

# HELIUM

(Data in million cubic meters of contained helium gas<sup>1</sup> unless otherwise noted)

**Domestic Production and Use:** The estimated value of Grade-A helium (99.997% helium or greater) sold during 2022 by private industry was about \$820 million. Five plants (three in Texas and two in Kansas) extracted helium from natural gas and produced crude helium that ranged from 50% to 80% helium. Five plants (two in Kansas, one each in Arizona, New Mexico, and Oklahoma) produced gaseous helium that ranged from 95% to 99.5% helium. Four plants (two in Colorado and one each in Utah and Wyoming) extracted helium from natural gas and produced Grade-A helium. Three plants in Kansas and one in Oklahoma accepted crude helium from other producers and the Bureau of Land Management (BLM) pipeline and purified it to Grade-A helium. In 2022, estimated domestic apparent consumption of Grade-A helium was 43 million cubic meters (1.5 billion cubic feet), and it was used for, in descending order by estimated quantity, magnetic resonance imaging, lifting gas, analytical and laboratory applications, electronics and semiconductor manufacturing, welding, engineering and scientific applications, and various other minor applications.

<b>Salient Statistics—United States:</b>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022<sup>e</sup></u>
Helium extracted from natural gas <sup>2</sup>	62	72	76	69	60
Withdrawn from storage <sup>3</sup>	28	17	7	7	15
Grade-A helium sales	90	89	83	76	75
Imports for consumption	8	7	7	9	8
Exports	458	58	52	47	40
Consumption, apparent <sup>5</sup>	40	38	38	38	43
Net import reliance <sup>6</sup> as a percentage of apparent consumption	E	E	E	E	E

The estimated price for private industry's Grade-A helium was about \$11 per cubic meter (\$310 per thousand cubic feet) in 2022, with some producers posting surcharges to this price.

**Recycling:** In the United States, helium used in large-volume applications is seldom recycled. Some low-volume or liquid boil-off recovery systems are used. In the rest of the world, helium recycling is more common.

**Import Sources (2018–21):** Qatar, 53%; Canada, 20%; Algeria, 15%; Russia, 5%; and other, 7%.

<u>Tariff:</u> <u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12–31–22</u>
Helium	2804.29.0010	3.7% ad valorem.

**Depletion Allowance:** Allowances are applicable to natural gas from which helium is extracted, but no allowance is granted directly to helium.

**Government Stockpile:**<sup>7</sup> Under the Helium Stewardship Act of 2013, the BLM manages the Federal Helium Program, which includes all operations of the BLM Crude Helium Enrichment Unit, Cliffside Field helium storage reservoir, in Potter County, TX, and the Government's crude helium pipeline system. Private firms that sell Grade-A helium to Federal agencies are required to purchase a like amount of (in-kind) crude helium from the BLM. The law mandated that the BLM sell at auction Federal Conservation Helium stored in Bush Dome at the Cliffside Field. The last auction was completed in summer 2018. As of the end of fiscal year (FY) 2022, the remaining conservation helium is about 60.7 million cubic meters (2.19 billion cubic feet). The BLM will continue to deliver helium from private storage until all Cliffside Field assets are sold or disposed of. It is expected that all Cliffside Field assets will be disposed of in FY 2023. In FY 2022, privately owned companies purchased about 5.10 million cubic meters (185 million cubic feet) of in-kind crude helium. During FY 2022, the BLM's Amarillo Field Office, Helium Operations, accepted about 9.2 million cubic meters (331 million cubic feet) of private helium for storage and redelivered nearly 17.8 million cubic meters (640 million cubic feet). As of September 30, 2022, about 57.2 million cubic meters (2.06 billion cubic feet) of privately owned helium remained in storage at Cliffside Field.

<u>Material</u>	<u>Inventory</u> <u>as of 9–30–22</u>	<u>Authorized</u> <u>for disposal</u>	<u>Disposal plan</u> <u>FY 2023</u>
Helium	60.7	60.7	60.7

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**Events, Trends, and Issues:** Helium sales in 2022 decreased slightly in the United States owing to several unplanned shutdowns taking place, including the BLM Crude Helium Enrichment Unit, which was not operational from mid-January 2022 through late June 2022. World helium production, excluding the United States, decreased owing to delays of added production capacity in Russia, helium plant shutdowns in Qatar, reduced separation of helium from natural gas in Algeria, and constraints on transportation for helium products.

