summary	3
Background	7
Proved reserves of crude oil and lease condensate	9
Extensions and discoveries	11
Crude oil and lease condensate from U.S. shale plays.....	13
Proved reserves of natural gas	14
Nonassociated natural gas	16
Associated-dissolved natural gas	17
Natural gas from U.S. shale plays.....	17
Proved U.S. reserves of dry natural gas	20
Proved reserves of lease condensate and NGPLs.....	21
Lease condensate	21
Natural gas plant liquids.....	21
Reserves in nonproducing reservoirs	21
Maps and additional data tables	22
Maps.....	23
Oil tables	27
Natural gas tables	34
Miscellaneous tables.....	44

Tables and Figures

Table 1. U.S. proved reserves and reserve changes, 2020–21	3
Table 2. Production and proved reserves of crude oil from selected U.S. shale plays, 2020–21.....	13
Table 3. Changes to proved reserves of U.S. natural gas by source, 2020–21	155
Table 4. U.S. shale plays: production and proved reserves of natural gas, 2020–21	20
Table 5. U.S. proved reserves of crude oil and lease condensate, 2011–21	27
Table 6. Proved reserves, reserve changes, and production of crude oil and lease condensate, 2021.....	28
Table 7. Proved reserves, reserve changes, and production of crude oil, 2021.....	30
Table 8. Proved reserves, reserve changes, and production of lease condensate, 2021.....	32
Table 9. U.S. proved reserves of natural gas, wet after lease separation, 2001–21	34
Table 10. Proved reserves, reserve changes, and production of natural gas, wet after lease separation, 2021	35
Table 11. Proved reserves, reserve changes, and production of nonassociated natural gas, wet after lease separation, 2021	37
Table 12. Proved reserves, reserve changes, and production of associated-dissolved natural gas, wet after lease separation, 2021	39
Table 13. Proved reserves and production of shale natural gas, 2018–21.....	41
Table 14. Proved reserves, reserve changes, and production of shale natural gas, 2021.....	42
Table 15. Estimated proved reserves of natural gas plant liquids and dry natural gas, 2021	43
Table 16. Reported proved nonproducing reserves of crude oil, lease condensate, nonassociated gas, associated-dissolved gas, and total gas, wet after lease separation, 2021	44
Figure 1. U.S. proved reserves, 1981–2021	3
Figure 2. Proved reserves of the top eight U.S. oil reserves states, 2017–21	4
Figure 3. Proved reserves of the top eight U.S. natural gas reserves states, 2017–21	5
Figure 4. Proved reserves, production, and imports of U.S. crude oil and lease condensate, 1991–2021 .	6
Figure 5. Proved reserves, production, and imports of U.S. natural gas, 1991–2021	6
Figure 6. WTI crude oil spot prices, first day of the month, 2012–22	8
Figure 7. Henry Hub natural gas spot prices, first day of the month, 2012–22.....	8
Figure 8. Proved reserves of U.S. crude oil and lease condensate, 1991–2021	10
Figure 9a. Changes in the proved reserves of U.S. crude oil and lease condensate, 2020–21	10
Figure 9b. Components of U.S. crude oil and lease condensate annual reserve changes, 2011–21	11
Figure 10. Proved reserves of U.S. natural gas, 1991–2021	14
Figure 11a. Changes in the proved reserves of U.S. natural gas, 2020–21	15
Figure 11b. Components of U.S. natural gas annual reserve changes, 2011–21	16
Figure 12. Proved reserves of U.S. natural gas (from shale and other sources), 2011–21.....	18
Figure 13. Proved shale gas reserves of the top eight U.S. shale gas reserves states, 2017–21.....	19
Figure 14. Crude oil and lease condensate proved reserves by state or area, 2021.....	23
Figure 15. Changes in crude oil and lease condensate proved reserves by state or area, 2020–21.....	24
Figure 16. Natural gas proved reserves by state or area, 2021	25
Figure 17. Changes in natural gas proved reserves by state or area, 2020–21	26

Proved Reserves of Crude Oil and Natural Gas in the United States, Year-End 2021

In 2021, U.S. energy demand rebounded from its 2020 lows caused by the COVID-19 pandemic. The average prices of both crude oil and natural gas in the United States rose to the highest levels since 2014. Proved reserves of natural gas reported by operators established a new record in the United States in 2021, while proved U.S. reserves of oil increased but did not quite return to pre-pandemic levels.

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 and costs
- New and improved techniques and technologies

To prepare this report, we collect 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. This year, we received responses from 392 of 411 sampled operators, which provided coverage of about 90% of proved reserves of oil and 93% of proved reserves of natural gas at the national level. We develop estimates for reserves located in the United States, each state individually, and some state subdivisions. States and regions with subdivisions are:

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

Oil highlights

- Proved reserves of U.S. crude oil and lease condensate increased by 6.2 billion barrels (16%), from 38.2 billion barrels to 44.4 billion barrels at year-end 2021 (Table 1).
- U.S. domestic production of crude oil and lease condensate decreased 1% in 2021.
- Texas, where more proved reserves of crude oil and lease condensate are located than any other, saw the largest net increase in proved reserves in 2021 (1.9 billion barrels, 12%) (Table 6).
- New Mexico saw the second-largest net increase of proved reserves of crude oil and lease condensate (1.4 billion barrels, 39%), and Alaska the third-largest (0.7 billion barrels, 31%).
- The largest net decrease in proved reserves of crude oil and lease condensate in 2021 was reported by operators in Oklahoma (-19 million barrels, 1%) (Table 6).

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

- The 12-month, first-day-of-the-month average spot price for West Texas Intermediate (WTI) crude oil at Cushing, Oklahoma, increased by 67% from \$39.66 per barrel in 2020 to \$66.26/barrel in 2021 (Figure 6).

Natural gas highlights

- Proved reserves of U.S. natural gas increased by 152.1 trillion cubic feet (Tcf) (32%), from 473.3 Tcf at year-end 2020 to 625.4 Tcf at year-end 2021 (Table 10), establishing a new record for natural gas proved reserves in the United States.
- Alaska (for the second consecutive year) saw a substantial volume of proved natural gas reserves added in 2021. The annual total of natural gas proved reserves in Alaska increased in 2021 by 63.3 Tcf, almost tripling the state's total from 36.5 Tcf to 99.8 Tcf—the largest increase of all states in 2021.
- Texas saw the second-largest increase in proved reserves of natural gas in 2021 (34.3 Tcf, 30%), and New Mexico the third-largest increase (10 Tcf, 38%).
- The 12-month, first day-of-the-month average spot price for natural gas at the Louisiana Henry Hub increased by 84% from \$1.99 per million British thermal units (MMBtu) in 2020 to \$3.67/MMBtu in 2021 (Figure 7), which was the highest annual average price since 2014.

National summary

Table 1. U.S. proved reserves and reserve changes, 2020–21

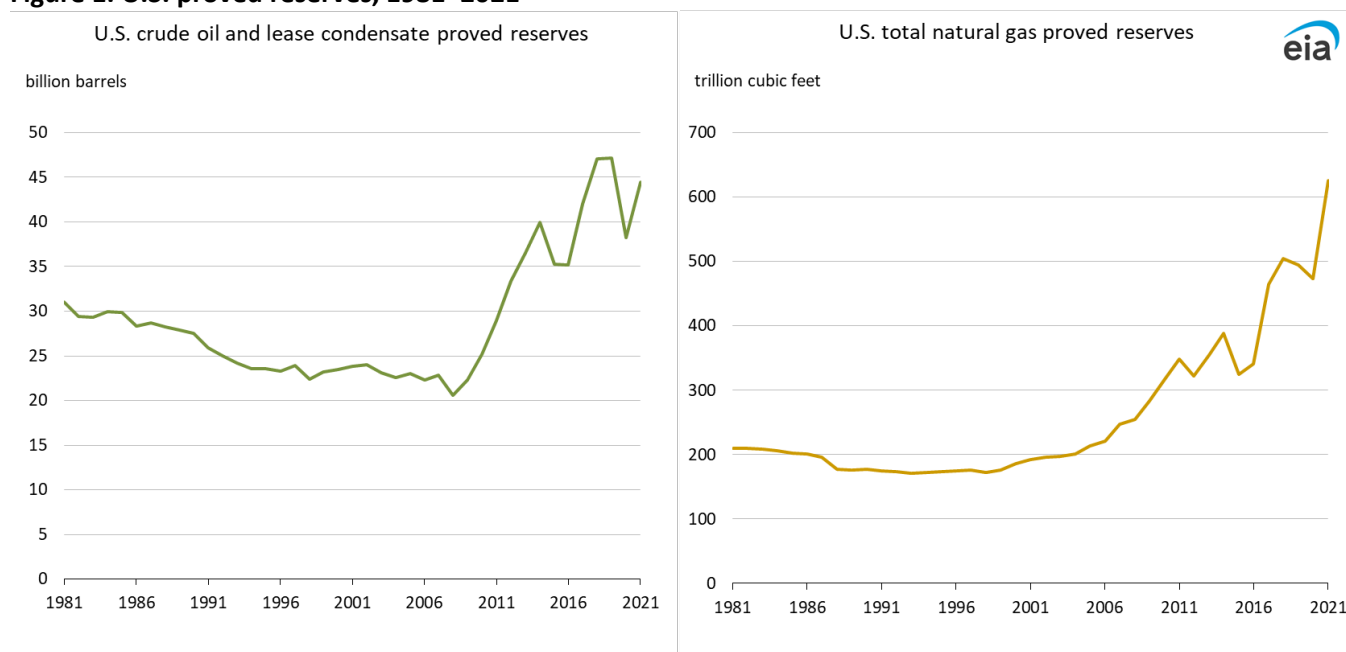
	Crude oil billion barrels	Crude oil and lease condensate billion barrels	Total natural gas trillion cubic feet
U.S. proved reserves as of December 31, 2020	35.8	38.2	473.3
Extensions and discoveries	5.7	6.3	67.6
Net revisions	1.6	2.3	100.0
Net adjustments, divestitures, and acquisitions	1.8	1.8	22.6
Estimated production	-3.8	-4.1	-38.1
Net additions to U.S. proved reserves	5.3	6.2	152.1
U.S. proved reserves as of December 31, 2021	41.2	44.4	625.4
Percentage change in U.S. proved reserves	14.8%	16.2%	32.1%

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

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

From 1981 to 1996, U.S. reserves of natural gas and crude oil steadily declined (Figure 1). In 1997, the downward trend for natural gas reversed as operators began introducing innovations including [horizontal drilling](#)² and [hydraulic fracturing](#) techniques that successfully increased proved reserves and production of natural gas from shale formations. The downward trend for crude oil reversed beginning in 2008 when operators also applied these innovations to tight oil-bearing formations, such as the Bakken shale of the Williston Basin.

Figure 1. U.S. proved reserves, 1981–2021



Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves, 1981–2021*

Steady increases in oil and natural gas reserves continued until 2015, when the industry experienced a large price drop (-47% for crude oil and -42% for natural gas), and proved reserves were revised downward because these lower prices did not support operators' projections of resource development. From 2016 to 2018, U.S. oil and

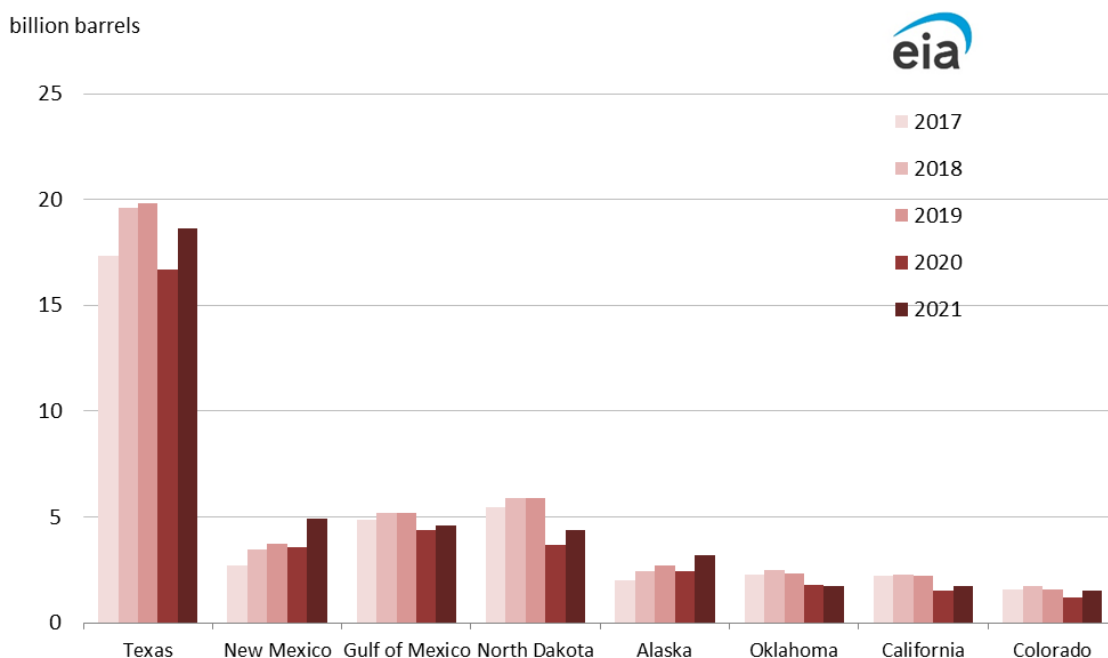
² U.S. Energy Information Administration, *Today in Energy*, Hydraulically fractured horizontal wells account for most new oil and natural gas wells, January 30, 2018.

natural gas prices and reserves increased by at least 9% each year. That trend was again interrupted in 2019 by declining oil and natural gas prices (-15% for crude oil; -20% for natural gas) and in 2020, demand and proved reserves declined for both fuels. In 2021, demand for petroleum and natural gas increased 5% from 2020³, prices rose, and proved reserves increased for both fuels, setting a new U.S. record for natural gas.

In 2021, proved U.S. reserves of combined crude oil and lease condensate increased in seven of the eight states with the most oil reserves states (Figure 2). In 2021, operators in Texas reported the largest net increase in the state's proved reserves of crude oil and lease condensate—an increase of 1,931 million barrels.

Operators in New Mexico had the second-largest increase of proved crude oil and lease condensate reserves—a net increase of 1,370 million barrels. The third-largest net increase in proved reserves of crude oil and lease condensate occurred in Alaska, a net increase of 754 million barrels.

Figure 2. Proved reserves of the top eight U.S. oil reserves states and regions, 2017–21



Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves, 2017–21*

Note: 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 producing region.

