



Fresh chip concerns surface; US semiconductor sector depends heavily on Ukraine-based neon supply

By [Rob Cockerill](#) | 28 February 2022

With up to 90% of the world's semiconductor-grade neon production derived from Ukraine and Eastern Europe as a whole, concerns are being raised for the stability of rare gases supply as the Russian invasion of Ukraine continues.

The war in Ukraine is into its fifth day, with a clearer picture emerging of the economic impact of the conflict.

The longer this crisis continues and escalates, the greater the volatility seen in global markets, at a time when those same markets are only just recovering from the effects of the global pandemic over the last two years.

For the gases industry, thoughts had immediately focused on the high-profile helium business.

The geographic needle of global helium supply had been due to shift eastwards as a result of Gazprom's Amur plant coming on-stream in Eastern Siberia. Russia's emerging helium market had been expected to see its production jump from just 3% in 2021 to 26% by 2025, in the context of simultaneously decreasing (traditional) North American production.

Whilst this is thought to still be the case in the long-term, the short-term outlook is once again less certain as explosions and fires at the Amur plant in January had already taken its nascent supply off the table for the foreseeable future and, combined with other factors, triggered the latest big market crunch, Helium Shortage 4.0.

Read more: [Helium markets now experiencing 'Helium Shortage 4.0'](#)

With the Amur plant already offline, there is understood to be little additional impact of sanctions on Russia in the short-term, but long-term challenges may exist in doing business in the region.

It is not just the helium business that could be impacted by the current Russia-Ukraine war, however, with the rare gases business – and neon in particular – now coming into focus as the conflict continues.

Ukraine is one of the world's major krypton, xenon and neon exporters. The potential for market disruptions is a growing concern, a point which is not lost on Stephen B. Harrison, Managing Director of sbh4 consulting and a member of **gasworld's** Editorial Advisory Board.

"Rare gas shortages in the past have been focused on krypton/xenon. Neon has generally not been an issue," he said, noting that while the talk may so far have concerned helium supply, rare gases like neon are much more scarce in their supply. "It comes out of ASUs in a different place (with nitrogen and helium, not with oxygen/krypton/xenon) and different ASUs are fitted for neon recovery versus those that are fitted with krypton/xenon."

"The question will come around to which ASUs can be modified to extract neon and diversify the global rare gases supply chain," he explained, adding, "Large ASUs are favoured, and some have been fitted with special tappings that allow subsequent investment for neon extraction."



Any threat to neon supply could derive from three implications of the war between Ukraine and Russia: the very obvious danger of any production plants being caught in the crossfire of military escalations; any complications around power/energy supply to ASUs as a result of the conflict and assault on infrastructure; and the potential ramifications of increasing trade and

economic sanctions on Russia, with logistical challenges in effect and most of the rare gases ASUs aligned to steel production and linked to Russia.

Any of these scenarios, or any combination, could cause the market to tighten, while the effects of any diversion of the workforce to the war effort and away from non-essential sectors could also have an impact.

Karina Kocha, Business Intelligence Manager for **gasworld**, affirmed the effects of any conflict on products – and pricing – like neon. “Back in 2014, after the annexation of Crimea to Russia, neon prices soared by 600% in almost one day. After that, American [chip] companies began to look for other gas suppliers,” she said. “But Ukraine is still a key supplier for US companies. Some sources suggest up to 95% of neon supply to US chip producers comes from Ukraine.”

“It looks like there was a chain there: Russia produced neon, as a by-product of steel manufacturing; this neon was then sourced and purified in Ukraine. No doubt all of this supply chain is now collapsed, however.”

Fresh chip concerns

Any potential neon shortages would have a knock-on effect on the production of electronics chips for all manner of applications – from devices to automotive – and a semiconductor sector still reeling from chip shortages at the hands of the Covid pandemic.

Only one month ago **gasworld** published an online exclusive chronicling the frustration with ongoing chip shortages and how the start-up of new semiconductor manufacturing plants ‘cannot come soon enough’.