**World Mine Production and Reserves:** Reserves for the United States were revised based on Government reports.

	Mine production		Reserves <sup>9</sup>
	<u>2021</u>	<u>2022<sup>e</sup></u>	
United States (extracted from natural gas)	69	60	8,500
United States (from Cliffside Field)	7	15	61
Algeria	<sup>e</sup> 14	9	<sup>e</sup> 1,800
Australia	<sup>e</sup> 4	4	NA
Canada	<sup>e</sup> 1	2	NA
China	<sup>e</sup> 1	1	NA
Poland	<sup>e</sup> 1	1	24
Qatar	<sup>e</sup> 61	60	<sup>e</sup> Large
Russia	<sup>e</sup> 5	5	<sup>e</sup> 1,700
South Africa	<sup>e</sup> 1	1	NA
World total (rounded)	<u><sup>e</sup>164</u>	<u>160</u>	<u>NA</u>

**World Resources:**<sup>9</sup> Section 16 of Public Law 113–40 required the U.S. Geological Survey (USGS) to complete a national helium gas assessment. The USGS and the BLM coordinated efforts to complete this assessment, which was published by the USGS in fall 2021.<sup>10</sup> The mean volume of recoverable helium within the known geologic natural gas reservoirs in the United States was estimated to be 8,490 million cubic meters (306 billion cubic feet). This does not include the remaining 60.7 million cubic meters (2.19 billion cubic feet) in the Federal helium inventory. The estimated mean for the Midcontinent region was 4,330 million cubic meters (156 billion cubic feet); the Rocky Mountain region, 4,110 million cubic meters (148 billion cubic feet); the North Central region, 52.7 million cubic meters (1.9 billion cubic feet); the Gulf Coast region, 12.5 million cubic meters (0.45 billion cubic feet); and the Alaska region, 1.11 million cubic meters (0.04 billion cubic feet).

Helium resources of the world, exclusive of the United States, were estimated to be about 31.3 billion cubic meters (1.13 trillion cubic feet). The locations and volumes of the major deposits, in billion cubic meters, are Qatar, 10.1; Algeria, 8.2; Russia, 6.8; Canada, 2.0; and China, 1.1.

**Substitutes:** Nothing substitutes for helium in cryogenic applications if temperatures below –429 degrees Fahrenheit are required. Argon can be substituted for helium in welding, and hydrogen can be substituted for helium in some lighter-than-air applications in which the flammable nature of hydrogen is not objectionable. Hydrogen is also being investigated as a substitute for helium in deep-sea diving applications below 305 meters (1,000 feet).

<sup>e</sup>Estimated. E Net exporter. NA Not available.

<sup>1</sup>Measured at 101.325 kilopascals absolute (14.696 pounds per square inch [psia]) and 15 degrees Celsius (°C) [59 degrees Fahrenheit (°F)]; 27.737 cubic meters of helium = 1,000 cubic feet of helium at 101.325 kilopascals absolute (14.696 psia) and 21.1 °C (70 °F).

<sup>2</sup>Both Grade-A and crude helium.

<sup>3</sup>Extracted from natural gas in prior years.

<sup>4</sup>Exports were adjusted by the U.S. Geological Survey for 2018 as the data reported by the U.S. Census Bureau were unusually high and may have contained misclassified items.

<sup>5</sup>Grade-A helium. Defined as sales + imports – exports.

<sup>6</sup>Defined as imports – exports.

<sup>7</sup>See Appendix B for definitions.

<sup>8</sup>General Engineer (contractor), Bureau of Land Management, Amarillo Field Office—Helium Operations, Amarillo, TX.

<sup>9</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>10</sup>Brennan, S.T., Rivera, J.L., Varela, B.A., and Park, A.J., 2021, National assessment of helium resource within known natural gas reservoirs: U.S. Geological Survey Scientific Investigations Report 2021–5085, 5 p., <https://doi.org/10.3133/sir20215085>.