The Impact of Conflict on the Global Helium Shortage

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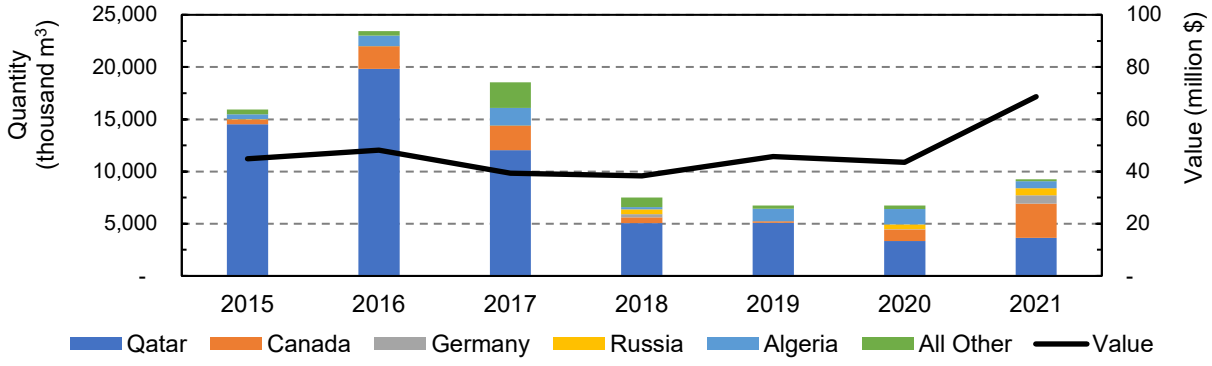
The end of the Federal Helium Program and exit of the United States Government as the major producer of helium has been anticipated for over two decades. The transition to full privatization of the sector has led to changes in production and sourcing both domestically and abroad. Since the 2017 *executive briefing on helium, several events have sent shocks through the global helium market—which is key to the fields of medicine, science, and defense. The most recent event, the 2022 shortage, is a combination of pre-existing market conditions and stress from the Russia-Ukraine War. This executive briefing on trade will provide an update on the helium market, highlight progress on U.S. privatization of helium and the effects of the war as well as a discuss of shortages (past and present).*

Domestic Helium Industry: Since 2017, the U.S. helium industry has continued to evolve. The Bureau of Land Management (BLM) announced on April 16, 2020, that effective September 30, 2021, in accordance with the Helium Stewardship Act of 2013 (HSA), it would no longer manage the Federal Helium System and Federal Helium Reserve (FHR). The General Services Administration took possession of the assets on that date to begin statutory disposal processes. Federal "in-kind" users will have access to helium until September 30, 2022, after which they must seek new sources on the open market.[1]

The U.S. industry continues to be the world's largest producer of helium throughout the privatization process. As of 2022, it maintains reserves of nearly 8.5 billion cubic meters (m^3).[2] In 2021, fifteen U.S. plants extracted helium from natural gas (producing < 50 percent purity crude and 50–99 percent purity helium), two plants produced Grade-A helium (99.997 percent or greater purity), and four plants purified crude helium sourced from private industry or BLM to Grade-A helium. The United States continues to supplement its own production with imports, and the largest source continues to be Qatar, the second-largest producer of helium globally (figure 1).

Figure 1: U.S. imports, quantity, total value, and calculated unit value (2015–21)



Unit Value ($/m³)	2015	2016	2017	2018	2019	2020	2021
	3.08	2.43	3.27	7.56	8.97	13.09	18.85

Source: USITC/Census DataWeb, HTS-10 statistical reporting number 2804.29.0010, accessed March 29, 2021.

[1] "In-kind" rules require federal agencies to buy helium sourced from BLM through private firms. These firms must buy equivalent amounts of crude helium from BLM; the in-kind helium is offered at a reduced rate to the agencies.

[2] Helium is typically sourced from natural gas fields, production is considered profitable when helium concentration levels are greater than or equal to 0.3 percent, but few natural gas fields in the world meet this requirement. Shale sources of natural gas are relatively porous and retain insignificant amounts of helium. Helium is light enough to escape Earth's atmosphere, meaning any gas capable of reaching the surface is irreplaceably lost to space.

Helium Shortages: There have been four notable global helium shortages in the past twenty years, including two since publication of the original briefing (figure 2). The June 2017 blockade of Qatar by Saudi Arabia cut off 30 percent of the global supply, priming the market for the third shortage (i.e., Shortage III), which resulted in a 10–15 percent market deficit. The situation was exacerbated in summer 2019, when a maintenance shutdown of ExxonMobil's helium plant in Wyoming and a maintenance outage at a plant in Algeria temporarily increased the deficit to about 40 percent. During Shortage III, refiners sourcing from BLM were on quota or allocation, and some customers reported receiving less than ordered and longer lead times.[3] Shortage III was ultimately abated by the economy-wide effects of the COVID-19 pandemic in 2020, which led to a dip in demand, bringing relief to the market. That drop also coincided with new helium sources coming online, resulting in a more resilient supply of helium.[4]

Figure 2: Notable Helium Shortages of the 21st century

Source: Compiled by USITC Staff.

Following Shortage III, industry believed it would be the last such event in the near future; however, events in 2021 ultimately led to the start of Shortage IV. The first was a set of unexpected shutdowns at BLM's Crude Helium Enrichment plant in summer 2021 and January 2022. These shutdowns were compounded by fires at Russian natural gas process plants in October 2021 and January 2022, halting helium production at the recently completed Anwar 1 facility. Output is not expected to resume from that source until at least Q3 2022. Unexpected problems for U.S. and Russian production also coincided with scheduled maintenance and downtime in Qatar between February and March 2022. Collectively, helium suppliers resorted to allocating supply to their customers by February 2022 in response to these events.

Outlook: The Russian war in Ukraine has further stressed the helium market. Beyond Russia's position as a global supplier of helium, restrictions on Russian natural gas imports by the EU has altered trade flows and operations in third-party countries. Algeria, for instance, normally compresses and liquifies its natural gas prior to shipping, allowing for helium to be collected at certain sites. However, due to the pressure on the European natural gas market, Algeria has been sending its natural gas straight to the pipeline without intervening liquefaction, preventing the extraction of helium. As the future of international relations remains uncertain, current geopolitical affairs will likely stress the global helium market beyond all that has occurred to date. Scientific researchers, who depend on helium for operating complex instruments, have reportedly already faced difficulty sourcing supplies.[5] Ultimately, a prolonged shortage could have wide-ranging effects across multiple sectors.

Sources: Bettenhausen, "How Helium Shortages Have Changed Science," October 21, 2020; Bettenhausen and Jansen, "The Helium Shortage that Wasn't," March 24, 2022; Reisch, "Help for Helium Users," November 24, 2019; BLM, "BLM Announces Disposal Process," April 16, 2020; Kramer, "Helium Shortage has Ended," June 5, 2020; USGS, "Helium," January 2022; Kornbluth, "Helium Markets Now Experiencing 'Helium Shortage 4.0'," February 8, 2022.

[3] Reportedly, lead times jumped by 30 percent or more. The 2021 estimated price for private industry's Grade-A helium was about $7.57/m^3, with some producers posting surcharges to this price.

[4] Three projects often cited are: Gazprom—Amur 1, 2, 3 (Russia); Irkustsk Oil—Yaraktinsky field (Russia); and RasGas—Helium 3 (Qatar). Amur has been cited as Russia's grab to increase its global share of the market.

[5] Notably, the medical community also uses helium for diagnostic imaging (e.g., by MRI machines).