

THE  
**EDELGAS**  
GROUP

# HELIUM MARKET OVERVIEW

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Our goal is to bring transparency, stability and confidence to project owners and end-users in the sourcing, supply, and pricing of helium and other rare gases.

# WHY IS HELIUM AN IMPORTANT COMMODITY?

Helium is a vital resource, essential in modern technologies with major critical and irreplaceable use throughout the science, medicine and manufacturing industries.

Helium has several unique properties with numerous applications that make it an essential and irreplaceable element.

## MRI (Magnetic Resonance Imaging)

Magnet cooling (a single MRI scanner requires approximately 700 liters of helium per year)



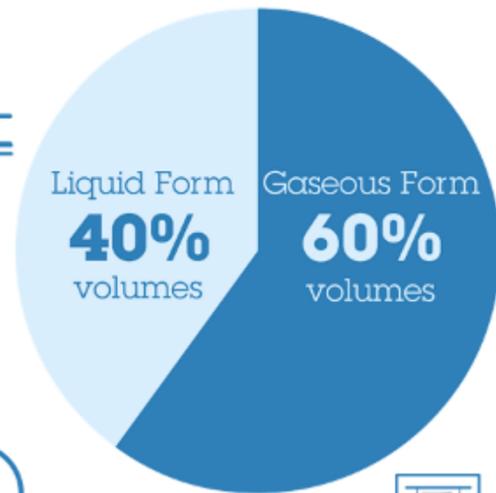
## Rockets & Satellites

Systems cooling & fuel pressurizing



## Fiber Optics

Highly purified glass preform creation & fiber cooling



## Electronics

Production cooling



## Breathing Atmospheres

Faster, easier and safer decompression

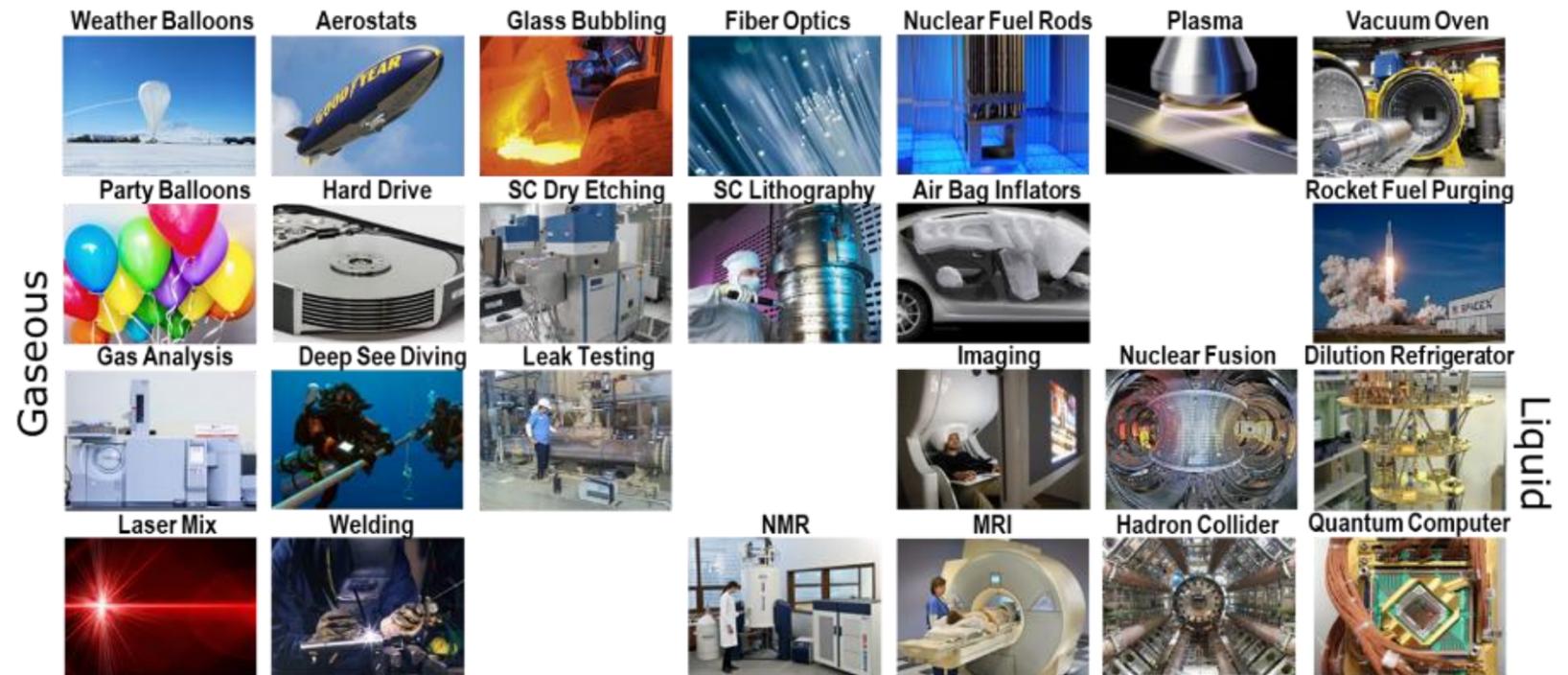


## Chromatography & Laboratory Applications

Carrier gas & purge gas, zero gas or neutral atmosphere gas

NB: there are several other sectors for which Helium is a key molecule: leisure (balloons), airbags, welding...