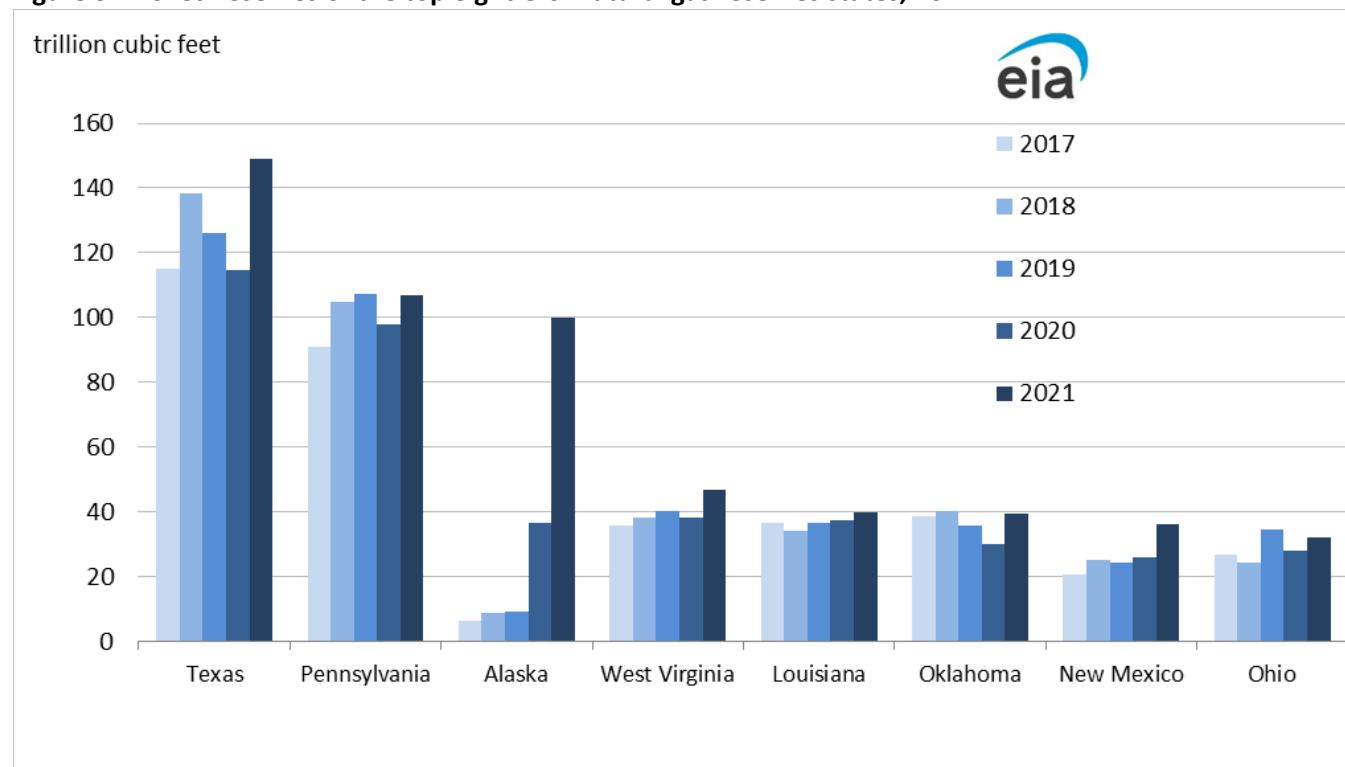
Proved U.S. natural gas reserves increased in each of the eight states with the most natural gas reserves in 2021 (Figure 3). Alaska, for the second year in a row, saw operators add the most proved reserves of natural gas. In the previous year, the [Alaska LNG project](#) pipeline allowed operators to book previously stranded natural gas from the north slope of Alaska as proved reserves. The continuing development of that project and rising natural gas prices caused operators to revise their reserves estimates up yet again in 2021. The annual total of natural gas

³ U.S. Energy Information Administration, *Monthly Energy Review*, November 2022, [Table 1.3, Primary Energy Consumption by Source](#).

proved reserves in Alaska increased in 2021 by 63.3 trillion cubic feet (Tcf), almost tripling the state's total natural gas reserves from 36.5 Tcf to 99.8 Tcf.

Operators in Texas reported the second-largest net increase in proved natural gas reserves in any state, a net increase of 34.3 Tcf. Operators in New Mexico reported the third-largest net increase in proved natural gas reserves in 2021, increasing by 10 Tcf. These increases resulted from extensions and discoveries in the Permian and Delaware Basins and also from net revision increases due to rising natural gas prices.

Figure 3. Proved reserves of the top eight U.S. natural gas reserves states, 2017–21



Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2017–21

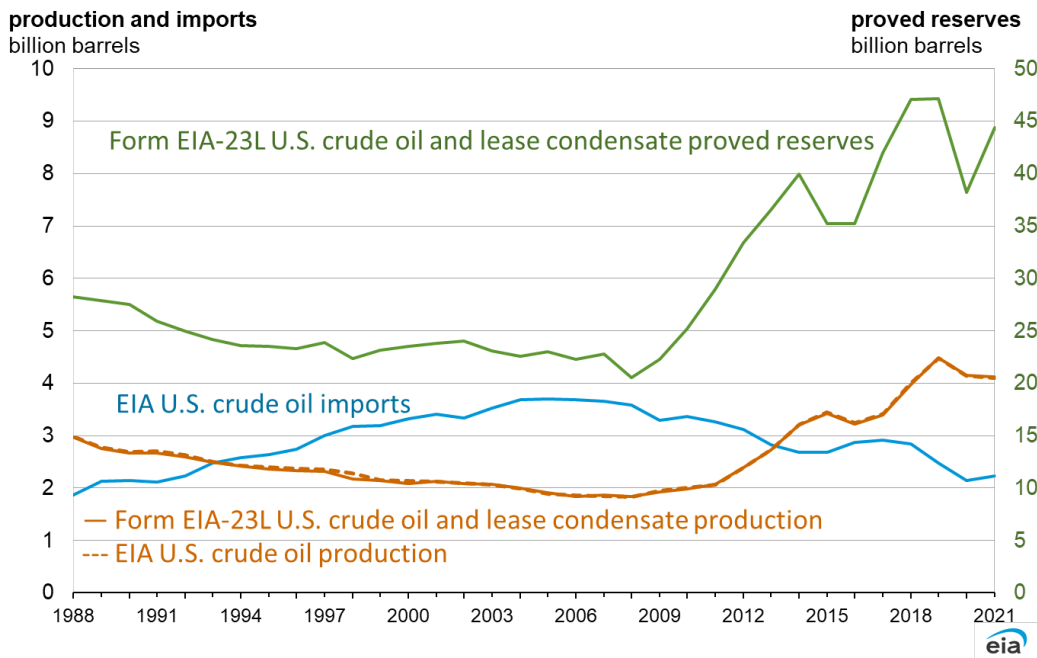
Note: Total natural gas includes natural gas plant liquids that have yet to be extracted downstream, and it does not include lease condensate.

Official oil and natural gas production data

We publish official production volumes in the [Petroleum Supply Annual 2021](#), DOE/EIA-0340(20), and the [Natural Gas Annual 2021](#), 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. Figures 4 and 5 display both the official EIA and the EIA-23L production data series.

In 2021, annual production of crude oil and lease condensate decreased in the United States by 1% (-35 million barrels). Annual U.S. imports of crude oil increased 4% (80 million barrels) (Figure 4).

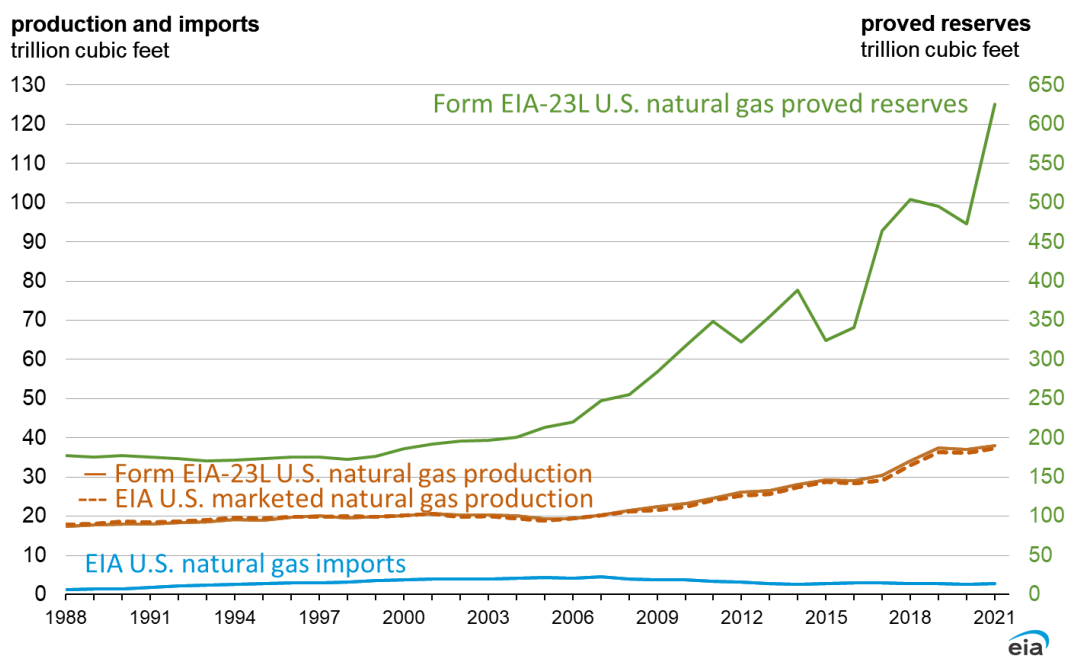
Figure 4. Proved reserves, production, and imports of U.S. crude oil and lease condensate, 1988–2021



Data source: 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 2021*, DOE/EIA-0340(21)

U.S. natural gas production increased 3% (1,126 billion cubic feet [Bcf]) in 2021, and natural gas imports increased 10% (256 Bcf) (Figure 5).

Figure 5. Proved reserves, production, and imports of U.S. natural gas, 1988–2021



Data source: 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 2021*, DOE/EIA-0131(21)

Background

This report provides estimates of proved reserves of crude oil and lease condensate and proved reserves of natural gas located within the United States at the end of 2021. We measured changes for 2021 as the difference between year-end 2020 and year-end 2021 estimates. We processed data filed on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, submitted by 392 of 411 sampled operators of U.S. oil and natural gas fields. We then estimated the remaining portion of U.S. 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, and 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 publish proved reserves for state subdivisions in 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 and costs
- New and improved techniques and technologies

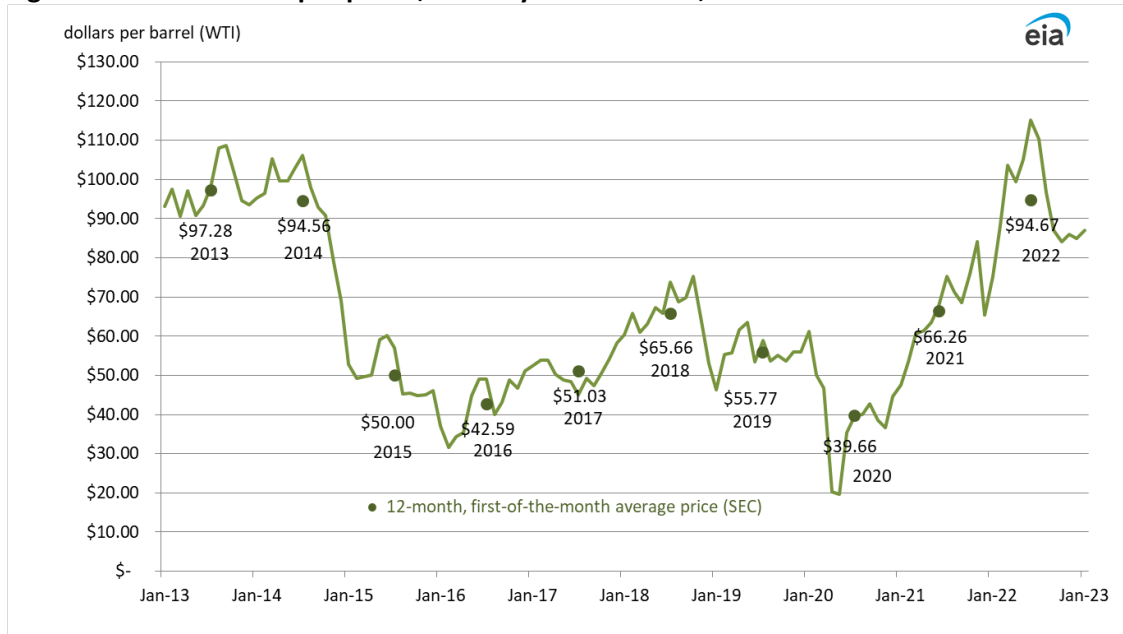
Discoveries include new fields, new reservoirs in previously discovered fields, and extensions, which are additional reserves that resulted from drilling and exploration in previously discovered reservoirs. Extensions typically make up the largest share of total discoveries. Beginning with the 2016 report, 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 of proved reserves as operators consider more of the resource base economically producible with reasonable certainty. Lower prices, on the other hand, generally reduce estimates 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 it has operators use to estimate proved reserves in 2008 to reduce their sensitivity to price fluctuations. [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; SEC requires companies to report their owned reserves, and EIA requires companies to report their operated reserves.

National or regional spot market prices are not necessarily the prices used by operators in their reserve estimates for us 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 price for crude oil) in 2021 was \$66.26 per barrel—a price increase of 67% from 2020 (Figure 6).

Figure 6. WTI crude oil spot prices, first day of the month, 2013–22



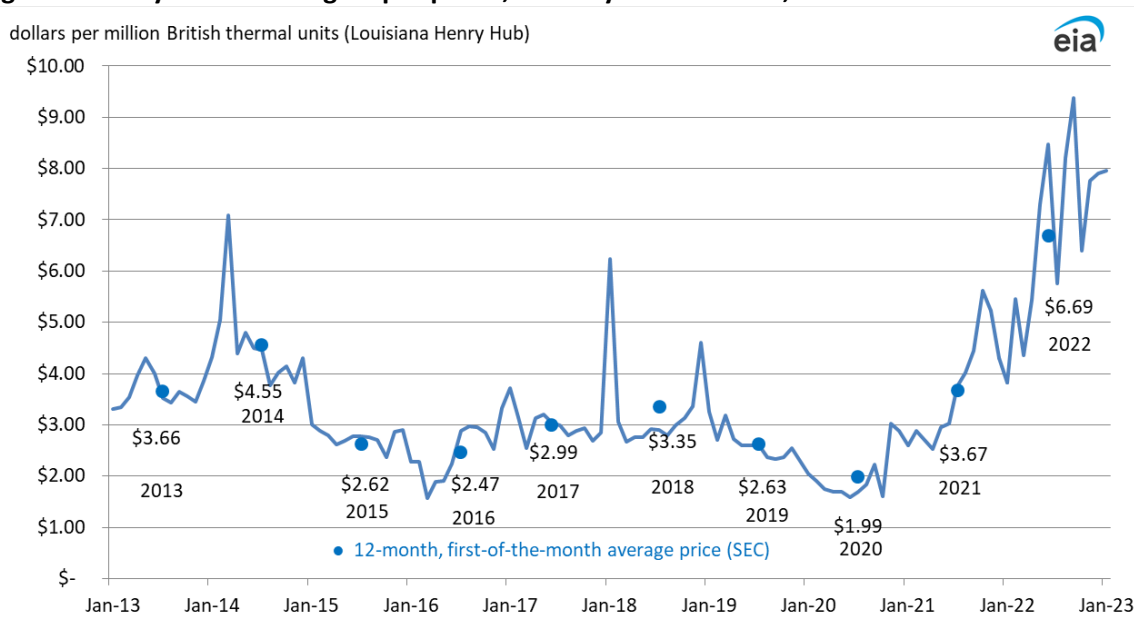
Data source: Refinitiv

Note: Dec 2022 and Jan 2023 price forecasts were taken from our *Short-Term Energy Outlook*, October 2022.

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 2021 was \$3.67 per million British thermal units (MMBtu)—an 84% increase from the previous year’s average spot price of \$1.99/MMBtu (Figure 7).

Figure 7. Henry Hub natural gas spot prices, first day of the month, 2013–22



Data source: Refinitiv data

Note: Dec 2022 and Jan 2023 price forecasts were taken from our *Short-Term Energy Outlook*, October 2022. SEC = U.S. Securities and Exchange Commission.

