



**The balloon explosion  
nobody saw coming**

Source: iStockphoto.com/scaanrail

The world’s most advanced technology depends on one of the universe’s simplest elements, a noble gas so abundant in the universe that it ranks as the second most common element: helium. Essential for AI chips, GPUs, and semiconductors, its market is now tightening as the Iran conflict begins to disrupt global supply.

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## Introduction

Helium sits at the intersection of energy and technology. It is not produced independently, but extracted as a by-product of natural gas, making its supply dependent on a limited number of locations and industrial processes. This creates a market where availability does not always align with demand, and where small disruptions can have outsized effects.

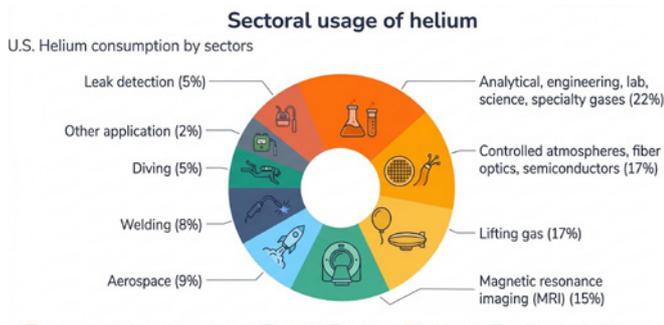
A third of the global commercial helium supply depends on Qatar, with exports passing through the Strait of Hormuz. As tensions rise, this structure leaves the market exposed, with implications for semiconductors, healthcare, and advanced industrial systems.

## The irreplaceability problem

Helium is the second most abundant element in the universe after hydrogen, making up about 24% of its total mass. Even though it's very common in stars and gas giants, it's quite rare in the earth's atmosphere because it's so light that it easily escapes into space. On earth, helium is mostly extracted from natural gas deposits, where it forms because of radioactive decay over time.

This gas is colourless, odourless, tasteless, and considered monatomic noble gas. It is the second-lightest element, and it is used across a wide range of critical applications, including cooling silicon wafers during chip fabrication, supporting semiconductor lithography (especially EUV machines), powering MRI machines in hospitals, enabling quantum computers that operate at extremely low temperatures, facilitating fibre optic cable production, and even in space rockets.

These applications rely on helium's unique physical properties: complete inertness, an ultra-low boiling point of -268.9 °C, and unmatched thermal conductivity at industrial scale. According to Reuters, industry experts stress that helium is "essential for heat management during semiconductor production" and currently has no practical alternatives.

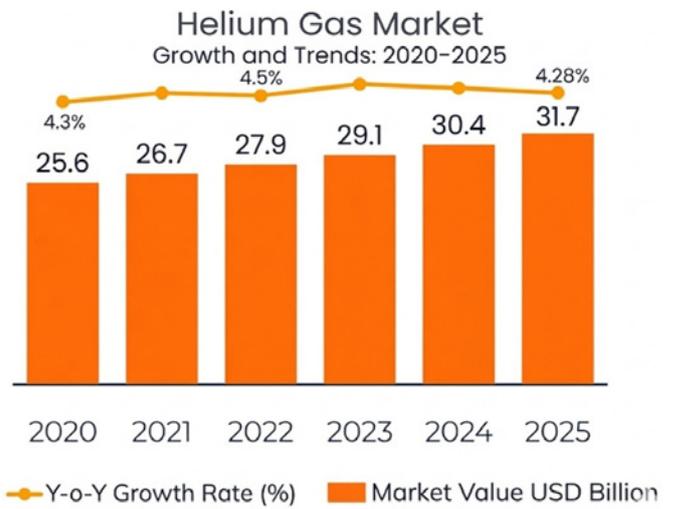


Source: USGS

A large part of the demand for Helium comes from the semiconductor industry. According to the United States Geological Survey (USGS), they account for around 17% of US helium consumption in 2025.