Source: Air Liquide



Source: Air Products

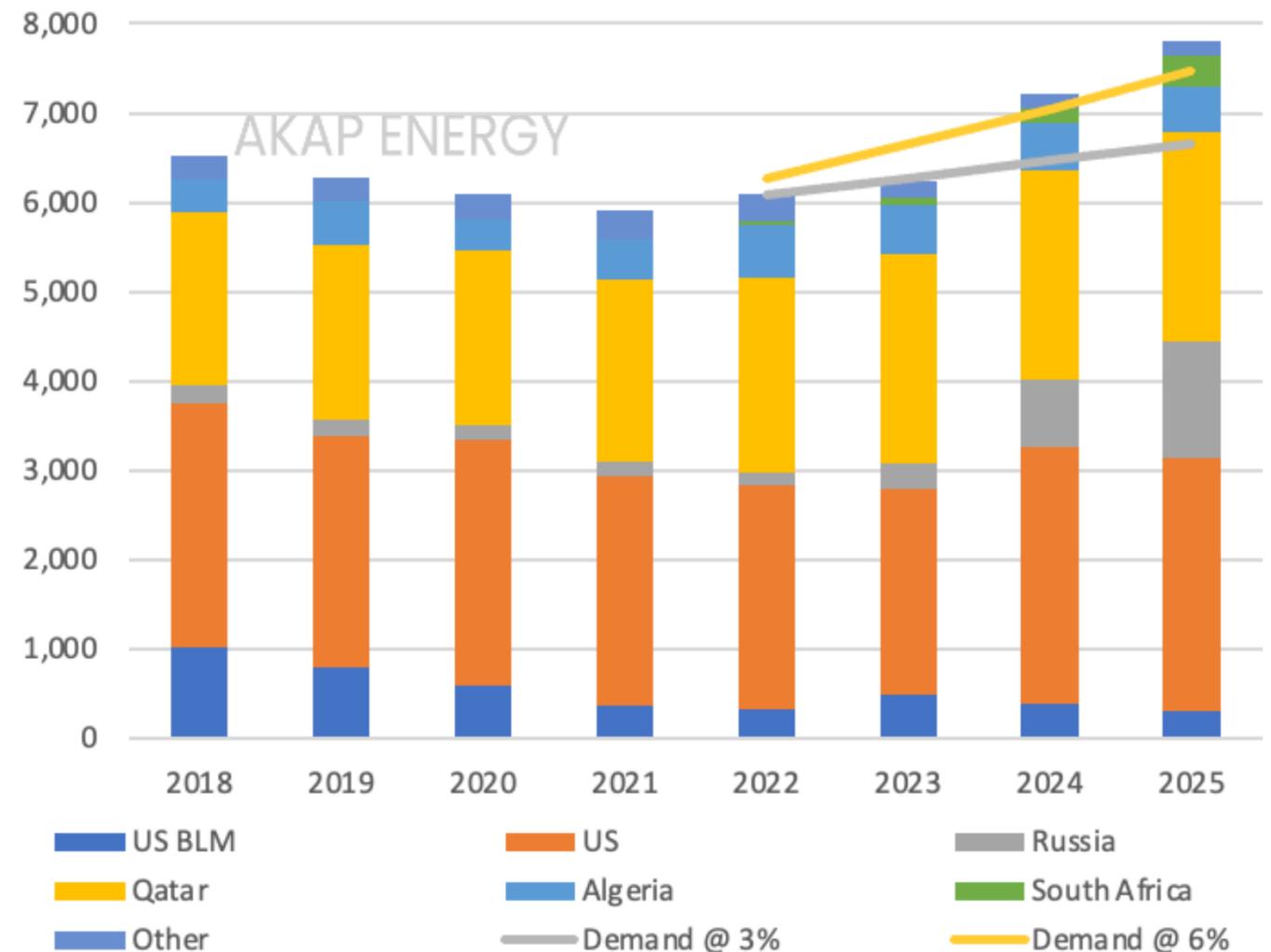
# WHAT DOES THE MARKET LOOK LIKE?

There are numerous players involved in the helium market but just a handful of companies control the majority of supply and distribution.

The helium industry is a niche market with opaque data and one that suffers from a lack of detailed analysis. Most of the large helium producers provide little or no data on production.