Proved reserves outlook for EIA's next report (2022)

On February 24, 2022, Russian Federation President Vladimir Putin announced that Russia was initiating a "special military operation"⁴ in the Donbass and launched a full-scale invasion into Ukraine⁵. The invasion caused international crude oil prices to rise above \$100 a barrel, before ultimately reaching \$120 a barrel a few months later as the United States and other countries imposed economic sanctions on Russia.

In 2022, 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 have increased from 2021. The oil price rose 43% (from \$66.26 per barrel to \$94.67 per barrel), and the natural gas price rose 90% (from \$3.67/MMBtu to \$6.69/MMBtu). On November 3, 2022, the WTI daily spot price was \$86.12 per barrel, and the natural gas daily spot price at the Henry Hub was \$5.02/MMBtu. During the summer months of 2022, [the price of U.S. retail regular gasoline](#) set a new record high average of \$4.93 cents per gallon.

In January 2021, only 374 [rotary rigs were operating in the United States](#).⁶ One year later, in January 2022, the number of operating rigs totaled 481. As of November 11, 2022, the number of rigs operating in the United States had risen to 779⁷ due to higher prices for oil and natural gas. As a result, we expect operators to report an increase in additions of proved reserves from extensions and discoveries in the 2022 reserves report.

According to estimates published in our [Short-Term Energy Outlook \(STEO\)](#) forecast, U.S. production in 2022 will increase 4% for crude oil and 9% for natural gas. When combined with higher prices, increased rig counts, and more annual production, we anticipate that total U.S. proved reserves will increase again in 2022 for both crude oil and natural gas.

Proved reserves of crude oil and lease condensate

We estimate that the United States had 44,418 million barrels of proved reserves of crude oil and lease condensate as of December 31, 2021—an increase of 16% from year-end 2020. Proved reserves increased 31% in Alaska, 17% onshore in the Lower 48 states (excluding Federal Offshore of the Pacific and the Gulf of Mexico), and 6% in the Federal Offshore (Figure 8).

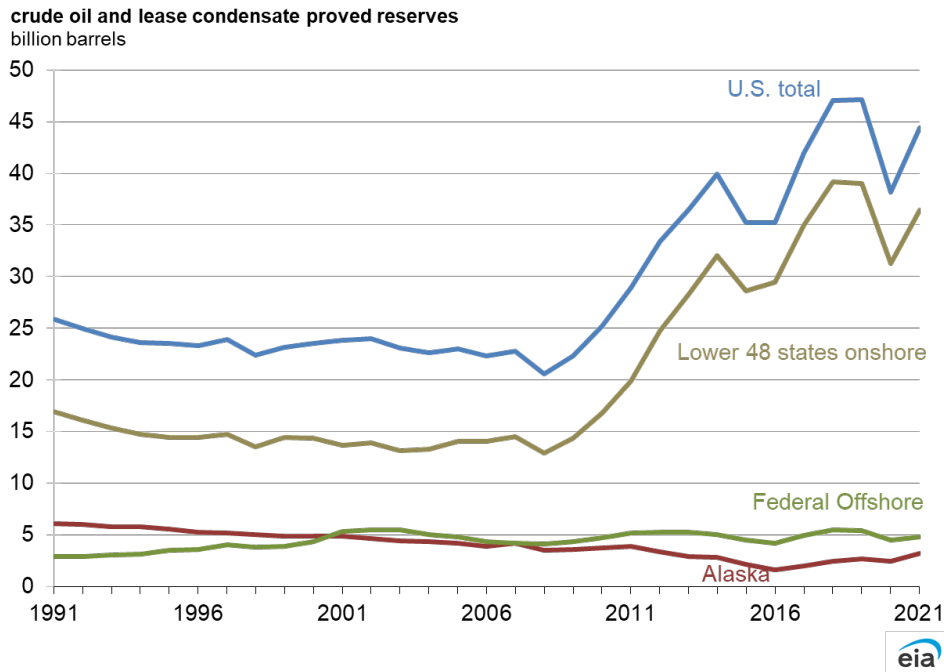
⁴ "Putin declares beginning of military operation in Ukraine." TASS Russian News Agency, 24 February 2022. <https://tass.com/politics/1409329>

⁵ "Ukraine Conflict: What we know about the Invasion." BBC News, 24 February, 2022. <https://www.bbc.com/news/world-europe-60504334>

⁶ 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.

⁷ Baker Hughes, Inc. <https://rigcount.bakerhughes.com/>

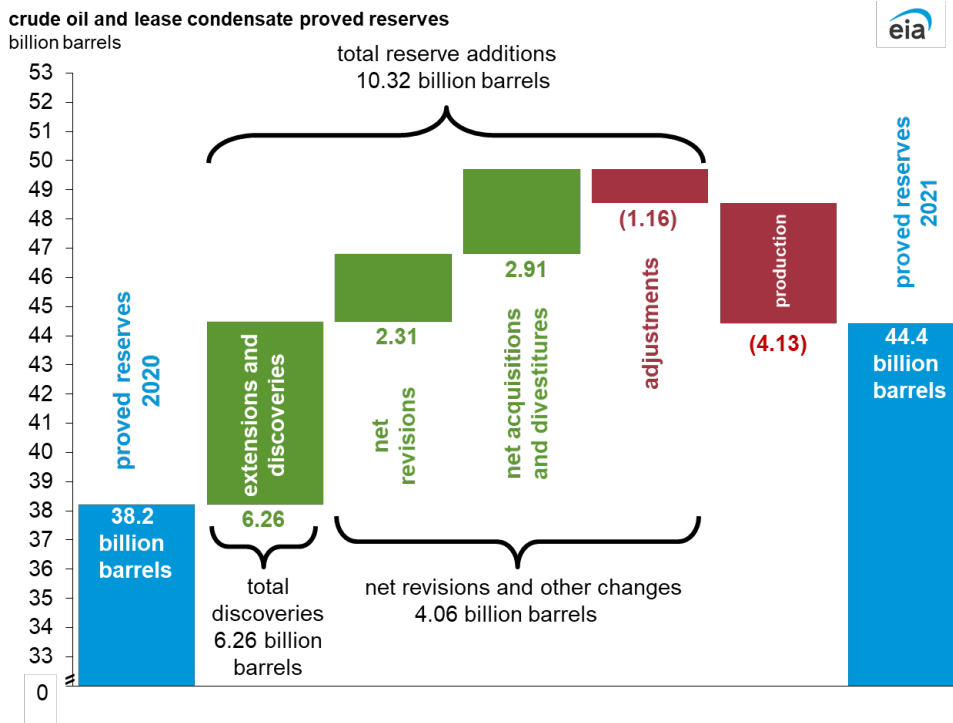
Figure 8. Proved reserves of U.S. crude oil and lease condensate, 1991–2021



Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 1991–2021

U.S. proved reserves of crude oil and lease condensate increased by over 6 billion barrels (16%) in 2021. Extensions and discoveries alone, a component of total proved reserves additions, exceeded U.S. annual production for the year (Figure 9a).

Figure 9a. Changes in the proved reserves of U.S. crude oil and lease condensate, 2020–21



Data 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.

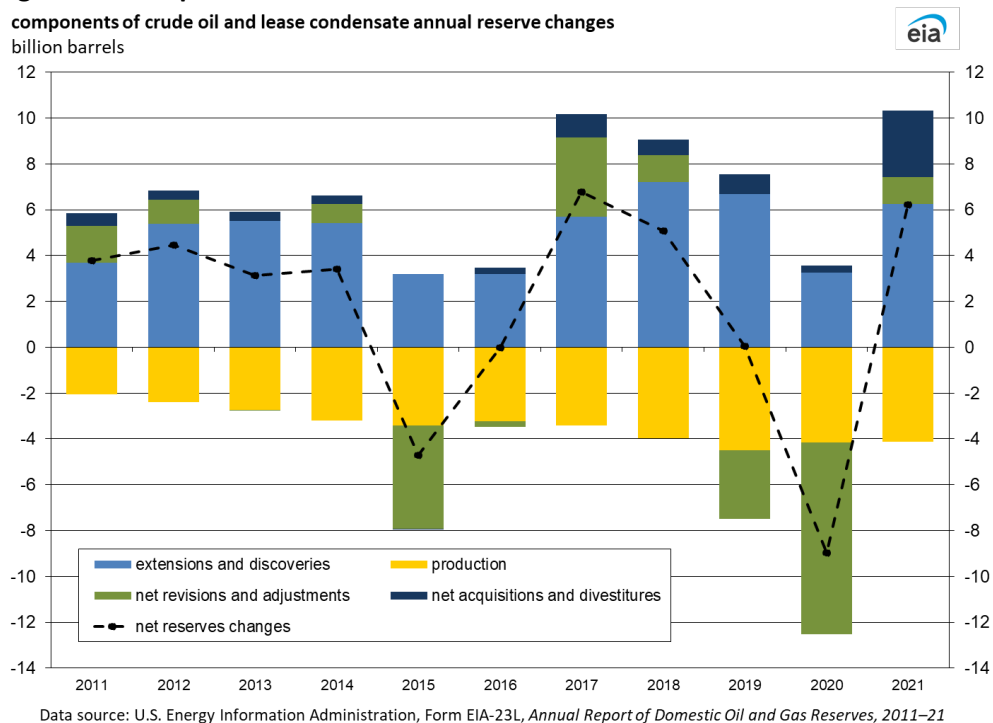
Operators in Texas reported the largest increase in total proved crude oil and lease condensate reserves (1,931 million barrels) of all states in 2021—an increase of 12% from 2020.

Operators in New Mexico had the second-largest net increase in 2021 of proved crude oil and lease condensate reserves (1,370 million barrels)—an increase of 39% from 2020.

Operators in Alaska reported the third-largest net increase in proved crude oil and lease condensate reserves (754 million barrels) in 2021—an increase of 31% from 2020.

Figure 9b summarizes the components of U.S. crude oil and lease condensate annual reserve changes since 2010:

Figure 9b. Components of U.S. crude oil and lease condensate annual reserve changes, 2011–21



Extensions and discoveries

Exploration including the discovery of new fields, identification of new reservoirs in fields discovered in previous years, and extensions, the addition of reserves that result from more drilling in previously discovered reservoirs, added 6.3 billion barrels to U.S. crude oil and lease condensate reserves in 2021. *Extensions and discoveries* in 2021—typically the largest component of proved reserves change in a given year—returned to pre-pandemic volumes (Figure 9b).

The largest extensions and discoveries of proved reserves of crude oil and lease condensate in 2021 were in Texas, New Mexico, and North Dakota. Operators reported 3.1 billion barrels of extensions and discoveries in Texas, 1.4 billion barrels in New Mexico, and 0.8 billion barrels in North Dakota.

Net revisions and other changes

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

Revisions increased proved reserves of U.S. crude oil and lease condensate by 2.3 billion barrels in 2021. The largest increases of proved reserves of crude oil and lease condensate due to revisions were in Alaska. Net revisions of proved reserves of crude oil and lease condensate accounted for an increase of 1.0 billion barrels in 2021 in Alaska.

The proved reserves of U.S. crude oil and lease condensate associated with buying and selling properties⁸ increased by 2.9 billion barrels in 2021. Texas reported the most transactions in 2021.

Adjustments

Adjustments are 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 2021, the sum of all of our adjustments for U.S. proved oil reserves was -1,159 million barrels.

Production

In general, production of crude oil and lease condensate in 2021 was not much changed from 2020. Our [official published estimate of total U.S. crude oil production](#) (including lease condensate) is 4,108 million barrels for 2021, down 1% from 2020 (4,142 million barrels). As estimated using Form EIA-23L responses, 4,129 million barrels of crude oil and lease condensate were produced in the United States produced during 2021, also down 1% from 2020 (Tables 5 and 6).⁹

Production of crude oil and lease condensate onshore in the Lower 48 states in 2021 (3,335 million barrels) was 1% lower than in 2020 (3,371 million barrels), but Federal Offshore (both Pacific and Gulf of Mexico) production increased by 1%, based on Form EIA-23L data, increasing from 621 million barrels in 2020 to 627 million barrels in 2021.

⁸ How can acquisitions in a given year exceed divestitures? 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.

⁹ 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 2021 in the *Petroleum Supply Annual 2021*, DOE/EIA-0340(21).

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

As of December 31, 2021, seven major shale plays accounted for 54% 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, 2020–21
million barrels

Basin	Play	States	2020 production	2020 proved reserves	2021 production	2021 proved reserves	2020-21 reserves change
Permian	Wolfcamp/Bone Spring	New Mexico and Texas	1,322	11,870	1,421	14,803	2,933
Williston	Bakken/Three Forks	North Dakota and Montana	431	3,685	398	4,379	694
Western Gulf	Eagle Ford	Texas	399	3,246	363	3,602	356
Denver	Niobrara	Colorado, Kansas, Nebraska, and Wyoming	16	218	43	479	261
Anadarko, S. Oklahoma	Woodford	Oklahoma	46	378	42	433	55
Appalachian	Marcellus*	Pennsylvania and West Virginia	23	247	23	278	31
Fort Worth	Barnett	Texas	1	15	1	26	11
Subtotal			2,238	19,659	2,291	24,000	4,341

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2020 and 2021

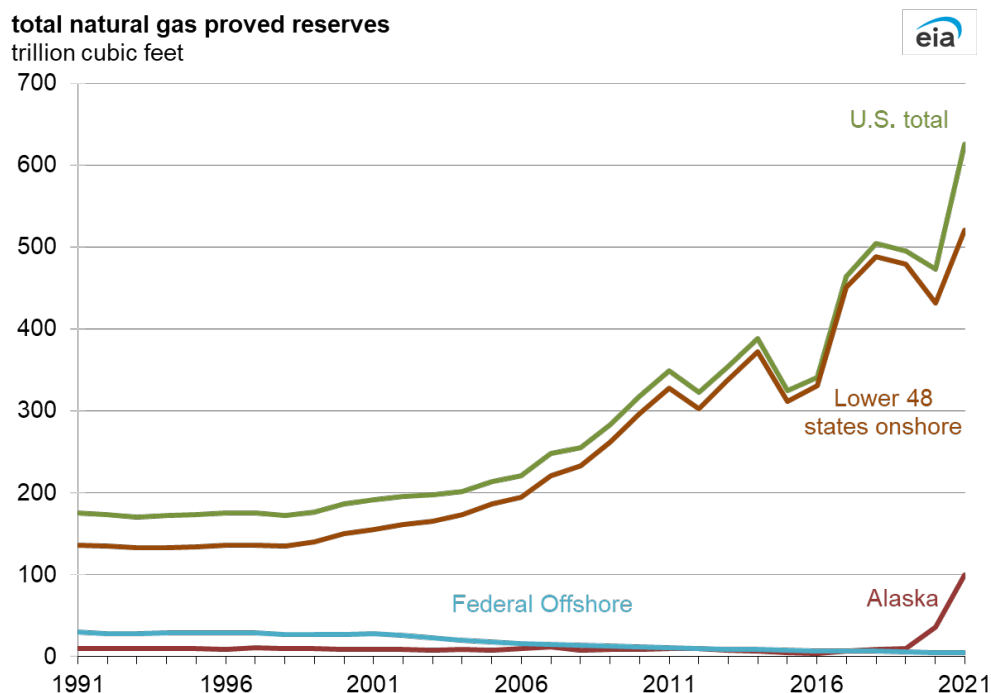
Note: Includes lease condensate. Bakken/Three Forks oil includes proved reserves from shale or low-permeability formations reported on Form EIA-23L. Wolfcamp/Bone Spring includes proved reserves from shale or low-permeability formations reported on Form EIA-23L in TX RRC 7C, TX RRC 8, TX RRC 8A, and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

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

Proved reserves of natural gas

The United States had 625.4 trillion cubic feet (Tcf) of proved natural gas and natural gas plant liquids (NGPLs) reserves as of December 31, 2021, up 32% (152.1 Tcf) from 2020 (Figure 10).