At the same time, the relationship between semiconductor activity and helium supply is not straightforward. Despite ongoing expansion in chip manufacturing, merchant helium sales volumes declined in 2025, reflecting weaker global demand conditions. This highlights a disconnect between rising fab utilisation, driven by AI and advanced nodes, and the underlying dynamics of the helium market.

Despite ongoing expansion in semiconductor manufacturing, merchant helium sales volumes declined in 2025 due to lower global demand, highlighting a gap between AI-driven fab utilisation growth and helium availability. According to the AKAP Energy report, helium's market development follows trends like other specialised energy-transition commodities, such as lithium and cobalt.



Source: FMI

Recycling offers only limited relief. USGS data shows that large-scale helium applications in the US rarely rely on recycling, and global practices remain inconsistent. Even in advanced semiconductor fabs, recovery rates typically do not exceed 80-90%, leaving a continued reliance on fresh helium supply. Air Products also notes that recycling has a limited impact on overall availability, reinforcing the structural dependence on primary production.

Helium prices remain tied to natural gas production rather than semiconductor investment cycles, as highlighted by Air Products. As a result, supply does not necessarily respond to shifts in demand from high-growth sectors. A notable example is the roughly 2% decline in Asia merchant helium pricing in 2025, despite rising advanced-node utilisation. This suggests that inventory buffers and allocation mechanisms can smooth short-term fluctuations, but do not address underlying supply constraints.

## Geopolitical shock from the Iran conflict

The escalation of the Iran conflict in late February led to targeted strikes on Qatar's Ras Laffan Industrial City, the world's largest LNG export hub and the single biggest concentration of helium production. Within days, QatarEnergy declared force majeure and halted operations across its 77 mtpa LNG facilities. As helium is extracted during natural gas processing, the shutdown immediately translated into a loss of supply.

The impact is amplified by Qatar's dominant position in the market. In 2025, the country produced around 63 million cubic meters of helium, accounting for roughly one-third of global supply. More than 80% of this output originates from Ras Laffan, making the site a clear single point of failure in the global system.

At the same time, exports have been effectively frozen. The Strait of Hormuz, through which nearly all Qatari helium is shipped, has become increasingly unsafe following attacks on vessels and rising security risks. As a result, even helium that has already been processed remains stranded, with no viable route to international markets.

The scale of the disruption is immediate. Around 5 million cubic meters of monthly supply has been taken offline, with no meaningful short-term replacement. Unlike other commodities, helium cannot be easily stockpiled due to boil-off constraints, and global spare capacity remains limited after years of tight balances.

Prices reacted accordingly. Spot helium prices surged within days, as buyers rushed to secure volumes. Early signals point to increases of around 50% in the spot market, according to Phil Kornbluth (Kornbluth Helium Consulting). This dynamic is reinforced by the structure of the market itself, where most volumes are sold through long-term contracts, meaning price signals tend to emerge with a lag, as noted by Kornbluth Helium Consulting and AKAP Energy.

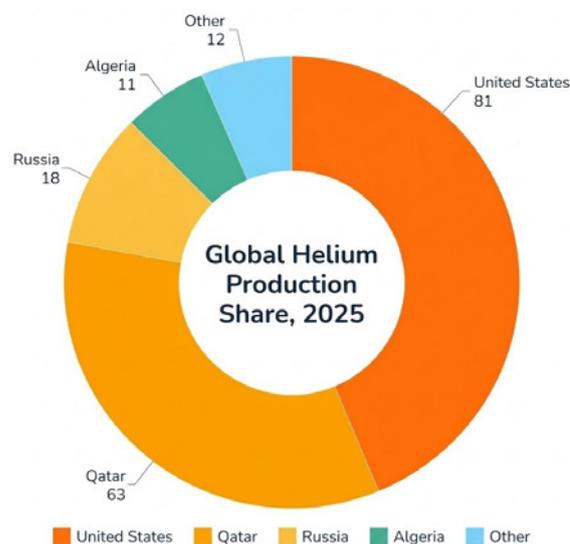
If the disruption persists, further increases are likely. Romanenko, CEO of market research firm IndexBox, estimates that a 30-day outage could lift delivered helium prices by 10-20%, and a 60-90-day disruption could push prices higher by 25-50%, particularly for buyers without long-term supply agreements. In a more prolonged scenario, AKAP Energy suggests that prices could retest previous shortage peaks above \$2,000 per thousand cubic feet.