The helium market is around 6bcf/y. Based on an upstream price assumption of US\$300/mcf it is worth around US\$1.8bn pa to the producers but based on end user pricing it is likely a 3-4x larger market.

ESTIMATED SUPPLY DEMAND BALANCE FOR HELIUM (MMCF/Y)

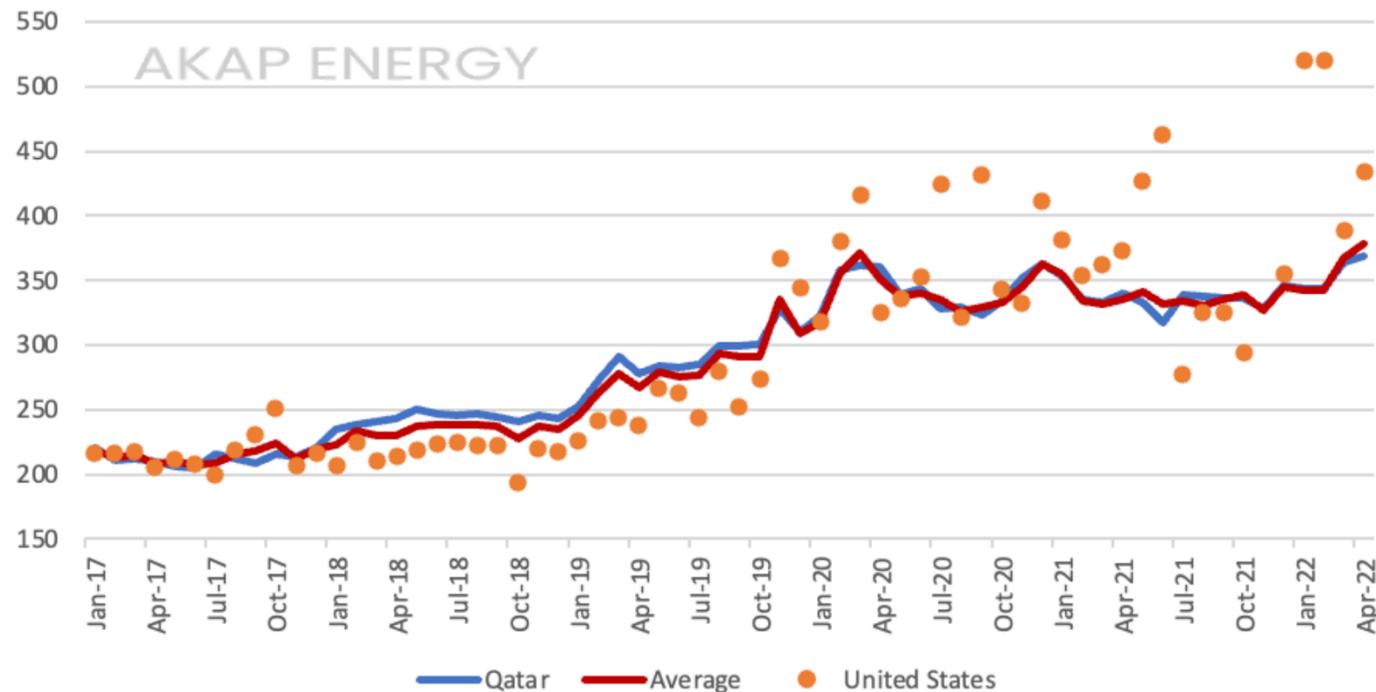


# HELIUM PRICING

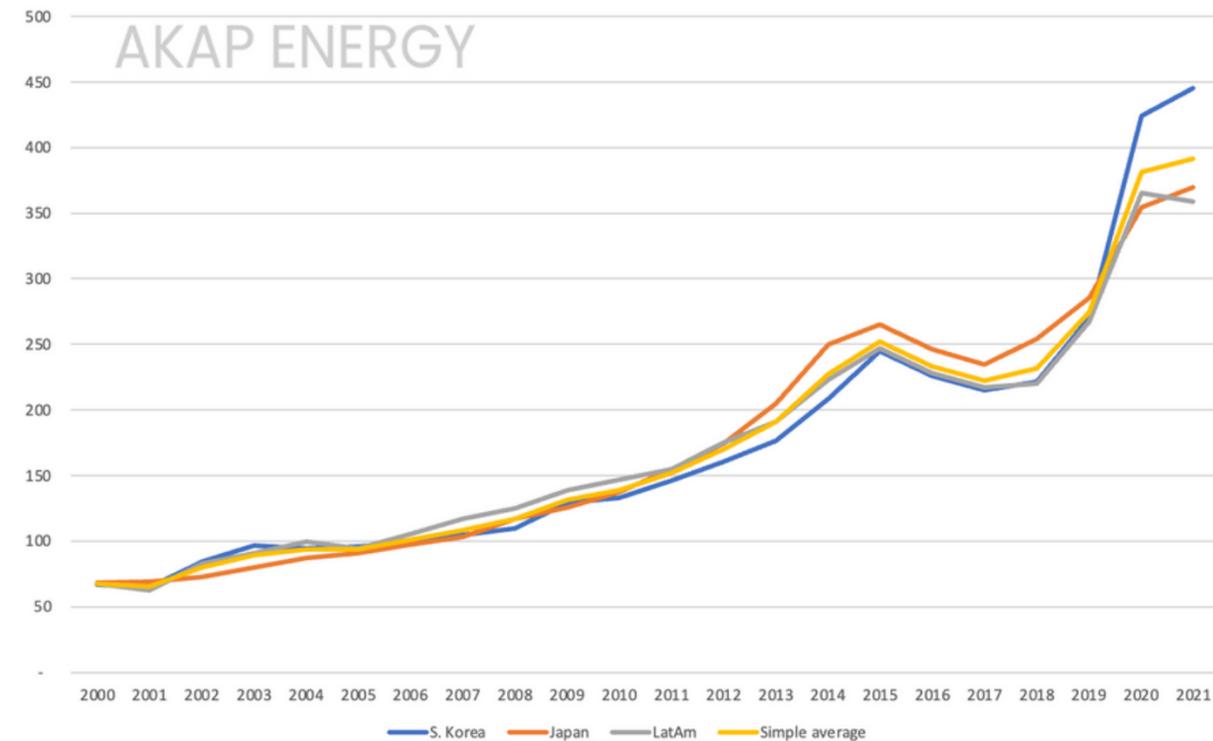
Market pricing for helium is difficult to ascertain as it is not a traded commodity and pricing is normally based on long-term, confidential contracts, resulting in opaque pricing given there are only a few key suppliers and industrial gas buyers.

Many helium users tend to be price insensitive as there are no substitutes for helium in many cases, making them price-takers.

Chinese estimated helium import pricing (\$/mcf)



Long term estimated helium pricing from the U.S. (\$/mcf)



# HELIUM REMOVED FROM US CRITICAL MINERAL LIST

The US removed helium from the 2022 Critical Mineral list on the basis of flawed data. Our data show that the official US helium export data (presumably considered when coming to this decision) is incorrect and is dramatically over-stating US helium exports. The criteria to be included on the list are as follows:

- **“essential to the economic or national security of the U.S.”** – Helium is vital to main critical industries such as semi-conductor manufacturing in the US, needed for MRI machines to function, critical university research and for rocket launches to name a few.
- **“supply chain vulnerable to disruption”** – The supply chain has been shown to be clearly susceptible to disruption with outages from Qatar, the BLM and Russia in recent years creating helium shortages.
- **“essential function in the manufacturing of a product”** – Helium is clearly critical in the manufacturer of semi-conductors, MRI machines, airbags
- **“the absence of which would have significant consequences for the economy or national security”** – Semi-conductors are vital for many parts of the US economy and having a reliance on imports will also impact national security.

## How is language in the lease form written with regards to helium royalties?

- Pre processing or “net” of processing