Figure 10. Proved reserves of U.S. natural gas, 1991–2021

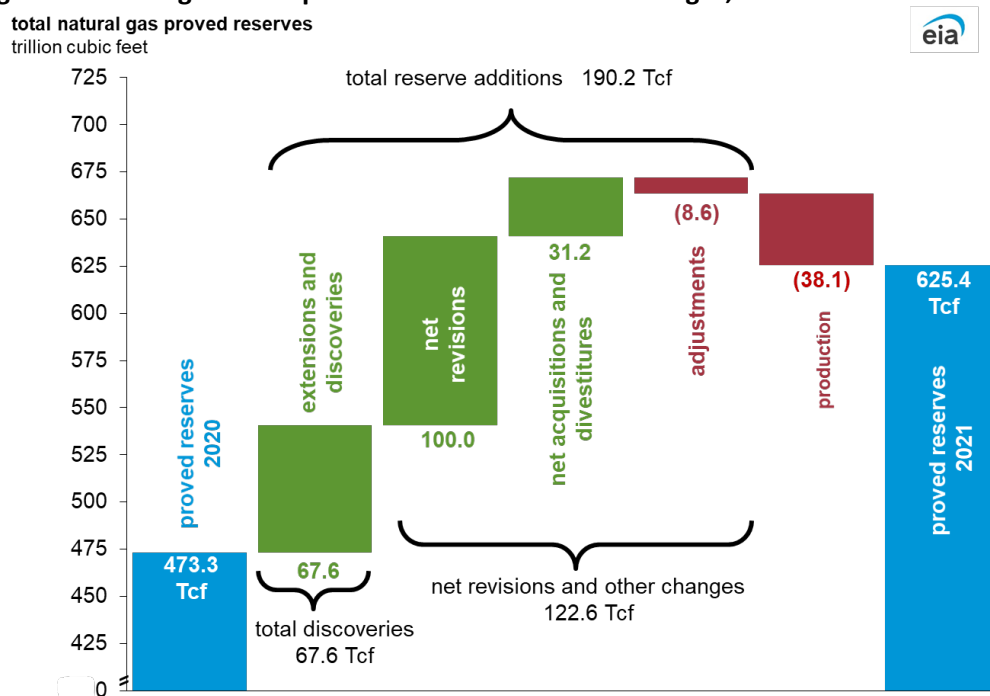


Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 1991–2021

The average natural gas price used by operators to estimate reserves increased 84% in 2021, causing most operators to revise their proved reserves upwards. Increases in natural gas proved reserves arising from extensions and discoveries in 2021 (67.6 Tcf) significantly exceeded U.S. annual production of 38.1 Tcf (Figure 11a), and net upward revisions (100 Tcf) exceeded extensions and discoveries. As a result of these large additions, the United States established a new record for total proved natural gas reserves in 2021.

Operators in Alaska reported the largest net increase in proved natural gas reserves in 2021. Total natural gas proved reserves in Alaska increased for the second consecutive year in 2021 by an additional 63.2 Tcf, almost tripling the state's total from 36.5 Tcf to 99.8 Tcf. In 2020, the proved reserves of Alaska had quadrupled from 9.4 Tcf to 36.5 Tcf—due to development of [the Alaska LNG Project](#) and its Mainline Pipeline connecting the North Slope to LNG facilities in the southern Alaska Cook Inlet Region. A large volume of previously stranded Alaskan natural gas resources can now be considered proved reserves.

Operators in Texas had the second-largest net increase in 2021 of proved natural gas reserves—proved reserves increased from 114.7 Tcf in 2020 to 149.1 Tcf in 2021 (34.3 Tcf, 30%). Operators in New Mexico reported the third-largest net increase in proved natural gas reserves—proved reserves increased from 26.1 Tcf in 2020 to 36.1 Tcf in 2021 (10.0 Tcf, 38%).

Figure 11a. Changes in the proved reserves of U.S. natural gas, 2020–21

Data 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 added 67.6 Tcf to U.S. natural gas proved reserves in 2021 (Table 3). Operators in Texas reported the most extensions and discoveries of proved natural gas reserves in the United States in 2021, totaling 17.8 Tcf (Table 10). The largest portion of these extensions and discoveries was from TX RRC Commission District 8 in the Delaware Basin (Wolfcamp/Bone Spring shale play).

Table 3. Changes to proved reserves of U.S. natural gas by source, 2020–21

trillion cubic feet

Source of natural gas	Year-end 2020 proved reserves	2021 extensions and discoveries	2021 revisions and other changes	2021 estimated production	Year-end 2021 proved reserves
Shale	317.8	56.6	47.4	-28.0	393.8
Other U.S. natural gas					
Lower 48 states onshore	113.9	10.5	11.0	-8.9	126.5
Lower 48 states offshore	5.1	0.3	0.7	-0.8	5.2
Alaska	36.5	0.1	63.5	-0.4	99.8
U.S. total	473.3	67.6	122.6	-38.1	625.4

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2020 and 2021
 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.

Operators in Pennsylvania reported the second most extensions and discoveries in 2021 (15.9 Tcf), as a result of development of the Marcellus shale play in the Appalachian Basin.

Net revisions and other changes

Net revisions and other changes increased U.S. natural gas proved reserves by 122.6 Tcf in 2021. The most significant change of 2021 in proved natural gas reserves occurred in Alaska, where operators reported an increase due to net revisions of 63.6 Tcf (Table 3). In the Lower 48 states, the following states saw the largest net revisions of 2021:

- Operators in Texas had the largest increase of proved natural gas reserves due to revisions of all states in the Lower 48 states in 2021 (18.5 Tcf).
- Oklahoma saw the second-largest net revision increase in the Lower 48 states (4.7 Tcf).
- Operators in New Mexico added the third most revision increase in the Lower 48 states (3.2 Tcf).

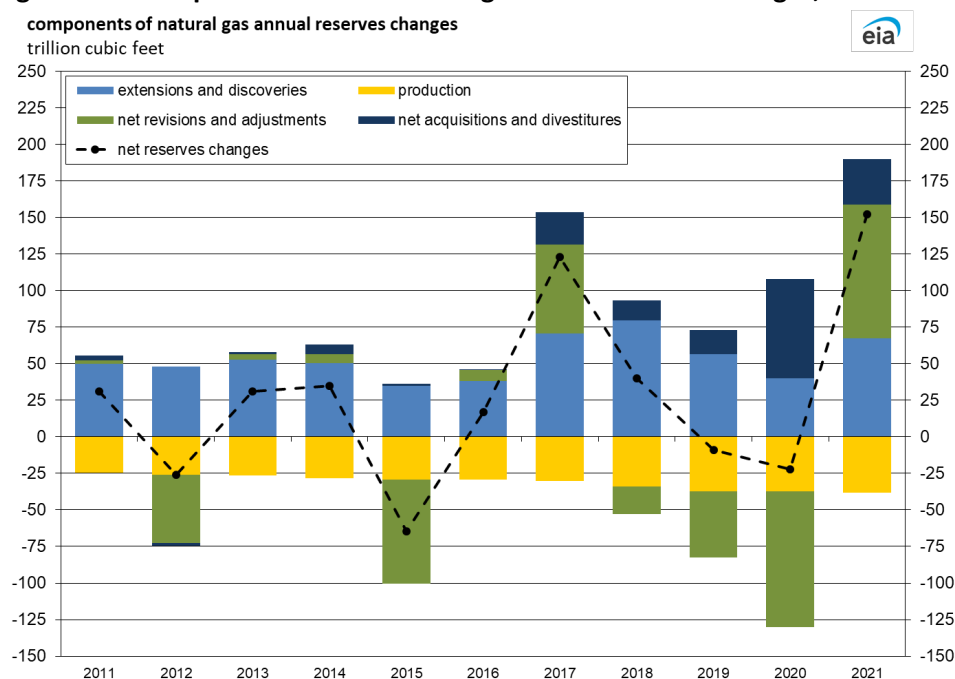
Adjustments

Adjustments are yearly changes in the published reserve estimates that we cannot attribute to other reserve change categories. In 2021, the sum of all of our adjustments for proved natural gas reserves was -8.6 Tcf.

Production

Our current published estimate of [marketed natural gas production](#) in 2021 is 37.3 Tcf, an increase of 3% from 2020 (36.2 Tcf). We estimate (using Form EIA-23L responses) that U.S. production of natural gas, wet after lease separation, was 38.1 Tcf in 2021 —an increase of 3% from our 2020 estimate (37.1 Tcf).¹⁰ Figure 11b illustrates the components of U.S. natural gas annual reserve changes over time.

Figure 11b. Components of U.S. natural gas annual reserve changes, 2011–21



Nonassociated natural gas

Nonassociated natural gas, also called *gas well gas*, is defined as natural gas not in contact with significant

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 2021*, DOE/EIA-0131(21).

quantities of crude oil in a reservoir. Nonassociated natural gas accounted for 64% of proved natural gas reserves in the United States in 2021. The U.S. total of proved reserves of nonassociated natural gas increased from 336.9 Tcf in 2020 to 398.1 Tcf in 2021—an increase of 18% (Table 11). The largest increase in 2021 proved nonassociated natural gas reserves was in Texas (22.6 Tcf, 21%). The second-largest increase in nonassociated natural gas reserves was in Pennsylvania (9.2 Tcf, 9%). We estimate that production of U.S. nonassociated natural gas increased by 2%, from 26.7 Tcf in 2020 to 27.2 Tcf in 2021.

Associated-dissolved natural gas

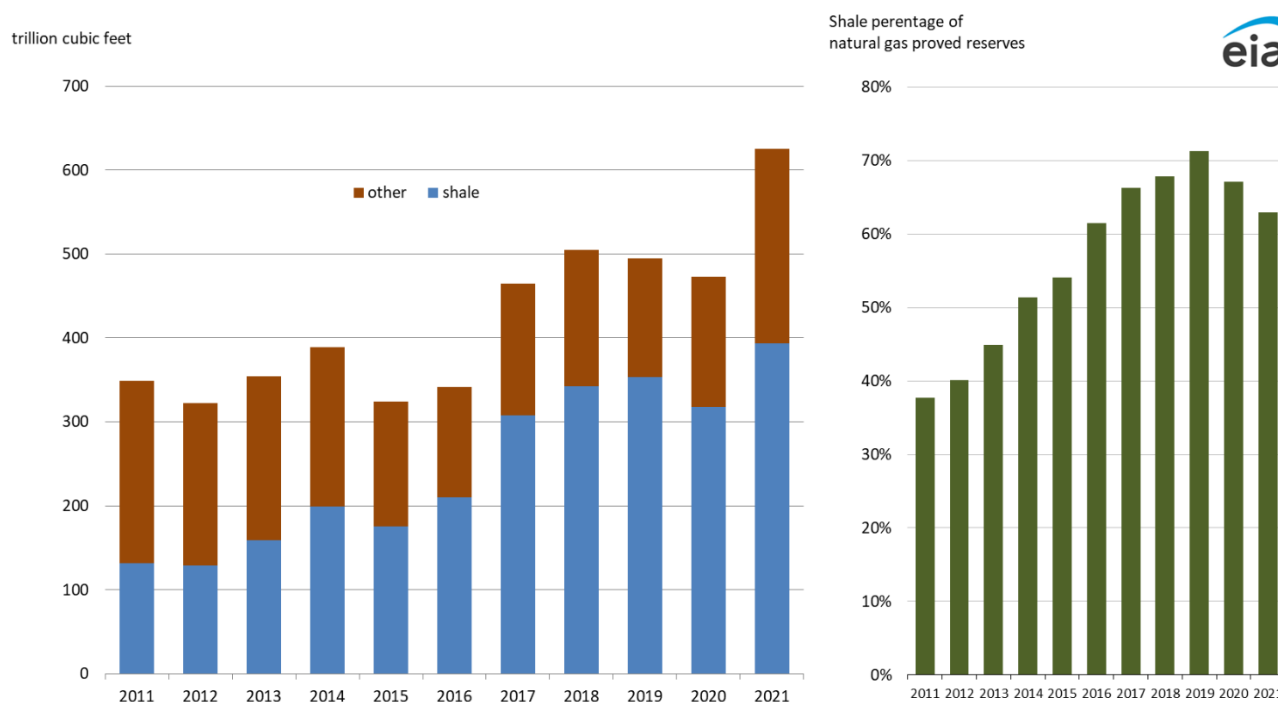
Associated-dissolved natural gas, also called *casinghead gas*, is defined as the combined volume of natural gas that occurs in crude oil reservoirs either as free, or associated natural gas, or in solution with crude oil, known as dissolved natural gas. Associated-dissolved natural gas accounted for 36% of proved natural gas reserves in the United States in 2021. The U.S. proved reserves of associated-dissolved natural gas increased from 136.4 Tcf in 2020 to 227.3 Tcf in 2021—up 67% (Table 12). The largest increase of proved reserves of associated-dissolved natural gas in 2021 occurred in Alaska (63.5 Tcf, 179%). The second-largest increase was in Texas (11.7 Tcf, 22%). Our estimate of production of associated-dissolved natural gas in the United States increased 4%—from 10.4 Tcf in 2020 to 10.8 Tcf in 2021.

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* where 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 because they allow more of the well bore to come in direct contact with the shale formation. However, horizontally drilled wells are more expensive to drill and complete at the same depth because they are longer and the drilling process is more complex.¹¹ Proved reserves of U.S. natural gas from shale increased 24%, from 317.8 Tcf in 2020 to 393.8 Tcf in 2021 (Table 13).

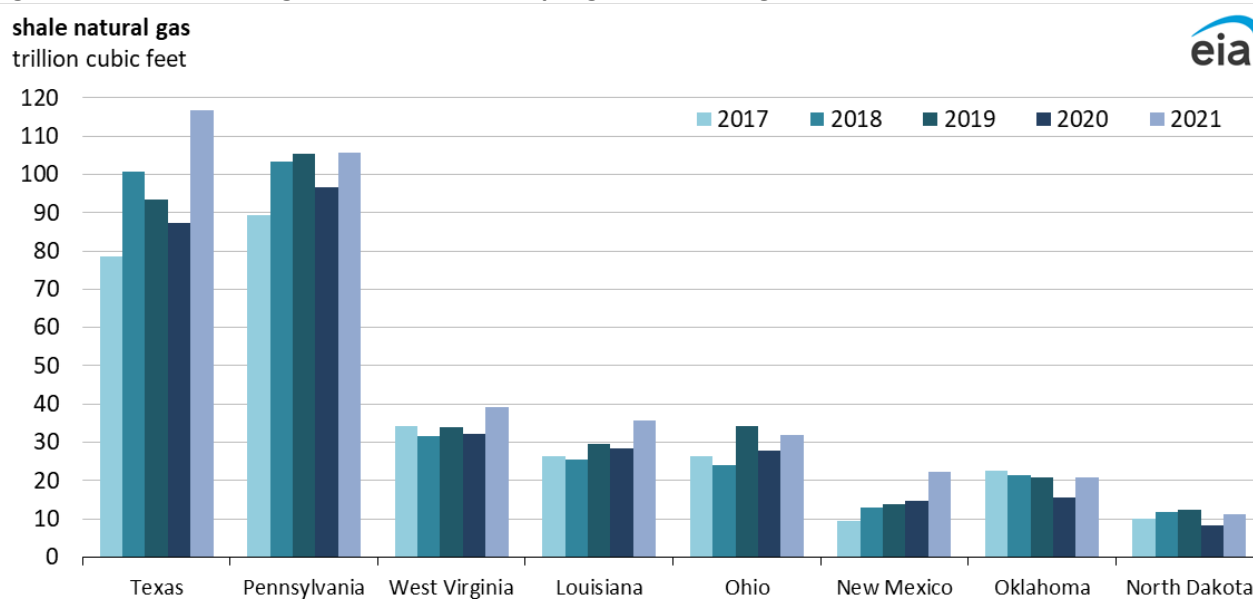
The share of total U.S. natural gas made up by natural gas from shale decreased from 67% in 2020 to 63% of proved natural gas reserves in 2021 (Figure 12). Estimated production of natural gas from shale increased 7%—from 26.1 Tcf in 2020 to 28.0 Tcf in 2021 (Table 13).

