

Still Afloat? A Look at the Helium Industry

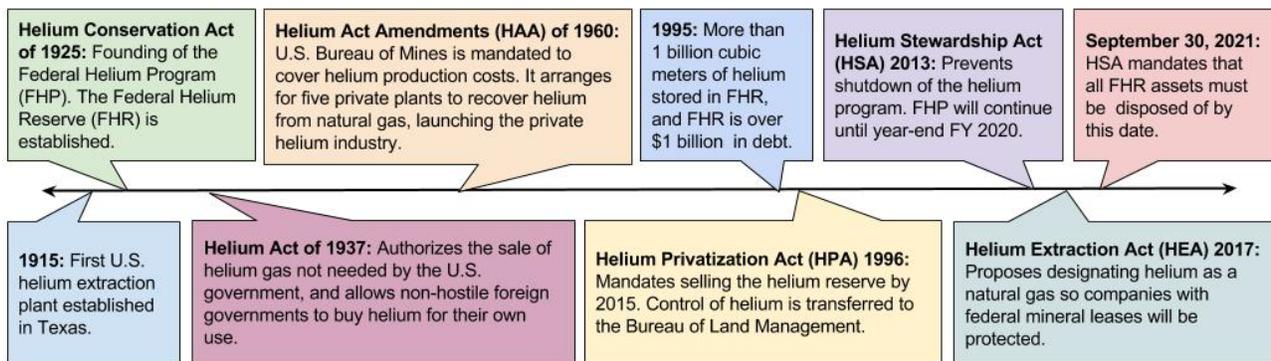
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Since the establishment of the U.S. helium industry, the U.S. government has been the major, and sometimes only, supplier of helium to the global market. However, the U.S. industry is now on the brink of major change as it complies with a federal mandate to divest by 2021 from the Federal Helium Program. Other nations—notably Qatar—have become significant suppliers despite supply chain issues. Congress has begun reviewing the Helium Extraction Act of 2017 to further facilitate the development of a private U.S. helium industry.

An industry traditionally moored in the United States. The U.S. industry has been a dominant producer and supplier of helium since the Federal Helium Reserve (FHR) was launched in 1925. Refined helium is an important part of the U.S. economy, vital to the fields of medicine, science, and defense. Because helium is inert and has a low boiling point, it is used widely in magnetic resonance imaging equipment, for cooling purposes, and to purge or pressure fuel in rocketry, among other applications.¹ Since its inception, the helium industry has been the subject of numerous laws. Recent legislation acted to reduce Federal Helium Program (FHP) debt² while preventing supply chain and price disruptions by extending FHP's operation (figure 1).

Figure 1. Timeline of U.S. helium industry development and related laws



Compiled from multiple sources, including *Chemical and Engineering News*, *Wired*, *The Hill*, and *The Historic American Engineering Record*.

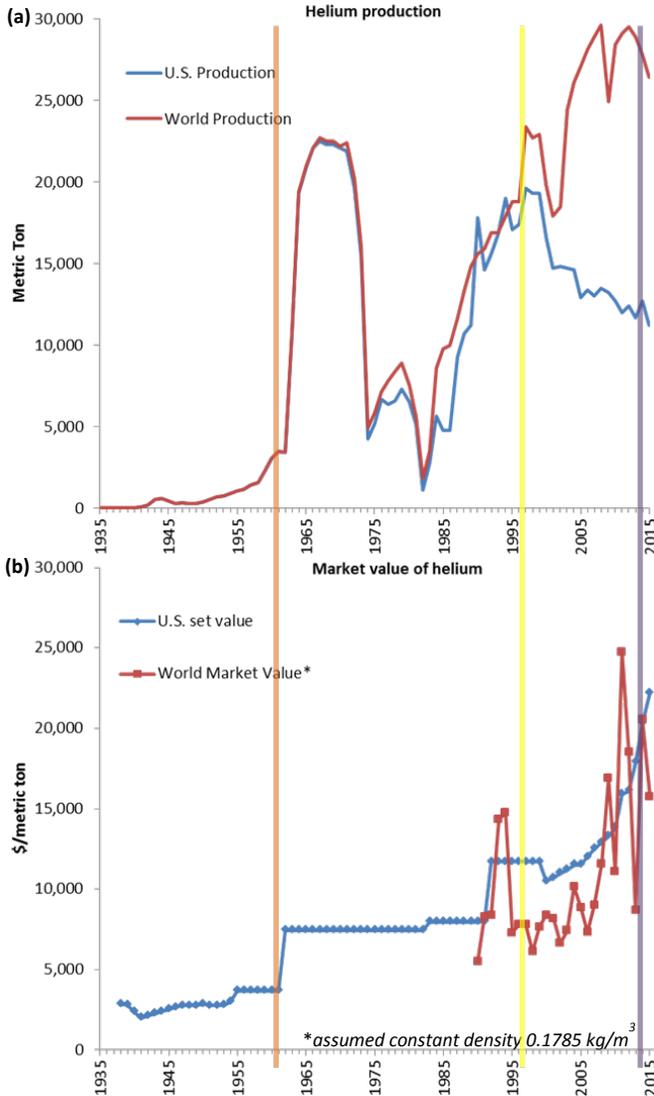
The FHR is being depleted. U.S. helium production and storage reached its peak during the 1960s and 1970s, primarily as a result of the space race. However, the continuing high costs for the maintenance and operation of the FHR led to the Helium Privatization Act (HPA) in 1996. Subsequently, the U.S. share of world production declined to less than 50 percent by 2005 as countries such as Qatar and Algeria stepped up production to meet demand (figure 2a); now Qatar is second only to the United States as a producer and is the primary source of U.S. helium imports (figure 3).³ Shifts in U.S. government pricing under the HPA contributed to large price increases (figure 2b), while unforeseen supply shortages both domestically and abroad led to volatile pricing. The Helium Stewardship Act (HSA) was passed in 2013 to restore some stability in pricing. It set up an auction system to help facilitate the sale of the FHR, including property and equipment, by 2021.