  - *What are the net terms?*
- What is the “price” of the helium? There is no market price.
  - *How do you know you're getting a fair royalty price?*
- What about long term contracts coupled with periods of short supply like we see today?
- A wrinkle: explorers “could” pay royalties on raw gas using rather arbitrary values.
  - *For instance, pay royalties on raw gas and sell gas to a “separate” processing company*
- Today's lease forms generally don't address helium adequately

1. Most helium off-take goes to the major industrial gas companies (IGC's). As they control the price, the price paid is generally low (and adjusted for CPI, which is the slowest moving indicator)
2. Should there be a clause for periodic price discovery?
3. The helium market itself needs more transparency - as price is controlled exclusively by IGC's, they dictate price paid and price sold.

## What we do:

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Edelgas Group is a full-service industrial, specialty and rare gases advisory firm. With over 80 years of combined experience Edelgas has the breadth and depth of knowledge to meet your requirements encompassing upstream, operations, marketing, contractual, and data analytics.

-  **Project development** Assisting explorers, financiers, and founders throughout the project lifecycle including exploration, development, finance, sales, and operations.
-  **Pricing** Providing advice, guidance, and transparency on the pricing of rare gases, particularly helium.
-  **Deal Structuring** Advising on acquisitions, fundraisings, joint-ventures, deal structuring, contract negotiations and strategic planning.
-  **Contracts** Assist with the review, preparation, and negotiation of contracts, including royalty, finance, concession, earn-in, tender, and EPC agreements.
-  **Regulatory and Compliance** Advising on regulatory and compliance issues relating to the supply and sale of industrial gases, including legal and risk management, procurement, and government contracts.

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