¹¹ U.S. Energy Information Administration, *Today in Energy*, Hydraulically fractured horizontal wells account for most new oil and natural gas wells, January 30, 2018.

Figure 12. Proved reserves of U.S. natural gas (from shale and other sources), 2011–21

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2011–21

The eight states that reported the most proved reserves of natural gas from shale formations in 2021 are shown in Figure 13. Operators in Texas reported the most proved reserves of shale natural gas in 2021 with 116.8 Tcf. The second-largest reserves were reported in Pennsylvania, with 105.6 Tcf. In West Virginia, operators reported 39.2 Tcf—the state with the third largest shale natural gas proved reserves in 2021.

Figure 13. Proved shale gas reserves of the top eight U.S. shale gas reserves states, 2017–21

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves, 2017–21*

We collected production and proved reserves data for nine major U.S. shale plays in 2021 (Table 4). The Marcellus shale play remained the play with the largest amount of proved reserves of natural gas from shale in 2021. Proved reserves in the Marcellus increased by 15.7 Tcf (12%) in 2021. The second-largest shale play in 2021 was the Wolfcamp/Bone Spring shale play of the Permian Basin where proved natural gas reserves from shale increased by 22.5 Tcf (43%) in 2021.

Table 4. U.S. shale plays production and proved reserves of natural gas, 2020–21 trillion cubic feet

Basin	Shale play	States	2020 production	2020 proved reserves	2021 production	2021 proved reserves	Change in production	2020-21 reserves change
Appalachian	Marcellus*	Pennsylvania and West Virginia	9.3	129.0	9.9	144.7	0.6	15.7
Permian Basin	Wolfcamp/ Bone Spring	New Mexico and Texas	5.2	52.5	5.8	75.0	0.6	22.5
TX-LA Salt	Haynesville/ Bossier	Louisiana and Texas	3.6	44.8	4.3	56.2	0.7	11.4
Western Gulf	Eagle Ford	Texas	1.9	22.3	1.9	30.0	0.0	7.7
Appalachian	Utica/Pt. Pleasant	Ohio	2.3	27.8	2.2	31.8	-0.1	4.0
Anadarko, S. OK	Woodford	Oklahoma	1.2	15.5	1.2	20.8	0.0	5.3
Fort Worth	Barnett	Texas	1.0	10.8	0.9	13.6	-0.1	2.8
Williston	Bakken/Three Forks	Montana and North Dakota	1.0	8.6	1.1	11.4	0.1	2.8
Arkoma	Fayetteville	Arkansas	0.4	4.2	0.4	5.1	0.0	0.9
Subtotal			25.9	315.5	27.6	388.5	1.7	73.0
Other shale			0.2	2.2	0.4	5.2	0.2	3.0
All U.S. shale			26.1	317.7	28.0	393.8	1.9	76.0

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves, 2020 and 2021*

Note: We base table values 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.

We publish 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 plant liquids (NGPLs) and non-hydrocarbon impurities are removed from the natural gas stream downstream at natural gas processing plants. 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 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 increased by 32%, from an estimated 445.3 Tcf in 2020 to 589.2 Tcf in 2021.¹²

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, 2021, the United States had proved reserves of 3,267 million barrels of lease condensate, an increase of 880 million barrels from 2020 (37%) (Table 8). U.S. lease condensate production decreased 4%—from 308 million barrels in 2020 to 295 million barrels in 2021.

Natural gas plant liquids

Natural gas plant liquids (NGPLs) (unlike lease condensate) remain within 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 natural gas processing plants rather than lease separation facilities.

The estimated volume of NGPLs in proved reserves of total natural gas increased by 26%, from 20,695 million barrels in 2020 to 26,183 million barrels in 2021 (Table 15).¹³

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 begin 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:

¹² U.S. Energy Information Administration, *U.S. Crude Oil and Natural Gas Proved Reserves, Year-End 2020*, January 2022, Table 15.

¹³ U.S. Energy Information Administration, *U.S. Crude Oil and Natural Gas Proved Reserves, Year-End 2020*, January 2022, Table 15.

- Be directly offset to wells that are producing 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
- 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, 2021, the United States had 11.3 billion barrels of crude oil proved reserves and 168.3 Tcf of natural gas proved reserves in nonproducing reservoirs (Table 16). These volumes are a 7% increase for crude oil and a 20% increase for total natural gas in nonproducing reservoirs from the 2020 levels published in our previous report.¹⁴

Maps and additional data tables

Maps

Figure 14. Proved reserves of U.S. crude oil and lease condensate by state or area, 2021

Figure 15. Changes in proved reserves of crude oil and lease condensate by state or area, 2020–21

Figure 16. Proved reserves of U.S. natural gas by state or area, 2021

Figure 17. Changes in proved reserves of natural gas by state or area, 2020–21

Oil tables

Table 5. U.S. proved reserves of crude oil and lease condensate, crude oil, and lease condensate, 2011–21

Table 6. Proved reserves, reserve changes, and production of crude oil and lease condensate, 2021

Table 7. Proved reserves, reserve changes, and production of crude oil, 2021

Table 8. Proved reserves, reserve changes, and production of lease condensate, 2021

Natural gas tables

Table 9. U.S. proved reserves of total natural gas, wet after lease separation, 2001–21

Table 10. Proved reserves, reserve changes, and production of natural gas, wet after lease separation, 2021

Table 11. Proved reserves, reserve changes, and production of nonassociated natural gas, wet after lease separation, 2021

Table 12. Proved reserves, reserve changes, and production of associated-dissolved natural gas, wet after lease separation, 2021

Table 13. Proved reserves and production of shale natural gas, 2018–21

Table 14. Proved reserves, reserve changes, and production of shale natural gas, 2021

Table 15. Estimated proved reserves of natural gas plant liquids and dry natural gas, 2021

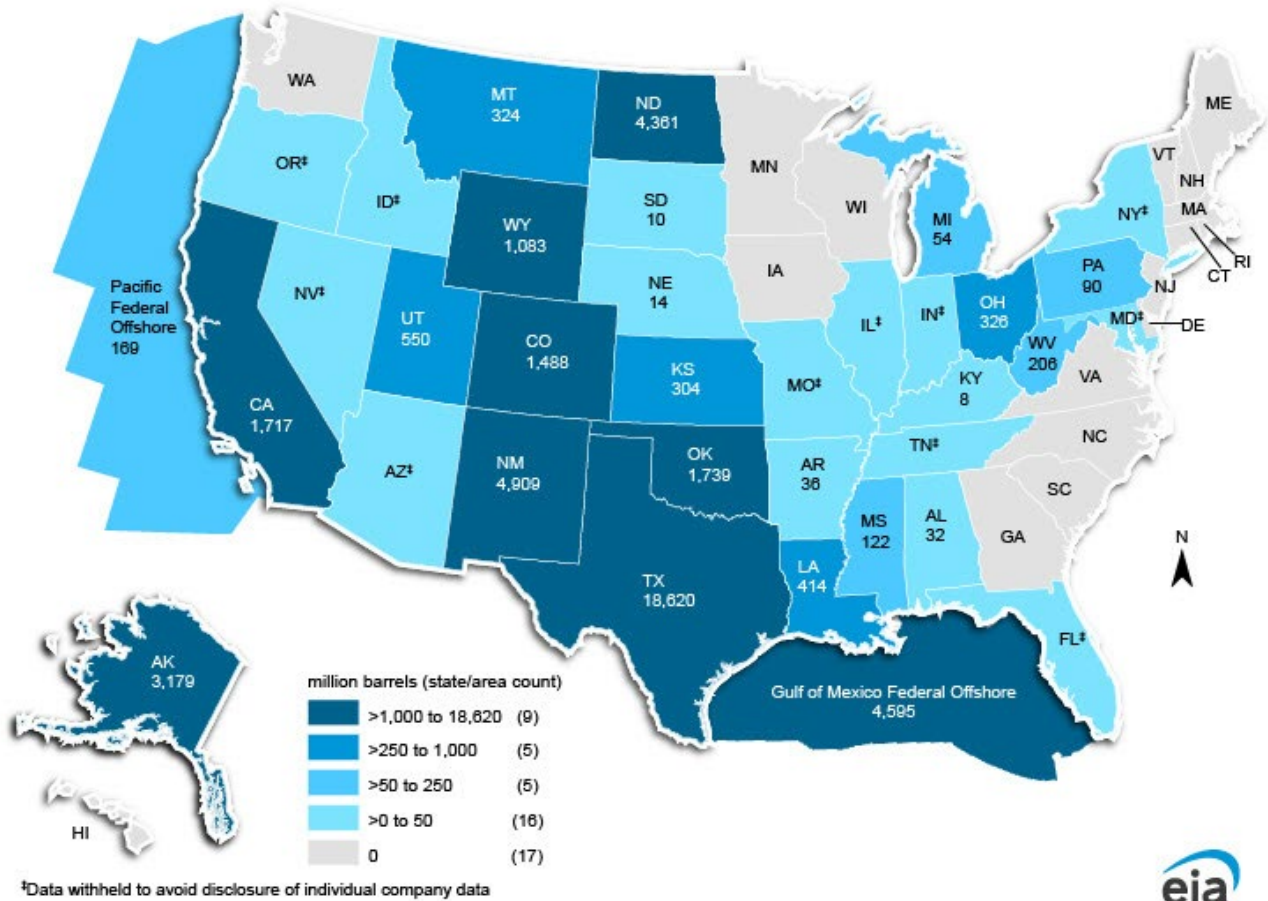
Miscellaneous tables

Table 16. Reported proved nonproducing reserves of crude oil, lease condensate, nonassociated gas, associated-dissolved gas, and total gas, wet after lease separation, 2021

¹⁴ U.S. Energy Information Administration, *U.S. Crude Oil and Natural Gas Proved Reserves, Year-End 2020*, January 2022, Table 16.

Figure 14. Proved reserves of U.S. crude oil and lease condensate by state or area, 2021

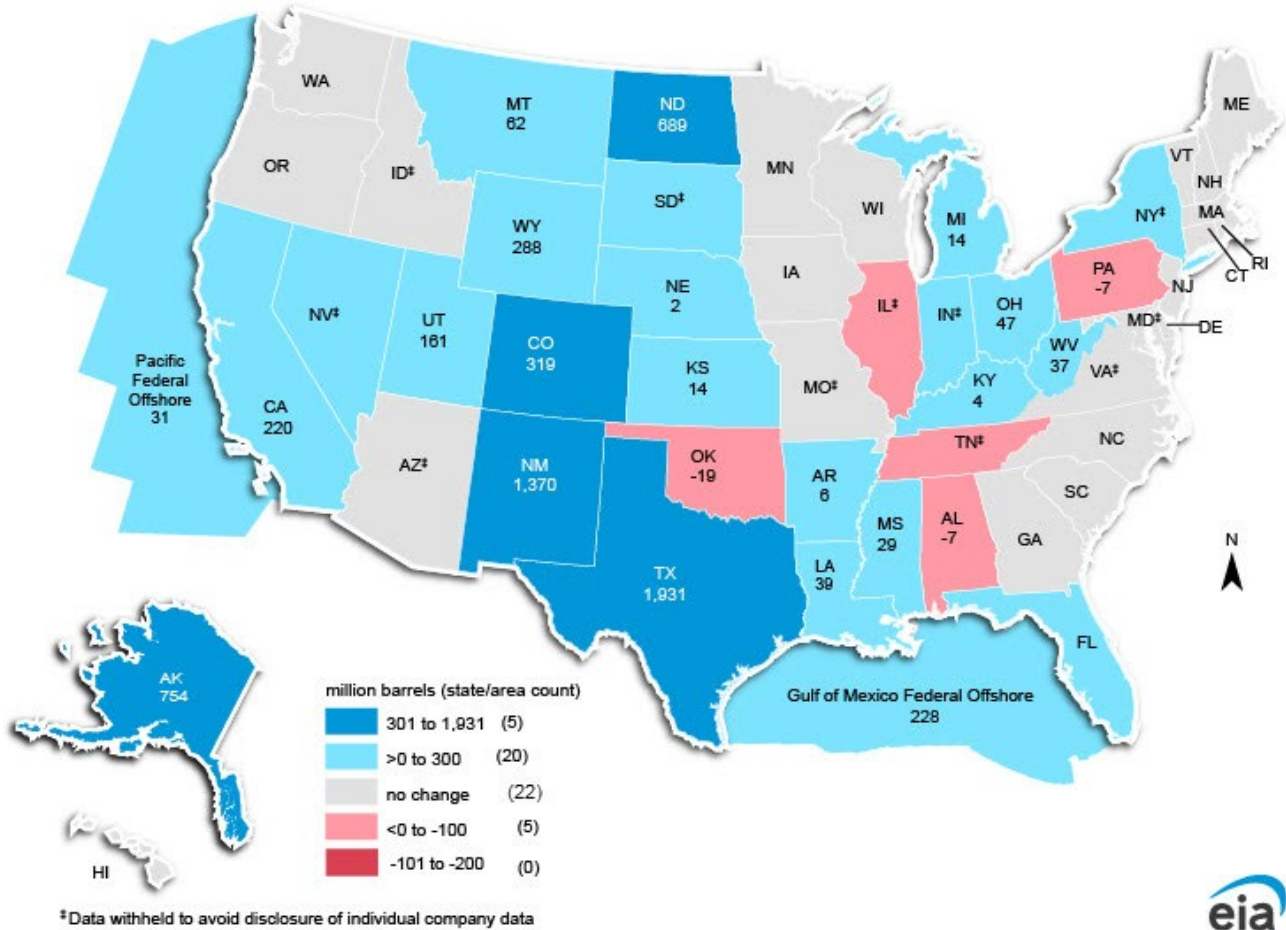
2021 U.S. proved reserves of crude oil and lease condensate: 44,418 million barrels



Data source: U.S. Energy Information Administration

Figure 15. Changes in proved reserves of crude oil and lease condensate by state or area, 2020–21