Read more: [New semiconductor plants cannot come soon enough](#)

The semiconductor shortage has been a hot topic in the US since the start of the coronavirus pandemic (Covid-19), as demand for electronics saw incredible growth when families were restricted to their homes during lockdowns, resulting in the need for new forms of entertainment or new computers to support work from home advice.

However, as the world slowly begins to open up again, these strains are still being felt by the industry.

In what could be described as one of many breakthroughs from the US semiconductor industry of late, Intel said it will invest more than \$20bn in two new chip manufacturing facilities in Ohio to meet surging demand. Set to be a new epicentre for advanced chipmaking in the Midwest, the 1,000-acre site will mark the largest single private-sector investment in Ohio history.

Source: Ken-Wolter-Shutterstock.com

Yet as Harrison explains with the backdrop of the conflict in Ukraine, any investment in new fabs is only as good as the specialty/rare gases to supply them.

“Neon is essential to produce excimer laser specialty gas mixtures that are used to make high-tech silicon chips. About 90% of US chip production is reliant on Ukrainian semiconductor-grade neon, I believe. The new wafer fabs opening up in Nevada will add welcome capacity to US and global chip production, but if there are no gases available, they and the existing fabs will be at a standstill,” he said.

“Car makers have curtailed production recently due to supply chain issues around chips. We could see many domino effects ripple through industry if there is a shortage of neon and other rare gases.”

Kocha shared the view that further supply chain complications could be ahead. “Back in early February, chip makers began reviewing their supply chains to forestall the potential fallout from strained relations between Russia, Ukraine, and the US,” she commented.

“They say cutting off supplies of materials from Russia/Ukraine will not stop semiconductor production, but will significantly increase its cost, besides, companies have some stocks of materials. However, this is still a serious problem, because the global supply of chips is limited, and orders for them are only growing.”

Kocha also noted that Russia is a ‘crucial’ source of C4F6 (hexafluorobutadiene), an organofluorine compound gas which has grown in prominence as an etchant in microelectronics production, as well as a supplier of more than 45% of global palladium production.

Helium concerns?

Speaking during **gasworld**’s latest webinar on Friday, titled *Helium: Markets Reimagined, Part 1*, Phil Kornbluth – President of Kornbluth Helium Consulting – described the current market situation as ‘very messy, unsettled and uncertain’ and added, “This year we’ve had 16 years of recurring shortages and this year was supposed to be a year of transition to more plentiful supply.”

“It looked like that was going to happen but then the Gazprom facility – after starting up briefly in September – they had a fire in October, and then a more serious explosion and fire on January 1st.”

The effect of any continued Ukraine war was the subject of much interest and discussion throughout the exclusive webinar and Kornbluth affirmed his view that, given the week’s events, the Amur plant is less than likely to be restarted this year.

“There is some aspiration to try to get the plant restarted before the end of the year, but that may or may not happen,” he said, adding, “It’s clear that this year is going to be another year of tight supply conditions, shortages, supply allocations and elevated prices.”

With Russia set to markedly increase its output of helium within the next few years, the proposed sanctions set by the US upon Russia could impact the global supply of helium, though the extent of this is not yet clear. Stating that he doesn’t think it will have a big impact on supply within the next 12 months, Kornbluth added, “Nobody’s expecting much out of Russia anyway but, longer term, it becomes very difficult to do business with Russia and from that point it could have a big impact.”

“I hope that things don’t go back to what they were like during the Cold War; doing business with Russia was very difficult.”

Read more: [Helium markets: Reimagined, Part 1 review](#)

Russia finds itself increasingly isolated on the political and economic stage since its invasion of Ukraine in the early hours of Thursday morning (24th February). Proliferating sanctions imposed on the country have seen interest rates rocket up to 20% and what analysts have described as the ‘collapse’ of the Rouble in recent days.