

# 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% or greater) extracted during 2021 by private industry was about \$540 million. Fifteen plants (one in Arizona, two in Colorado, five in Kansas, one in New Mexico, one in Oklahoma, four in Texas, and one in Utah) extracted helium from natural gas and produced crude helium that ranged from 50% to 99% helium. One plant in Colorado and another in 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 2021, estimated domestic apparent consumption of Grade-A helium was 40 million cubic meters (1.4 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>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021<sup>e</sup></b>
Helium extracted from natural gas <sup>2</sup>	81	76	72	76	71
Withdrawn from storage <sup>3</sup>	22	22	17	7	6
Grade-A helium sales	103	98	89	83	77
Imports for consumption	19	8	7	7	9
Exports <sup>e, 4</sup>	74	66	56	50	46
Consumption, apparent <sup>5</sup>	48	40	40	40	40
Net import reliance <sup>6</sup> as a percentage of apparent consumption	E	E	E	E	E

In fiscal year (FY) 2021, the price for crude helium to Government users was \$3.61 per cubic meter (\$100.00 per thousand cubic feet). The BLM does not post a conservation helium price; conservation helium prices were last posted by the Federal Government in 2018. The estimated price for private industry's Grade-A helium was about \$7.57 per cubic meter (\$210 per thousand cubic feet), 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 (2017–20):** Qatar, 65%; Algeria, 12%; Canada, 11%; Portugal, 7%; and other, 5%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations 12–31–21</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> Under the Helium Stewardship Act of 2013, the BLM manages the Federal Helium Program, which includes all operations of the 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. The remaining conservation helium is about 85.7 million cubic meters (3.09 billion cubic feet). The Helium Stewardship Act requires that the BLM dispose of all helium assets including the Cliffside Field helium storage reservoir and pipeline system. The BLM will continue to make in-kind helium available to Federal customers until summer 2022. In FY 2021, privately owned companies purchased about 5.88 million cubic meters (0.212 billion cubic feet) of in-kind crude helium. During FY 2021, the BLM's Amarillo Field Office, Helium Operations, accepted about 8.0 million cubic meters (0.288 billion cubic feet) of private helium for storage and redelivered nearly 18.7 million cubic meters (0.674 billion cubic feet). As of September 30, 2021, about 82.1 million cubic meters (2.96 billion cubic feet) of privately owned helium remained in storage at Cliffside Field.

<b>Material</b>	<b>Inventory as of 9–30–21</b>	<b>Authorized for disposal</b>	<b>Disposal plan FY 2022</b>	<b>FY 2023</b>
Helium	85.7	85.7	5.88	79.2

**Events, Trends, and Issues:** Helium production in 2021 decreased in the United States owing to several unplanned shutdowns taking place, including the BLM Crude Helium Enrichment Unit. As of September 2021, the BLM completed sales of the remaining Federal helium inventory and transferred responsibility for the sale of the remaining assets to the General Services Administration. Federal in-kind users were to have access to helium until

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September 30, 2022. In Russia, a 60-million-cubic-meter-per-year helium-processing plant was commissioned. The first of three 20-million-cubic-meter-per-year trains started production in fall 2021; the next train was scheduled to be completed in February 2022.

On November 9, 2021, a proposed revised U.S. critical minerals list was published in the Federal Register (86 FR 62199). The new list contained 50 individual mineral commodities; proposed changes were the addition of nickel and zinc and the removal of helium, potash, rhenium, strontium, and uranium, which were included in the 2018 critical minerals list.

**World Mine Production and Reserves:**<sup>9</sup> Reserves for the United States and Poland were revised based on Government information.

	Mine production		Reserves <sup>10</sup>
	2020	2021 <sup>e</sup>	
United States (extracted from natural gas)	76	71	8,500
United States (from Cliffside Field)	7	6	86
Algeria	14	14	1,800
Australia	4	4	NA
Canada	<1	<1	NA
China	1	1	NA
Poland	1	1	24
Qatar	51	51	Large
Russia	5	9	1,700
World total (rounded)	160	160	NA

**World Resources:**<sup>10</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>11</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 85.7 million cubic meters (3 billion cubic feet) in the Federal helium inventory. The estimated mean for the Alaska region was 1.11 million cubic meters (0.04 billion cubic feet); the Gulf Coast region, 12.5 million cubic meters (0.45 billion cubic feet); the Midcontinent region, 4,330 million cubic meters (156 billion cubic feet); the North Central region, 52.7 million cubic meters (1.9 billion cubic feet); and the Rocky Mountain region 4,110 million cubic meters (148 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. As of December 31, 2021, the BLM had analyzed about 22,720 gas samples from the United States and 26 other countries in a program to identify world helium resources.

**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 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>Substantial increases in exports reported in recent years suggested that the data may be incorrect. The Census Bureau was reviewing the export data. Exports were estimated to result in an apparent consumption of 40 million cubic meters for 2018–2021.

<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>Supervisory General Engineer, Helium Resources Division, Bureau of Land Management, Amarillo Field Office, Helium Operations, Amarillo, TX.

<sup>9</sup>Production and reserves outside of the United States were estimated.

<sup>10</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>11</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>.