

## HELIUM

(Data in million cubic meters, helium gas<sup>1</sup> content, unless otherwise specified)

**Domestic Production and Use:** In 2023, the estimated sales of Grade-A helium (99.997% helium or greater) and gaseous helium (generally greater than 98% helium) was an estimated 79 million cubic meters (2.8 billion cubic feet) valued at an estimated \$1.1 billion. Five plants (three in Texas and two in Kansas) extracted helium from natural gas and produced crude helium that generally ranged from 50% to 80% helium. Nine plants (two each in Arizona, Kansas, and New Mexico, and one each in Colorado, Oklahoma, and Utah) produced gaseous helium. Five plants (two in Colorado and one each in New Mexico, Utah, and Wyoming) extracted helium from natural gas and produced Grade-A helium. Four plants (three 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 2023, estimated domestic apparent consumption of Grade-A and gaseous helium was 59 million cubic meters (2.1 billion cubic feet), and it was used for, in decreasing quantity of use, analytical, engineering, lab, science, and specialty gases (21%); controlled atmospheres, fiber optics, and semiconductors (17%); magnetic resonance imaging (17%); lifting gas (16%); aerospace, pressuring, and purging (9%); welding (8%); leak detection (5%); diving (4%); and various other minor applications (3%).

<b>Salient Statistics—United States:</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023<sup>e</sup></b>
Helium extracted from natural gas <sup>2</sup>	64	72	69	65	60
Withdrawn from storage <sup>3</sup>	22	10	7	12	19
Grade-A and gaseous helium sales	86	82	76	77	79
Imports for consumption	7	7	9	9	12
Exports	58	35	33	32	32
Consumption, apparent <sup>4</sup>	<sup>5</sup> 50	53	52	54	59
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 \$14 per cubic meter (\$390 per thousand cubic feet) in 2023, 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 (2019–22):** Qatar, 47%; Canada, 31%; Algeria, 11%; Russia, 4%; and other, 7%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–23</b>
	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> The Federal Helium System includes all operations of the Cliffside Crude Helium Enrichment Unit, the Cliffside Field helium storage reservoir, and the Government's crude helium pipeline system. The Helium Stewardship Act of 2013 (HSA) mandated the privatization of the Federal Helium System. The BLM was directed to sell at auction the 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) 2023, the remaining conservation helium was 51.5 million cubic meters (1.86 billion cubic feet). During FY 2023, the BLM's Amarillo Field Office, Helium Operations, accepted 5.7 million cubic meters (206 million cubic feet) of private helium for storage and redelivered 24.7 million cubic meters (891 million cubic feet). As of September 30, 2023, 41.4 million cubic meters (1.49 billion cubic feet) of privately owned helium remained in storage at Cliffside Field. On December 3, 2022, the management of the Federal Helium System was transferred from BLM to the General Services Administration (GSA) to dispose of all assets. The BLM will continue to deliver helium from private storage until all Federal Helium System assets are sold or disposed of. The Federal Helium System assets were being sold in two lots. Lot 1 included approximately 28 million cubic meters (1.0 billion cubic feet) of Federally owned crude helium. Lot 2 included the Federal Helium System and approximately 22 million cubic meters (800 million cubic feet) of crude helium. The GSA was accepting bids for the Federal Helium System assets until January 23, 2024. On September 7, 2023, a lawsuit was filed to prevent the Federal Government from selling the Federal Helium System. On November 2, 2023, the Court issued a decision that the sale of the Federal Helium System will continue as mandated in the HSA.

<b>Material</b>	<b>Authorized for disposal</b>	<b>Disposal plan FY 2024</b>
Helium	51.5	51.5

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**Events, Trends, and Issues:** In 2023, Grade-A and gaseous helium sales increased slightly, whereas helium extracted from natural gas decreased by 8% compared with those in 2022. The decrease in helium extracted from natural gas was mainly due to planned maintenance lasting about a month at one helium facility but was offset by a 58% increase of helium withdrawn from the Cliffside Field compared with that in 2022. In 2023, there were three new helium operations (one each in Arizona, Colorado, and New Mexico) that began producing helium in the United States. Total world helium production increased by 8%. Globally, several new helium facilities began operations—four in Canada, one in Russia, and one South Africa. A helium facility in Amur, Russia, restarted production from the first of its three trains in September 2023. The only helium facility in Australia ceased production in 2023 owing to reduced feedgas. Multiple companies were exploring for and developing helium deposits throughout the world. Some of these helium deposits that are being explored and developed are nonhydrocarbon sourced.

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

	Production		Reserves <sup>8</sup>
	2022	2023 <sup>e</sup>	
United States (extracted from natural gas)	65	60	8,500
United States (from Cliffside Field)	12	19	52
Algeria	<sup>e</sup> 8	10	<sup>e</sup> 1,800
Australia	<sup>e</sup> 3	1	NA
Canada	3	4	NA
Poland	3	3	24
Qatar	<sup>e</sup> 59	66	<sup>e</sup> Large
Russia	<sup>e</sup> 5	8	<sup>e</sup> 1,700
South Africa	NA	( <sup>9</sup> )	NA
World total (rounded)	<sup>e</sup> 158	170	NA

**World Resources:**<sup>8</sup> The U.S. Geological Survey (USGS) and the BLM coordinated efforts to complete a national helium gas 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 51.5 million cubic meters (1.86 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. Superconductors, including those in magnetic resonance imaging scanners, are being developed to operate at higher temperatures using nitrogen instead of helium as a coolant. Hydrogen can be substituted for helium in some lighter-than-air applications in which the flammable nature of hydrogen is not objectionable. Argon can be substituted for helium in welding. Hydrogen can be used as a substitute for helium in deep-sea diving applications.

<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>As Grade-A, gaseous, or crude helium.

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

<sup>4</sup>Grade-A and gaseous helium. Defined as sales + imports – exports.

<sup>5</sup>Consumption was estimated by the U.S. Geological Survey for 2019 because the data reported by the U.S. Census Bureau were unusually high and may have contained misclassified items.

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

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

<sup>8</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>9</sup>Less than ½ unit.

<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>.