¹ Consumption of helium broken down by end use can be found at the U.S. Geological Survey (USGS) website under the minerals information page for helium: <https://minerals.usgs.gov/minerals/pubs/commodity/helium/>.

² Traditionally helium is found only in natural gas fields. Production is considered profitable when helium concentration levels are equal to or greater than 0.3%, but few natural gas fields in the world meet this requirement. It should be noted that shale sources of natural gas are relatively porous and retain insignificant amounts of helium.

³ U.S. imports of helium designated by *Harmonized Tariff Schedule* (HTS) code 2804.29.00.10; general rate of duty is 3.7 percent and free under FTAs.

Figure 2 (a). Helium production from the founding of the helium industry; (b). Unit value of helium (\$/metric ton). World market values available from 1988 onwards. (From left to right: Orange = HAA; yellow = HPA; purple = HSA; see figure 1 for definitions.)

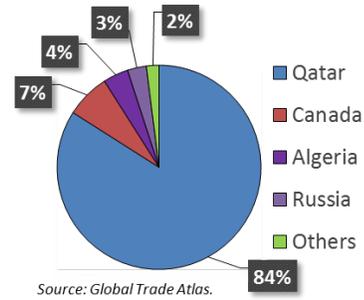


Sources: USGS and IHS Markit, Global Trade Atlas.

Note: "U.S. set value" = market value of helium set by the U.S. government.

Thor Resources Inc., "Helium Market" (accessed July 20, 2017); IHS Markit, Global Trade Atlas (accessed July 20, 2017); Minor, "Petrolia Oilfield" (accessed July 27, 2017); Kemp, "Congress Must Legislate to Avoid a Helium Crisis," March 27, 2013; Huggard, "U.S. Bureau of Mines, Helium Plants, Amarillo Helium Plant" (accessed July 27, 2017); Zhang, "The Feds Created a Helium Problem That's Screwing Science," July 15, 2015.

Figure 3. Origin of U.S. helium imports for consumption, 2016



Outlook is up in the air. Ongoing supply chain issues and price volatility are of concern because the United States industry may have to rely more on imported helium as the FHR ends. U.S. producers (e.g., ExxonMobil) are seen as less aggressive than foreign counterparts in developing domestic helium beyond established natural gas producers. In particular, Russia, Canada, and Tanzania are bringing new helium plants online as supplies from Qatar and Algeria become less reliable.⁴ Helium users have taken several steps in anticipation of the FHR shuttering: (1) increasing efforts to recycle helium, (2) replacing helium with other gases for specific applications, (3) minimizing helium use in research and development projects,⁵ (4) preparing for the end of "in-kind" sales for federal use,⁶ and (5) developing new helium sources (U.S. and foreign) to offset the loss of annual U.S. government auctions. U.S. producers have also recently pushed for passage of the Helium Extraction Act of 2017, which designates helium as a natural gas. This will support development of the private U.S. helium industry in the absence of the FHP and FHR.

Sources: U.S. Department of the Interior, "Helium Draft Bill," June 21, 2017; Bare, "The Helium Crisis" October 19, 2016; Butler, "Qatar Blockade Hits Helium Supply," July 4, 2017; Peterson, "Helium Statistics and Information," February 23, 2017; Reisch, "More Helium is on the Way," July 19, 2017; Helium One, "Projects" (accessed July 20, 2017);

⁴ Russia has announced plans to bring a major helium plant online in 2021. Canada seeks to supply 20% of the global market by 2021 (supplements loss from FHR closing), while Tanzania is expected to become a major contributor due to three large, highly concentrated helium reserves discovered in 2015. At the same time, Algeria is faces geopolitical uncertainty, while the 2017 blockade of Qatar by several Arab nations cuts Qatar off from land route access to its seaport in the United Arab Emirates.

⁵ This primarily applies to academic helium end users.

⁶ "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 the Bureau of Land Management; the in-kind helium is offered at a reduced rate to the agencies. The end of the FHP means that federal agencies would have to pay regular helium market prices. There are appeals to continue with a "royalty in-kind" program in which a portion of helium extracted from federal lands would still be marketed to private firms at the reduced in-kind rate, and vendors would be required to sell this helium to federal end users.