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BUSINESS

# Iran war halts Qatar helium output, threatening global tech supply chains

This April 4, 2009, file photo, shows a gas production facility at Ras Laffan, Qatar. (AP Photos/Maneesh Bakshi, File)

BY KELVIN CHAN
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LONDON (AP) — Iran's attack this week on Qatar's natural gas export facility threatens to disrupt not just world energy markets but also global technology supply chains because the helium it produces is crucial for a range of advanced industries.

Best known as the gas that makes party balloons float, helium is also a key input in chipmaking, space rockets and medical imaging.

Qatar supplies a third of the world's helium, according to the U.S. Geological Survey, but the nation had to halt production shortly after the war erupted three weeks ago. The latest Iranian strikes against the region's energy producing infrastructure have added to supply worries, with Qatar's state-owned gas company saying it would crimp helium exports by 14%.

Here's a deeper look at helium's industrial role:

## Qatar's role in helium supply

Helium is a byproduct of natural gas production, when it's separated out by cryogenic distillation. Qatar, which sits on the world's biggest single natural gas field, produces about 30% of global helium supply, according to the U.S. Geological Survey.

Qatar's helium is produced at its Ras Laffan facility, the world's largest liquefied natural gas plant. But state-owned energy company QatarGas halted production of LNG and "associated products" on March 2 because of Iran's drone attacks and two days later declared force majeure, meaning it's unable to supply contracted customers due to circumstances beyond its control.

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After Ras Laffan was hit again by more Iranian strikes on Wednesday and Thursday, QatarGas reported "extensive" damage that will take years to repair and cut annual helium exports by 14%.

"It makes the story worse," said Phil Kornbluth, president of Kornbluth Helium Consulting. "Your best case scenario would be you're back producing some helium in six weeks or something like that. As it looks right now, that's highly unlikely."

## Helium prices are on the rise

Spot prices for helium have doubled since the crisis erupted and will probably rise further, Kornbluth said.

But spot trading only accounts for about 2% of the total market in normal times, he said. Helium is a thinly traded commodity and is mostly sold through long-term contracts.

Still, contract prices "could go up a lot," Kornbluth said. "There's lots of room for price increase if this is an extended outage."

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Kornbluth said the shortage hasn't hit yet, because helium containers that would have been filled when the conflict erupted at the start of March would have still taken several weeks to arrive in Asia.

"Nobody's run out of helium yet. But it's a few weeks out when the shortage really hits."

## It's not just party balloons

Helium is essential for manufacturing semiconductors, including the cutting-edge chips used for artificial intelligence models produced in Asian fabrication plants.

It's great at conducting or transferring heat, making it ideal for rapid cooling.

Chipmakers use it to cool wafers — the discs of silicon printed with tiny electronic circuits. Helium is used during the etching process, when material that's been deposited on a wafer is scraped away to form transistor structures, said Jacob Feldgoise, an analyst at Georgetown University's Center for Security and Emerging Technology.

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During the etching process, "you really want to maintain a constant temperature over the wafer. And in order to do that, you need to be able to draw heat away from the wafer that's being processed," said Feldgoise. "Helium is an excellent thermal conductor. And so chip fabs will blow helium over the back of the wafer in order to speed heat removal and keep heat removal consistent."

Under current semiconductor manufacturing processes, there's no viable replacement for helium to cool wafers, said Jong-hwan Lee, a professor of semiconductor devices at South Korea's Sangmyung University.

The medical industry uses helium to cool superconducting magnets powering magnetic resonance imaging machines.

And the space industry uses helium to purge rocket fuel tanks, a demand that is expected to grow because of more frequent launches by companies like SpaceX and Blue Origin.

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## A complicated supply chain situation

Helium's atomic properties make it tricky to store and transport.

In gas form, helium's tiny molecules can easily escape containers by leaking through even the smallest of gaps.

Helium is typically chilled by Qatar's gas company into liquid form and stored in insulated containers for transport through the Strait of Hormuz. The specialized containers can store helium for 35 to 48 days. Any longer and they start warming up, letting the helium transform into gas that escapes through pressure release valves.

About 200 of these containers are stuck in the Middle East, Kornbluth said. They cost about $1 million each, so there aren't a lot of extra ones sitting around elsewhere.

"It's going to take a fair amount of time to get these containers out of Qatar and to get them somewhere else where they might be able to be filled with helium," he said.

"So this initial period when you lose Qatar supply and have to rejig the supply chain and reposition containers, that's going to be the worst part of the shortage most likely."

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## Other major suppliers of helium

There only are a handful of countries that produce helium.

The United States is the biggest producer, accounting for 81 million cubic meters last year. Qatar, Algeria and Russia are the other major producers, but Russian supplies are banned under Under States and European Union sanctions.

USGS estimates the United States has 8.5 billion cubic meters of recoverable helium in geologic reservoirs, while the rest of the world has 31.3 billion cubic meters.

## Asian chipmakers on edge

The war highlights the sprawling global supply chains that underpin South Korea's semiconductor industry, which has seen a surge in global demand for its chips amid the AI boom.

Fitch Ratings said in a report this week that the country — home to Samsung Electronics and SK Hynix, the world's largest memory chip makers — is particularly vulnerable to supply shortages because it imports about 65% of its helium from Qatar.

Samsung Electronics and SK Hynix likely have several months of inventory, but it's crucial that they accelerate efforts to secure alternative sources, Lee said, as the war could drag on and potentially disrupt supplies of more materials beyond helium.

Helium is among 14 semiconductor supply chain materials the Seoul government has flagged for monitoring due to their heavy vulnerability to the war.

"Even disruptions affecting just a handful of materials could destabilize the entire semiconductor manufacturing process as each stage of production depends on the previous one," Lee said.

Still, a full-blown helium crisis is unlikely, experts said. In the event of a shortage, Kornbluth said the helium industry allocates supplies based on importance so critical industries such as chipmaking and medical would be at the front of the line.

And because helium is a small part of the overall production cost of a semiconductor, it's likely that chip fabs "would be willing to pay a higher price" to secure supplies, Feldgoise said.

Samsung and SK Hynix declined to respond to questions about inventory or plans to diversify supplies. The Korea Semiconductor Industry Association said short-term supplies are sufficient and companies have been diversifying their supply routes.

Chipmaking giant Taiwan Semiconductor Manufacturing Company also said it does not "anticipate any significant impact at this time" but will continue monitoring the situation.

—

AP writers Kim Tong-hyung in Seoul, South Korea, Chan Ho-him in Hong Kong and Eileen Ng in Kuala Lumpur, Malaysia contributed.

KELVIN CHAN
Chan covers technology and innovation in Europe and beyond for The Associated Press.

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