## Fragile supply chain

"Helium isn't just for party balloons it's a critical raw material with a fragile supply chain. It's essential for future technologies like AI, and none of it can happen without helium," said Justyn Wood, CEO of Noble Helium.

Helium cannot be produced independently and is extracted solely as a by-product of natural-gas and LNG processing. Any disruption in LNG output directly reduces helium supply. This dependence means that pricing, operational, or transportation issues in natural gas markets immediately affect helium availability. There is no primary production alternative to buffer these shocks.

The supply base is highly concentrated. With Qatar accounting for roughly one-third of global output, disruptions at a single hub such as Ras Laffan remove significant volumes from the market. Alternative sources, including the US, Algeria, and Russia, cannot compensate quickly due to capacity limits and the by-product nature of extraction.



Source: Reuters

Helium is also uniquely constrained by its physical properties. It constantly evaporates, even in sealed containers, and must typically reach end users within roughly 45 days. It cannot be stored long-term, and once released into the atmosphere, it is lost forever. Unlike oil, there are no strategic reserves, meaning production disruptions immediately translate into supply pressure.

Inventory buffers provide only temporary protection. Asian semiconductor manufacturers hold around two to three months of supply, which is sufficient for current operations but primarily supports leading-edge, AI-focused production. As a result, supply constraints tend to be managed through allocation rather than immediate shutdowns.

## Who gets hit if helium runs out?

Higher helium prices are often associated with non-essential uses such as balloons, but those are not where the impact is most significant. The real exposure sits much deeper in the industrial stack, across critical systems where helium's inert properties and cooling capacity are required at multiple stages of production.

Semiconductors are the most immediate pressure point. Helium is essential in advanced manufacturing processes, particularly for AI-related chips. As supply tightens, production is reallocated. Semiconductor companies will tend to prioritise higher-margin AI-related chips, particularly high-bandwidth memory and advanced nodes below 5 nm used in products such as Nvidia GPUs, AMD accelerators, and Google TPUs. These leading-edge chips can receive up to 95% of available helium during constraints, according to Kornbluth Helium Consulting.

South Korea is especially exposed, importing around 65% of its helium from Qatar and its two main chipmakers, Samsung and SK Hynix, together account for more than 40% of the country's equity market. Both operate with limited buffers, holding roughly 2-3 months of inventory. Taiwan faces similar constraints, with TSMC partially reliant on the same supply chain and already monitoring the situation.

Lower-priority components are rationed first. The impact then spreads across the system. Consumer electronics production slows, automotive supply chains face renewed pressure, and industrial equipment is affected as delays compound across production cycles.

Beyond manufacturing, more critical systems are also exposed. Hospitals as well rely on helium to operate MRI machines, where it is used to maintain superconducting magnets. Research labs, quantum computing facilities, and aerospace testing environments depend on it for cooling constraints. These are not easily substitutable uses, and disruptions translate directly into operational delays.

Industrial gas companies with exposure to Qatari supply, including Air Liquide, Linde, Iwatani Japan, and Air Products, are particularly sensitive to current disruptions, according to AKAP Energy. Air Products noted it is implementing measures to preserve supply continuity, while Air Liquide emphasised its multi-source supply network and storage capacity in Europe.

Conversely, suppliers outside the region stand to benefit if constraints persist. Exxon Mobil remains the largest helium producer outside Qatar, while North American Helium and smaller players such as Helix Exploration and Blue Star Helium could see demand strengthen in a tighter market, according to AKAP Energy.

## Conclusion

The recent increase in helium prices shows how fast a localised disruption can spread through global supply chains. A shock at a single production hub quickly translates into tighter supply, higher costs, and pressure across multiple industries, a reminder that the cost of war rarely stops at the battlefield.

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