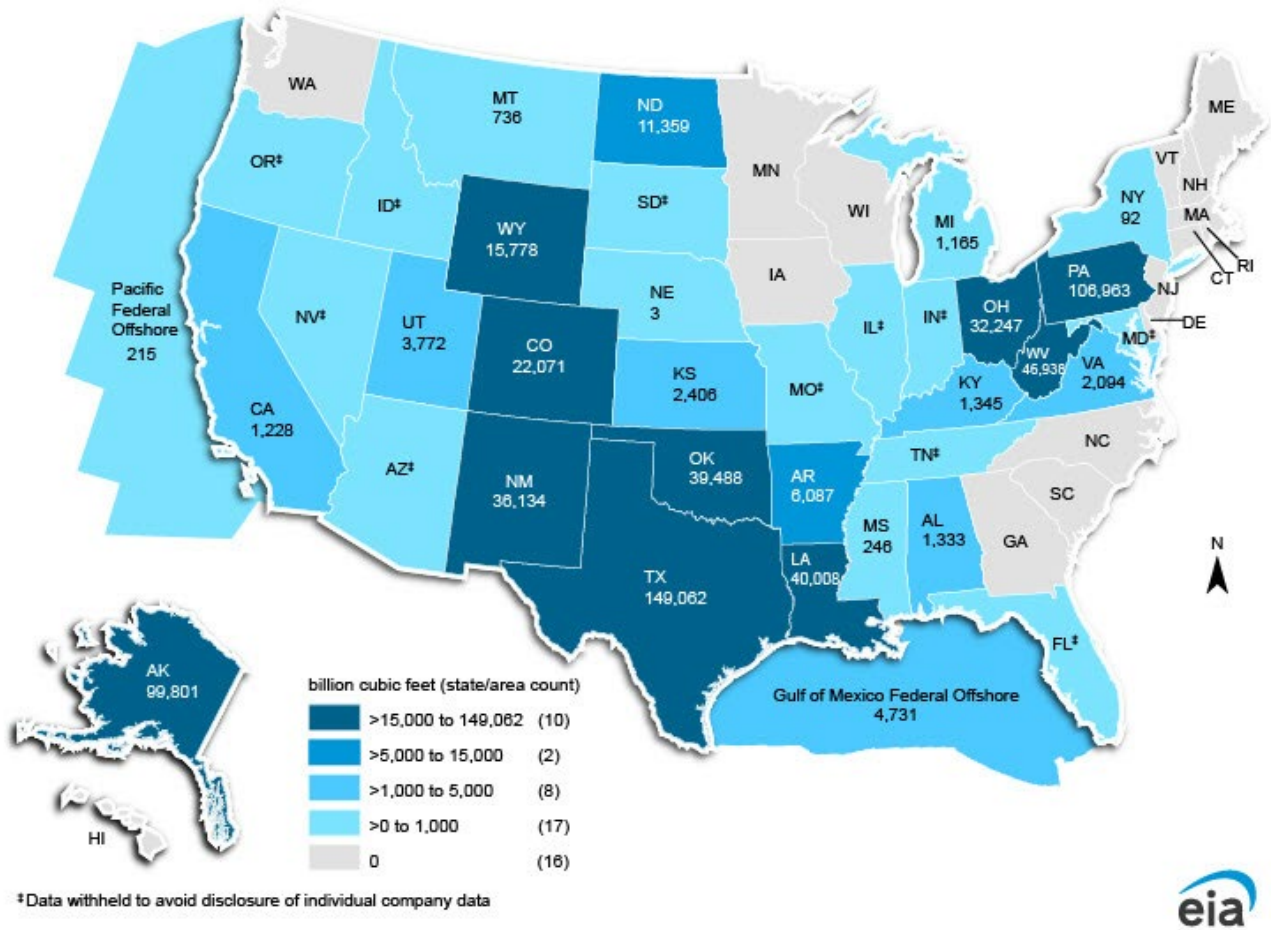
Total U.S. increase: 16% (6,206 million barrels)



Data source: U.S. Energy Information Administration

Figure 16. Proved reserves of U.S. natural gas by state or area, 2021

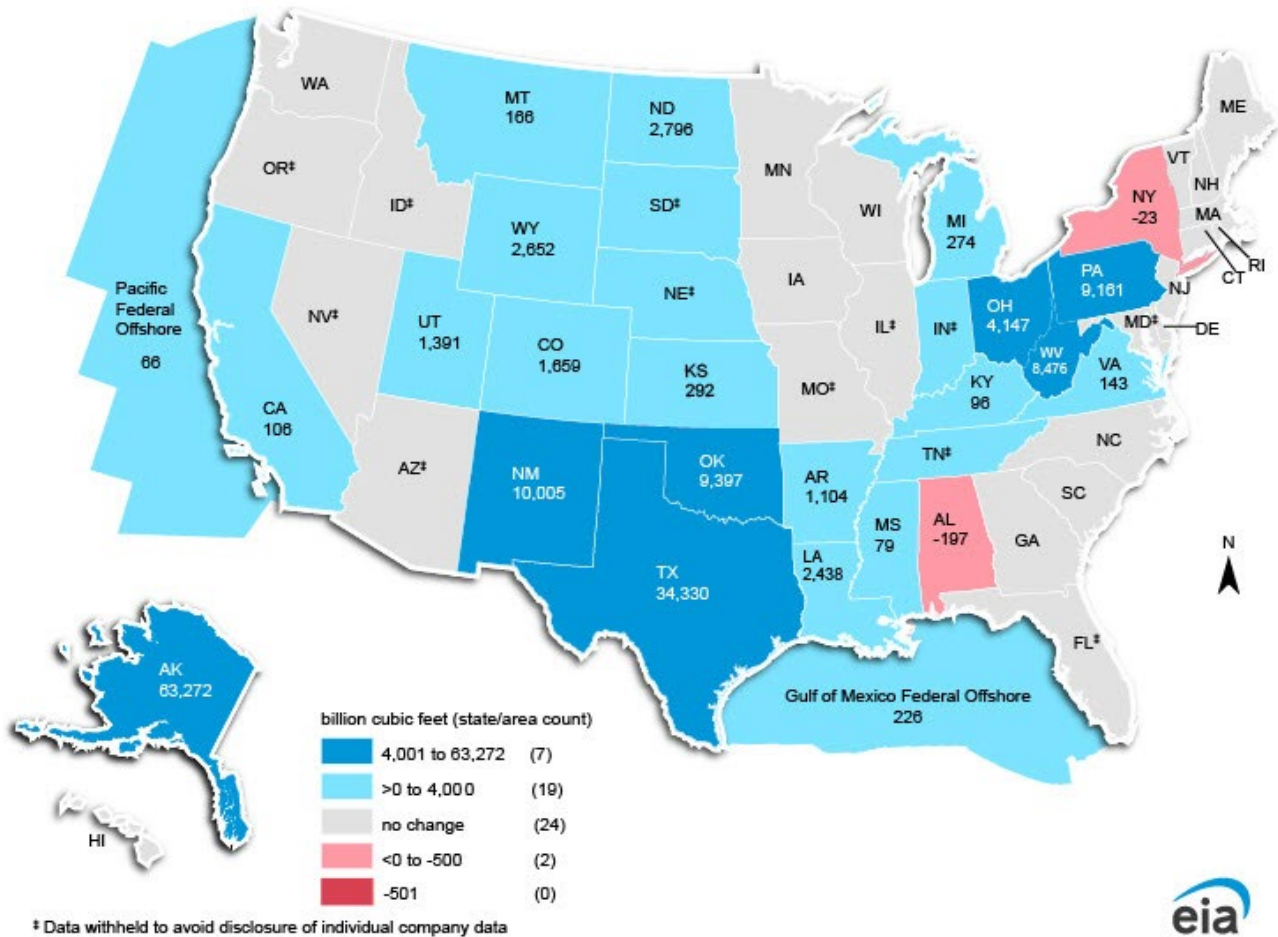
2021 U.S. proved reserves of natural gas: 625,373 billion cubic feet



Data source: U.S. Energy Information Administration

Figure 17. Changes in proved reserves of natural gas by state or area, 2020–21

Total U.S. increase: 32% (152,088 billion cubic feet)



Data source: U.S. Energy Information Administration

Table 5. U.S. proved reserves of crude oil and lease condensate, 2011–21

million barrels

Year	Adjustments (1)	Net revisions (2)	Revisions ^a and adjustments (3)	Net of acquisitions and divestitures ^b (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)								
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
2021	-1,159	2,315	1,156	2,914	6,265	4,129	44,418	6,206
Crude oil (million barrels)								
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
2021	-1,073	1,645	572	2,842	5,736	3,834	41,151	5,316
Lease condensate (million barrels)								
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
2021	-86	670	584	72	529	295	3,267	890

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2011–21Note: We base the production estimates in this table on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. The estimates may differ slightly from the official U.S. EIA production data for crude oil and lease condensate for 2021 in the *Petroleum Supply Annual 2021*, DOE/EIA-0340(21). One barrel = 42 U.S. gallons. EIA's [petroleum and other liquids data](#) are available on our website.^a Revisions and adjustments = Column 1 plus Column 2.^b Net of acquisitions and divestitures = acquisitions minus divestitures.^c Proved reserves = Column 7 from previous year plus Column 3 plus Column 4 plus Column 5 minus Column 6.

Table 6. Proved reserves, reserve changes, and production of crude oil and lease condensate, 2021

million barrels

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021							Estimated production (-)	Proved reserves 12/31/21
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)	Extensions and discoveries (+)			
Alaska	2,425	-256	1,033	21	0	0	165	167	3,179	
Lower 48 states	35,787	-903	5,571	4,268	1,233	4,147	6,100	3,962	41,239	
Alabama	39	3	9	0	15	0	0	4	32	
Arkansas	30	6	4	0	0	0	0	4	36	
California	1,497	126	303	66	18	0	26	151	1,717	
Coastal Region										
Onshore	171	0	66	10	10	0	1	15	203	
Los Angeles Basin										
Onshore	116	9	50	1	8	0	1	10	157	
San Joaquin Basin										
Onshore	1,090	23	93	55	0	0	23	99	1,075	
State Offshore	120	94	94	0	0	0	1	27	282	
Colorado	1,169	-157	458	357	18	480	66	153	1,488	
Kansas	290	10	42	10	0	1	0	29	304	
Kentucky	4	4	1	0	0	0	0	1	8	
Louisiana	375	0	79	21	0	3	12	34	414	
North	73	24	18	7	0	1	3	9	103	
South Onshore	267	-18	49	11	0	2	9	20	278	
State Offshore	35	-6	12	3	0	0	0	5	33	
Michigan	40	13	7	1	1	0	1	5	54	
Mississippi	93	-7	58	11	1	0	3	13	122	
Montana	262	10	90	14	20	13	5	22	324	
Nebraska	12	0	4	0	0	0	0	2	14	
New Mexico	3,539	17	515	391	70	367	1,394	462	4,909	
East	3,420	38	509	387	70	367	1,389	454	4,812	
West	119	-21	6	4	0	0	5	8	97	
North Dakota	3,672	-240	586	122	302	381	786	400	4,361	
Ohio	279	-1	57	35	2	0	47	19	326	
Oklahoma	1,758	13	144	287	38	73	221	145	1,739	
Pennsylvania	97	-3	9	14	0	0	7	6	90	
South Dakota	7	0	4	0	0	0	0	1	10	
Texas	16,689	-746	2,069	2,706	729	2,700	3,086	1,743	18,620	
RRC District 1	1,984	-28	325	258	46	117	188	181	2,101	
RRC District 2										
Onshore	1,338	41	225	158	32	137	128	181	1,498	
RRC District 3										
Onshore	453	-28	64	43	7	14	72	48	477	
RRC District 4										
Onshore	150	-4	48	28	0	0	49	15	200	
RRC District 5	60	-27	4	0	7	3	4	3	34	
RRC District 6	152	0	41	22	1	1	3	13	161	
RRC District 7B	88	10	15	15	0	1	4	9	94	
RRC District 7C	1,125	55	126	103	47	215	324	137	1,558	
RRC District 8	9,974	-895	918	2,022	566	2,201	2,260	1,041	10,829	
RRC District 8A	1,123	36	250	13	17	9	46	94	1,340	
RRC District 9	97	22	29	15	2	0	0	9	122	
RRC District 10	144	73	23	29	4	2	8	12	205	
State Offshore	1	-1	1	0	0	0	0	0	1	

Table 6. Proved reserves, reserve changes, and production of crude oil and lease condensate, 2021 (cont.)

million barrels

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021						Estimated production (-)	Proved reserves 12/31/21
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)	Extensions and discoveries (+)		
Utah	389	13	102	30	0	2	109	35	550
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	169	1	29	41	1	0	67	18	206
Wyoming	795	0	209	44	16	118	106	85	1,083
Federal Offshore	4,505	-20	778	42	2	9	163	627	4,764
Pacific (California)	138	0	37	2	0	0	0	4	169
Gulf of Mexico (Central and Eastern) ^a	4,166	-31	654	30	2	9	27	559	4,234
Gulf of Mexico (Western)	201	11	87	10	0	0	136	64	361
Other states ^b	75	-4	14	15	0	0	1	6	65
U.S. total	38,212	-1,159	6,604	4,289	1,233	4,147	6,265	4,129	44,418

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

Note: We base the production estimates in this table on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official EIA production data for crude oil and lease condensate for 2021 in the *Petroleum Supply Annual 2021*, DOE/EIA-0340(21). One barrel = 42 U.S. gallons. EIA's [petroleum and other liquids data](#) are available on our website.

^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 for these states to avoid disclosure of operator-level reserves data or because of other statistical precision or data quality reasons.

Table 7. Proved reserves, reserve changes, and production of crude oil, 2021

million barrels

State and subdivision	Changes in reserves during 2021								Proved reserves 12/31/21
	Published proved reserves 12/31/20	Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Alaska	2,423	-257	979	18	0	0	164	164	3,127
Lower 48 states	33,412	-816	4,546	3,862	1,162	4,004	5,572	3,670	38,024
Alabama	34	4	7	0	15	0	0	4	26
Arkansas	29	6	4	0	0	0	0	4	35
California	1,496	126	303	66	18	0	26	151	1,716
Coastal Region Onshore	171	0	66	10	10	0	1	15	203
Los Angeles Basin Onshore	115	9	50	1	8	0	1	10	156
San Joaquin Basin Onshore	1,090	23	93	55	0	0	23	99	1,075
State Offshore	120	94	94	0	0	0	1	27	282
Colorado	1,061	-164	453	257	18	480	66	152	1,469
Kansas	277	9	42	9	0	1	0	28	292
Kentucky	4	3	1	0	0	0	0	1	7
Louisiana	317	5	69	11	0	3	10	28	365
North	53	26	14	3	0	1	3	7	87
South Onshore	234	-15	46	8	0	2	7	17	249
State Offshore	30	-6	9	0	0	0	0	4	29
Michigan	39	14	6	1	1	0	1	5	53
Mississippi	90	-7	58	11	1	0	3	13	119
Montana	256	7	90	14	20	13	5	21	316
Nebraska	12	0	4	0	0	0	0	2	14
New Mexico	3,365	52	336	387	67	356	1,302	440	4,517
East	3,277	69	336	384	67	356	1,297	434	4,450
West	88	-17	0	3	0	0	5	6	67
North Dakota	3,669	-246	586	122	302	381	786	399	4,353
Ohio	74	3	34	2	0	0	0	4	105
Oklahoma	1,483	38	111	232	20	54	164	124	1,474
Pennsylvania	11	-7	5	0	0	0	0	1	8
South Dakota	7	0	4	0	0	0	0	1	10
Texas	15,612	-733	1,557	2,569	684	2,594	2,822	1,568	17,031
RRC District 1	1,909	-21	219	253	46	117	181	171	1,935
RRC District 2 Onshore	1,105	-4	120	135	29	130	96	141	1,142
RRC District 3 Onshore	372	7	58	32	7	13	37	39	409
RRC District 4 Onshore	20	-6	22	1	0	0	0	4	31
RRC District 5	57	-27	4	0	6	3	4	3	32
RRC District 6	68	-6	30	3	0	1	2	9	83
RRC District 7B	87	11	13	15	0	1	4	9	92
RRC District 7C	1,120	58	124	103	47	215	324	137	1,554
RRC District 8	9,596	-876	685	1,989	526	2,103	2,126	945	10,174
RRC District 8A	1,123	36	250	13	17	9	46	94	1,340
RRC District 9	84	22	17	14	2	0	0	8	99
RRC District 10	71	73	15	11	4	2	2	8	140
State Offshore	0	0	0	0	0	0	0	0	0

Table 7. Proved reserves, reserve changes, and production of crude oil, 2021 (cont.)

million barrels

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021					Estimated production (-)	Proved reserves 12/31/21	
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)			Extensions and discoveries (+)
Utah	378	16	89	30	0	2	109	34	530
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	8	-1	8	0	0	0	10	2	23
Wyoming	703	3	184	38	14	111	104	75	978
Federal Offshore	4,410	1	581	37	2	9	163	610	4,515
Pacific (California)	138	0	37	2	0	0	0	4	169
Gulf of Mexico (Central and Eastern) ^a	4,075	-11	462	25	2	9	27	543	3,992
Gulf of Mexico (Western)	197	12	82	10	0	0	136	63	354
Other states ^b	75	-4	14	15	0	0	1	6	65
U.S. total	35,835	-1,073	5,525	3,880	1,162	4,004	5,736	3,834	41,151

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*Note: We base production estimates in this table 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 2021 in the *Petroleum Supply Annual 2021*, DOE/EIA-0340(21).One barrel = 42 U.S. gallons. EIA's [petroleum and other liquids data](#) are available on our website.^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 for these states to avoid disclosure of operator-level reserves data or because of other statistical precision or data quality reasons.

Table 8. Proved reserves, reserve changes, and production of lease condensate, 2021

million barrels

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021						Estimated production (-)	Proved reserves 12/31/21
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)	Extensions and discoveries (+)		
Alaska	2	1	54	3	0	0	1	3	52
Lower 48 states	2,375	-87	1,025	406	71	143	528	292	3,215
Alabama	5	-1	2	0	0	0	0	0	6
California	1	0	0	0	0	0	0	0	1
Coastal Region Onshore	0	0	0	0	0	0	0	0	0
Los Angeles Basin									
Onshore	1	0	0	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	108	7	5	100	0	0	0	1	19
Kentucky	0	1	0	0	0	0	0	0	1
Louisiana	58	-5	10	10	0	0	2	6	49
North	20	-2	4	4	0	0	0	2	16
South Onshore	33	-3	3	3	0	0	2	3	29
State Offshore	5	0	3	3	0	0	0	1	4
Michigan	1	-1	1	0	0	0	0	0	1
Mississippi	3	0	0	0	0	0	0	0	3
Montana	6	3	0	0	0	0	0	1	8
Nebraska	0	0	0	0	0	0	0	0	0
New Mexico	174	-35	179	4	3	11	92	22	392
East	143	-31	173	3	3	11	92	20	362
West	31	-4	6	1	0	0	0	2	30
North Dakota	3	6	0	0	0	0	0	1	8
Ohio	205	-4	23	33	2	0	47	15	221
Oklahoma	275	-25	33	55	18	19	57	21	265
Pennsylvania	86	4	4	14	0	0	7	5	82
South Dakota	0	0	0	0	0	0	0	0	0
Texas	1,077	-13	512	137	45	106	264	175	1,589
RRC District 1	75	-7	106	5	0	0	7	10	166
RRC District 2 Onshore	233	45	105	23	3	7	32	40	356
RRC District 3 Onshore	81	-35	6	11	0	1	35	9	68
RRC District 4 Onshore	130	2	26	27	0	0	49	11	169
RRC District 5	3	0	0	0	1	0	0	0	2
RRC District 6	84	6	11	19	1	0	1	4	78
RRC District 7B	1	-1	2	0	0	0	0	0	2
RRC District 7C	5	-3	2	0	0	0	0	0	4
RRC District 8	378	-19	233	33	40	98	134	96	655
RRC District 8A	0	0	0	0	0	0	0	0	0
RRC District 9	13	0	12	1	0	0	0	1	23
RRC District 10	73	0	8	18	0	0	6	4	65
State Offshore	1	-1	1	0	0	0	0	0	1

Table 8. Proved reserves, reserve changes, and production of lease condensate, 2021 (cont.)

million barrels

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021						Estimated production (-)	Proved reserves 12/31/21
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)	Extensions and discoveries (+)		
Utah	11	-3	13	0	0	0	0	1	20
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	161	2	21	41	1	0	57	16	183
Wyoming	92	-3	25	6	2	7	2	10	105
Federal Offshore	95	-21	197	5	0	0	0	17	249
Pacific (California)	0	0	0	0	0	0	0	0	0
Gulf of Mexico (Central and Eastern) ^a	91	-20	192	5	0	0	0	16	242
Gulf of Mexico (Western)	4	-1	5	0	0	0	0	1	7
Other states ^b	14	1	0	1	0	0	0	1	13
U.S. total	2,377	-86	1,079	409	71	143	529	295	3,267

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

Note: We base the production estimates in this table 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 2021 in the *Petroleum Supply Annual 2021*, DOE/EIA-0340(21). One barrel = 42 U.S. gallons. EIA's [petroleum and other liquids data](#) are available on our website.

^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 for these states to avoid disclosure of operator-level reserves data or because of other statistical precision or data quality reasons.

Table 9. U.S. proved reserves of total natural gas, wet after lease separation, 2001–21

billion cubic feet

Year	Adjustments (1)	Net revisions (2)	Revisions ^a and adjustments (3)	Net of acquisitions and divestitures ^b (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
2021	-8,622	100,014	91,392	31,230	67,564	38,098	625,373	152,088

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2001–21Note: We base the production estimates in this table 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 2021 in the *Natural Gas Annual 2021*, DOE/EIA-0131(21).Natural gas is measured at 60°F and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia). EIA's [petroleum and other liquids data](#) are available on our website.^a Revisions and adjustments = Column 1 plus Column 2.^b Net of acquisitions and divestitures = acquisitions minus divestitures.^c Proved reserves = Column 7 from previous year plus Column 3 plus Column 4 plus Column 5 minus Column 6.

Table 10. Proved reserves, reserve changes, and production of natural gas, wet after lease separation, 2021

billion cubic feet

State and subdivision	Changes in reserves during 2021								Proved reserves 12/31/21
	Published proved reserves 12/31/20	Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Alaska	36,529	-110	68,022	4,371	15	0	106	360	99,801
Lower 48 states	436,756	-8,512	75,056	38,693	10,510	41,755	67,458	37,738	525,572
Alabama	1,530	-66	96	42	78	0	0	107	1,333
Arkansas	4,983	2	1,514	42	177	257	0	450	6,087
California	1,122	11	254	42	11	0	9	115	1,228
Coastal Region									
Onshore	103	9	37	11	11	0	0	9	118
Los Angeles Basin									
Onshore	54	-3	15	0	0	0	0	5	61
San Joaquin Basin									
Onshore	921	-35	175	31	0	0	9	91	948
State Offshore	44	40	27	0	0	0	0	10	101
Colorado	20,412	-1,867	5,905	4,259	68	3,226	537	1,815	22,071
Kansas	2,114	276	211	44	1	0	2	152	2,406
Kentucky	1,249	50	125	3	0	0	0	76	1,345
Louisiana	37,570	-8,107	3,317	4,674	1,865	13,301	3,911	3,445	40,008
North	36,049	-8,165	3,055	4,265	1,865	13,300	3,864	3,304	38,669
South Onshore	1,150	-81	192	50	0	1	47	111	1,148
State Offshore	371	139	70	359	0	0	0	30	191
Michigan	891	9	328	12	197	206	1	61	1,165
Mississippi	167	9	103	3	0	0	0	30	246
Montana	570	32	110	28	43	133	5	43	736
Nebraska	2	1	0	0	0	0	0	0	3
New Mexico	26,129	621	5,771	2,567	393	2,158	6,698	2,283	36,134
East	16,890	173	3,660	2,323	393	2,158	6,514	1,809	24,870
West	9,239	448	2,111	244	0	0	184	474	11,264
New York	115	8	13	34	0	0	0	10	92
North Dakota	8,563	-304	2,291	96	500	561	1,910	1,066	11,359
Ohio	28,100	198	5,870	3,337	48	349	3,367	2,252	32,247
Oklahoma	30,091	1,648	7,332	2,641	1,065	1,838	4,852	2,567	39,488
Pennsylvania	97,802	-519	2,963	4,775	288	3,537	15,884	7,641	106,963
Texas	114,732	-823	31,595	13,062	4,496	14,008	17,823	10,715	149,062
RRC District 1	6,915	346	3,494	737	51	555	608	695	10,435
RRC District 2 Onshore	4,882	190	2,005	682	87	237	621	677	6,489
RRC District 3 Onshore	1,708	-276	392	144	5	69	781	263	2,262
RRC District 4 Onshore	15,031	82	3,062	1,273	20	312	3,173	927	19,440
RRC District 5	7,062	34	1,549	132	420	395	21	646	7,863
RRC District 6	20,740	-658	7,154	659	89	825	1,583	1,792	27,104
RRC District 7B	907	-14	369	101	61	352	10	107	1,355
RRC District 7C	8,302	1,294	1,982	722	516	1,744	1,791	869	13,006
RRC District 8	38,505	-2,200	7,829	6,742	2,987	9,224	8,887	3,949	48,567
RRC District 8A	1,224	31	438	3	13	15	82	124	1,650
RRC District 9	5,166	-87	2,388	751	86	204	0	362	6,472
RRC District 10	4,268	455	922	1,116	161	76	266	302	4,408
State Offshore	22	-20	11	0	0	0	0	2	11

Table 10. Proved reserves, reserve changes, and production of natural gas, wet after lease separation, 2021 (cont.)

billion cubic feet

State and subdivision	Changes in reserves during 2021								Proved reserves 12/31/21
	Published proved reserves 12/31/20	Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)	Extensions and discoveries (+)	Estimated production (-)	
Utah	2,381	219	1,252	30	0	5	188	243	3,772
Virginia	1,951	-4	243	0	0	0	0	96	2,094
West Virginia	38,462	478	2,404	2,751	616	33	11,598	2,670	46,938
Wyoming	13,126	-276	2,346	132	662	2,131	342	1,097	15,778
Federal Offshore	4,654	-114	981	118	2	12	331	798	4,946
Pacific (California)	149	-1	70	0	0	0	0	3	215
Gulf of Mexico (Central and Eastern) ^a	4,134	-116	809	72	2	12	17	692	4,090
Gulf of Mexico (Western)	371	3	102	46	0	0	314	103	641
Other states ^b	40	7	31	1	0	0	0	5	72
U.S. total	473,285	-8,622	143,078	43,064	10,525	41,755	67,564	38,098	625,373

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*Note: We base the production estimates in this table 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 2021 in the *Natural Gas Annual 2021*, DOE/EIA-0131(21). Natural gas is measured at 60°F and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia). EIA's [petroleum and other liquids data](#) are available on our website.^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 for these states to avoid disclosure of operator-level reserves data or because of other statistical precision or data quality reasons.

Table 11. Proved reserves, reserve changes, and production of nonassociated natural gas, wet after lease separation, 2021

billion cubic feet

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021						Extensions and discoveries (+)	Estimated production (-)	Proved reserves 12/31/21
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)				
Alaska	1,116	212	65	537	15	0	101	67	875	
Lower 48 states	335,751	-5,353	52,868	25,365	6,410	25,680	47,228	27,175	397,224	
Alabama	1,396	-101	85	42	4	0	0	94	1,240	
Arkansas	4,907	12	1,512	37	177	257	0	446	6,028	
California	105	-4	76	20	0	0	0	11	146	
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	105	-4	76	20	0	0	0	11	146	
State Offshore	0	0	0	0	0	0	0	0	0	
Colorado	12,133	-425	1,534	2,584	47	268	123	734	10,268	
Kansas	1,925	278	148	42	0	0	2	136	2,175	
Kentucky	1,249	44	124	3	0	0	0	75	1,339	
Louisiana	37,092	-8,062	3,226	4,651	1,824	13,300	3,902	3,409	39,574	
North	35,904	-8,167	3,030	4,254	1,824	13,300	3,864	3,296	38,557	
South Onshore	880	-54	134	42	0	0	38	89	867	
State Offshore	308	159	62	355	0	0	0	24	150	
Michigan	813	11	313	5	197	206	0	53	1,088	
Mississippi	141	3	98	1	0	0	0	20	221	
Montana	310	50	2	14	12	120	0	25	431	
Nebraska	2	1	0	0	0	0	0	0	3	
New Mexico	11,542	336	3,613	1,035	58	291	873	664	14,898	
East	2,746	-63	1,527	791	58	291	694	217	4,129	
West	8,796	399	2,086	244	0	0	179	447	10,769	
New York	112	4	13	34	0	0	0	9	86	
North Dakota	40	84	0	1	0	0	0	11	112	
Ohio	27,698	205	5,679	3,317	48	349	3,365	2,234	31,697	
Oklahoma	20,043	2,399	5,298	2,061	1,004	1,487	3,798	1,716	28,244	
Pennsylvania	97,703	-441	2,913	4,766	288	3,537	15,884	7,635	106,907	
Texas	63,063	118	22,295	3,852	1,481	3,792	7,641	5,864	85,712	
RRC District 1	3,090	119	2,585	70	3	26	210	294	5,663	
RRC District 2 Onshore	2,187	324	1,540	337	24	50	362	350	3,752	
RRC District 3 Onshore	1,231	-293	294	77	0	44	665	200	1,664	
RRC District 4 Onshore	14,894	127	2,606	1,258	20	312	3,173	869	18,965	
RRC District 5	6,961	89	1,529	131	418	393	15	639	7,799	
RRC District 6	20,371	-385	7,010	655	89	825	1,579	1,731	26,925	
RRC District 7B	832	-39	328	75	61	351	0	95	1,241	
RRC District 7C	757	371	395	90	14	13	0	110	1,322	
RRC District 8	4,714	-386	2,907	223	625	1,547	1,393	993	8,334	
RRC District 8A	16	77	11	1	0	0	0	2	101	
RRC District 9	4,419	-156	2,369	119	81	204	0	341	6,295	
RRC District 10	3,569	290	710	816	146	27	244	238	3,640	
State Offshore	22	-20	11	0	0	0	0	2	11	

Table 11. Proved reserves, reserve changes, and production of nonassociated natural gas, wet after lease separation, 2021 (cont.)

billion cubic feet

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021						Extensions and discoveries (+)	Estimated production (-)	Proved reserves 12/31/21
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)				
Utah	1,730	69	964	1	0	3	0	164	2,601	
Virginia	1,951	-6	243	0	0	0	0	96	2,092	
West Virginia	38,404	504	2,380	2,751	616	33	11,598	2,665	46,887	
Wyoming	12,179	-270	1,876	112	654	2,037	40	935	14,161	
Federal Offshore	1,184	-170	445	36	0	0	2	174	1,251	
Pacific (California)	0	0	0	0	0	0	0	0	0	
Gulf of Mexico (Central and Eastern) ^a	1,099	-174	411	23	0	0	2	162	1,153	
Gulf of Mexico (Western)	85	4	34	13	0	0	0	12	98	
Other states ^b	29	8	30	0	0	0	0	4	63	
U.S. total	336,867	-5,141	52,933	25,902	6,425	25,680	47,329	27,242	398,099	

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

Note: We base production estimates in this table 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 2021 in the *Natural Gas Annual 2021*, DOE/EIA-0131(21). Natural gas is measured at 60°F and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia). EIA's [petroleum and other liquids data](#) are available on our website.

^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 for these states to avoid disclosure of operator-level reserves data or because of other statistical precision or data quality reasons.

Table 12. Proved reserves, reserve changes, and production of associated-dissolved natural gas, wet after lease separation, 2021

billion cubic feet

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021						Estimated production (-)	Proved reserves 12/31/21
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)	Extensions and discoveries (+)		
Alaska	35,413	-322	67,957	3,834	0	0	5	293	98,926
Lower 48 states	101,005	-3,159	22,188	13,328	4,100	16,075	20,230	10,563	128,348
Alabama	134	35	11	0	74	0	0	13	93
Arkansas	76	-10	2	5	0	0	0	4	59
California	1,017	15	178	22	11	0	9	104	1,082
Coastal Region Onshore	103	9	37	11	11	0	0	9	118
Los Angeles Basin Onshore	54	-3	15	0	0	0	0	5	61
San Joaquin Basin Onshore	816	-31	99	11	0	0	9	80	802
State Offshore	44	40	27	0	0	0	0	10	101
Colorado	8,279	-1,442	4,371	1,675	21	2,958	414	1,081	11,803
Kansas	189	-2	63	2	1	0	0	16	231
Kentucky	0	6	1	0	0	0	0	1	6
Louisiana	478	-45	91	23	41	1	9	36	434
North	145	2	25	11	41	0	0	8	112
South Onshore	270	-27	58	8	0	1	9	22	281
State Offshore	63	-20	8	4	0	0	0	6	41
Michigan	78	-2	15	7	0	0	1	8	77
Mississippi	26	6	5	2	0	0	0	10	25
Montana	260	-18	108	14	31	13	5	18	305
New Mexico	14,587	285	2,158	1,532	335	1,867	5,825	1,619	21,236
East	14,144	236	2,133	1,532	335	1,867	5,820	1,592	20,741
West	443	49	25	0	0	0	5	27	495
New York	3	4	0	0	0	0	0	1	6
North Dakota	8,523	-388	2,291	95	500	561	1,910	1,055	11,247
Ohio	402	-7	191	20	0	0	2	18	550
Oklahoma	10,048	-751	2,034	580	61	351	1,054	851	11,244
Pennsylvania	99	-78	50	9	0	0	0	6	56
Texas	51,669	-941	9,300	9,210	3,015	10,216	10,182	4,851	63,350
RRC District 1	3,825	227	909	667	48	529	398	401	4,772
RRC District 2 Onshore	2,695	-134	465	345	63	187	259	327	2,737
RRC District 3 Onshore	477	17	98	67	5	25	116	63	598
RRC District 4 Onshore	137	-45	456	15	0	0	0	58	475
RRC District 5	101	-55	20	1	2	2	6	7	64
RRC District 6	369	-273	144	4	0	0	4	61	179
RRC District 7B	75	25	41	26	0	1	10	12	114
RRC District 7C	7,545	923	1,587	632	502	1,731	1,791	759	11,684
RRC District 8	33,791	-1,814	4,922	6,519	2,362	7,677	7,494	2,956	40,233
RRC District 8A	1,208	-46	427	2	13	15	82	122	1,549
RRC District 9	747	69	19	632	5	0	0	21	177
RRC District 10	699	165	212	300	15	49	22	64	768
State Offshore	0	0	0	0	0	0	0	0	0

Table 12. Proved reserves, reserve changes, and production of associated-dissolved natural gas, wet after lease separation, 2021 (cont.)

billion cubic feet

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021						Extensions and discoveries (+)	Estimated production (-)	Proved reserves 12/31/21
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)				
Utah	651	150	288	29	0	2	188	79	1,171	
Virginia	0	1	0	0	0	0	0	0	1	
West Virginia	58	-26	24	0	0	0	0	5	51	
Wyoming	947	-6	470	20	8	94	302	162	1,617	
Federal Offshore	3,470	56	536	82	2	12	329	624	3,695	
Pacific (California)	149	-1	70	0	0	0	0	3	215	
Gulf of Mexico (Central and Eastern) ^a	3,035	58	398	49	2	12	15	530	2,937	
Gulf of Mexico (Western)	286	-1	68	33	0	0	314	91	543	
Other states ^b	11	-1	1	1	0	0	0	1	9	
U.S. total	136,418	-3,481	90,145	17,162	4,100	16,075	20,235	10,856	227,274	

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

Note: We base production estimates in this table on data reported on Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*. They may differ slightly from the official EIA production data for associated-dissolved natural gas for 2021 in the *Natural Gas Annual 2021*, DOE/EIA-0131(21). Natural gas is measured at 60°F and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia). EIA's [petroleum and other liquids data](#) are available on our website.

^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 for these states to avoid disclosure of operator-level reserves data or because of other statistical precision or data quality reasons.

Table 13. Proved reserves and production of shale natural gas, 2018–2021

billion cubic feet

State and subdivision	Reserves				Production			
	2018	2019	2020	2021	2018	2019	2020	2021
Alaska	0	0	0	0	0	0	0	0
Lower 48 states	342,135	353,682	317,756	393,779	22,054	25,556	26,139	27,985
Arkansas	5,970	5,093	4,210	5,127	521	471	419	387
California	41	-	-	-	4	-	-	-
Colorado	2,727	2,500	1,331	4,149	126	149	116	301
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	25,598	29,553	28,533	35,630	2,044	2,518	2,555	2,942
North	25,598	29,553	28,533	35,630	2,044	2,518	2,555	2,942
South	0	0	0	0	0	0	0	0
State Offshore	0	0	0	0	0	0	0	0
Michigan	1,457	1,138	823	1,092	77	72	57	53
Mississippi	0	0	0	0	0	0	0	0
Montana	221	268	227	254	18	21	16	15
New Mexico	13,082	14,413	14,667	22,245	785	1,101	1,337	1,642
North Dakota	11,737	12,542	8,376	11,146	840	1,043	970	1,052
Ohio	23,956	34,376	27,775	31,790	2,337	2,558	2,320	2,207
Oklahoma	21,396	20,897	15,483	20,750	1,325	1,490	1,195	1,239
Pennsylvania	103,388	105,394	96,699	105,586	6,079	6,782	7,040	7,546
Texas	100,789	93,487	87,296	116,848	6,392	7,440	7,844	8,262
RRC District 1	11,434	9,511	6,517	9,790	693	729	688	652
RRC District 2 Onshore	4,993	4,345	4,290	5,775	654	631	621	582
RRC District 3 Onshore	451	328	135	177	21	23	21	18
RRC District 4 Onshore	13,953	12,486	11,396	14,235	689	682	599	608
RRC District 5	8,431	6,728	5,344	6,467	680	586	516	480
RRC District 6	18,690	17,026	16,224	20,453	515	895	1,046	1,358
RRC District 7B	1,673	1,090	679	1,067	118	93	84	77
RRC District 7C	7,454	7,747	7,688	12,282	597	705	798	803
RRC District 8	26,116	27,657	30,026	40,334	1,960	2,683	3,088	3,339
RRC District 8A	104	115	141	120	6	9	15	5
RRC District 9	7,490	6,454	4,856	6,148	459	404	368	340
RRC District 10	0	0	0	0	0	0	0	0
State Offshore	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0	0
West Virginia	31,748	34,020	32,335	39,160	1,504	1,911	2,270	2,339
Wyoming	0	0	0	0	0	0	0	0
Federal Offshore	0	0	0	0	0	0	0	0
Other states ^a	25	1	1	2	2	0	0	0
U.S. total	342,135	353,682	317,756	393,779	22,054	25,556	26,139	27,985

Data source: U.S. Energy Information Administration, Form EIA-23L, *Annual Report of Domestic Oil and Gas Reserves*, 2018–21

Note: We based this table 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 (for example, 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 EIA production volumes listed elsewhere on our website. Natural gas is measured at 60°F and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia).

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

Table 14. Proved reserves, reserve changes, and production of shale natural gas, 2021

billion cubic feet

State and subdivision	Published proved reserves 12/31/20	Changes in reserves during 2021					Estimated production (-)	Proved reserves 12/31/21	
		Adjustments (+,-)	Revision increases (+)	Revision decreases (-)	Divestitures (-)	Acquisitions (+)			Extensions and discoveries (+)
Alaska	0	0	0	0	0	0	0	0	
Lower 48 states	317,756	-3,921	51,222	25,412	7,464	33,005	56,578	27,985	393,779
Arkansas	4,210	0	1,338	34	0	0	0	387	5,127
Colorado	1,331	-472	2,685	227	0	803	330	301	4,149
Kansas	0	0	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	0	0	0
Louisiana	28,533	-3,543	2,326	3,481	1,823	12,803	3,757	2,942	35,630
North Onshore	28,533	-3,543	2,326	3,481	1,823	12,803	3,757	2,942	35,630
South Onshore	0	0	0	0	0	0	0	0	0
Michigan	823	6	309	2	196	205	0	53	1,092
Mississippi	0	0	0	0	0	0	0	0	0
Montana	227	-1	93	12	43	0	5	15	254
New Mexico	14,667	-350	3,158	1,521	371	2,124	6,180	1,642	22,245
North Dakota	8,376	-331	2,284	94	500	561	1,902	1,052	11,146
Ohio	27,775	108	5,756	3,282	48	349	3,339	2,207	31,790
Oklahoma	15,483	571	3,862	976	269	924	2,394	1,239	20,750
Pennsylvania	96,699	-601	2,706	4,730	288	3,537	15,809	7,546	105,586
Texas	87,296	501	24,769	8,689	3,312	11,679	12,866	8,262	116,848
RRC District 1	6,517	289	3,523	604	33	225	525	652	9,790
RRC District 2 Onshore	4,290	233	1,718	603	87	231	575	582	5,775
RRC District 3 Onshore	135	32	19	17	0	13	13	18	177
RRC District 4 Onshore	11,396	239	2,233	842	0	240	1,577	608	14,235
RRC District 5	5,344	208	1,310	88	89	260	2	480	6,467
RRC District 6	16,224	-448	4,766	264	34	674	893	1,358	20,453
RRC District 7B	679	-79	309	55	61	351	0	77	1,067
RRC District 7C	7,688	1,286	1,766	589	343	1,626	1,651	803	12,282
RRC District 8	30,026	-908	6,761	5,053	2,595	7,855	7,587	3,339	40,334
RRC District 8A	141	-68	9	0	0	0	43	5	120
RRC District 9	4,856	-283	2,355	574	70	204	0	340	6,148
RRC District 10	0	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0	0	0
West Virginia	32,335	190	1,936	2,364	614	20	9,996	2,339	39,160
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	0	0	0	0	0	0	0	2
U.S. total	317,756	-3,921	51,222	25,412	7,464	33,005	56,578	27,985	393,779

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

Note: We based this table 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 (for example, 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 EIA production volumes listed elsewhere on our website. Natural gas is measured at 60°F and at an atmospheric pressure base of 14.73 pounds per square inch absolute (psia).

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

Table 15. Estimated proved reserves of natural gas plant liquids and dry natural gas, 2021

million barrels and billion cubic feet

State and subdivision	Total proved natural gas reserves	Estimated yield from total proved natural gas reserves	
	2021 billion cubic feet	Natural gas plant liquids million barrels	Dry natural gas billion cubic feet
Alaska	99,801	230	98,841
Lower 48 states	525,572	25,953	490,395
Alabama	1,333	30	1,295
Arkansas	6,087	2	6,084
California	1,228	58	1,151
Coastal Region Onshore	118	4	113
Los Angeles Basin Onshore	61	3	58
San Joaquin Basin Onshore	948	51	879
State Offshore	101	0	101
Colorado	22,071	1,667	19,824
Kansas	2,406	154	2,267
Kentucky	1,345	63	1,256
Louisiana	40,008	176	39,859
North	38,669	54	38,599
South Onshore	1,148	89	1,084
State Offshore	191	33	176
Michigan	1,165	12	1,148
Mississippi	246	0	246
Montana	736	16	715
New Mexico	36,134	2,172	33,072
East	24,870	1,534	22,699
West	11,264	638	10,373
New York	92	0	92
North Dakota	11,359	1,522	9,224
Ohio	32,247	470	31,580
Oklahoma	39,488	2,764	35,531
Pennsylvania	106,963	957	105,564
Texas	149,062	12,158	133,169
RRC District 1	10,435	328	9,972
RRC District 2 Onshore	6,489	1,258	5,397
RRC District 3 Onshore	2,262	192	1,971
RRC District 4 Onshore	19,440	485	18,545
RRC District 5	7,863	322	7,392
RRC District 6	27,104	354	26,603
RRC District 7B	1,355	104	1,206
RRC District 7C	13,006	1428	10,957
RRC District 8	48,567	6,495	39,732
RRC District 8A	1,650	225	1,597
RRC District 9	6,472	497	5,744
RRC District 10	4,408	470	4,042
State Offshore	11	0	11
Utah	3,772	100	3,638
Virginia	2,094	1	2,093
West Virginia	46,938	2,745	43,023
Wyoming	15,778	563	15,005
Federal Offshore	4,946	323	4,484
Pacific (California)	215	2	212
Gulf of Mexico (Central and Eastern) ^a	4,090	289	3,677
Gulf of Mexico (Western)	641	32	595
Other states ^b	72	1	75
U.S. total	625,373	26,183	589,236

Data 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*

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

^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 for these states to avoid disclosure of operator-level reserves data or because of other statistical precision or data quality reasons.

Table 16. Reported proved nonproducing reserves of crude oil, lease condensate, nonassociated gas, associated-dissolved gas, and total gas, wet after lease separation, 2021

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	692	1	560	3,584	4,144
Lower 48 states	10,598	1,190	126,549	37,642	164,191
Alabama	5	2	37	11	48
Arkansas	2	0	60	12	72
California	262	0	59	188	247
Coastal Region Onshore	37	0	0	20	20
Los Angeles Basin Onshore	31	0	0	8	8
San Joaquin Basin Onshore	150	0	59	149	208
State Offshore	44	0	0	11	11
Colorado	235	4	2,292	2,224	4,516
Kansas	10	6	96	12	108
Kentucky	0	0	0	0	0
Louisiana	101	9	9,693	104	9,797
North	3	1	9,245	13	9,258
South Onshore	91	8	445	88	533
State Offshore	7	0	3	3	6
Michigan	0	0	0	0	0
Mississippi	28	0	16	1	17
Montana	117	0	20	148	168
New Mexico	1,789	31	3,638	8,047	11,685
East	2,112	118	1,706	9,945	11,651
West	10	3	2,109	81	2,190
New York	0	0	0	0	0
North Dakota	1,214	0	2	2,717	2,719
Ohio	71	142	16,533	397	16,930
Oklahoma	426	70	5,830	3,381	9,211
Pennsylvania	0	43	37,198	0	37,198
Texas	4,676	503	27,334	16,400	43,734
RRC District 1	495	12	2,299	1,158	3,457
RRC District 2 Onshore	352	190	1,822	882	2,704
RRC District 3 Onshore	107	14	452	116	568
RRC District 4 Onshore	0	64	9,788	9	9,797
RRC District 5	3	0	803	2	805
RRC District 6	1	30	8,205	2	8,207
RRC District 7B	1	0	20	0	20
RRC District 7C	496	0	40	3,202	3,242
RRC District 8	3,159	174	2071	10,905	12,976
RRC District 8A	57	0	0	99	99
RRC District 9	3	4	1,184	4	1,188
RRC District 10	2	15	650	21	671
State Offshore	0	0	0	0	0
Utah	250	2	427	459	886
Virginia	0	0	355	0	355
West Virginia	8	93	21,025	0	21,025
Wyoming	166	11	1,210	523	1,733
Federal Offshore	889	184	547	1,039	1,586
Pacific (California)	148	0	0	189	189
Gulf of Mexico (Central and Eastern) ^a	610	182	507	522	1,029
Gulf of Mexico (Western)	131	2	40	328	368
Other states ^b	8	0	0	0	0
U.S. total	11,290	1,191	127,109	41,226	168,335

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

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

^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 for these states to avoid disclosure of operator-level reserves data or because of other statistical precision or data quality reasons.