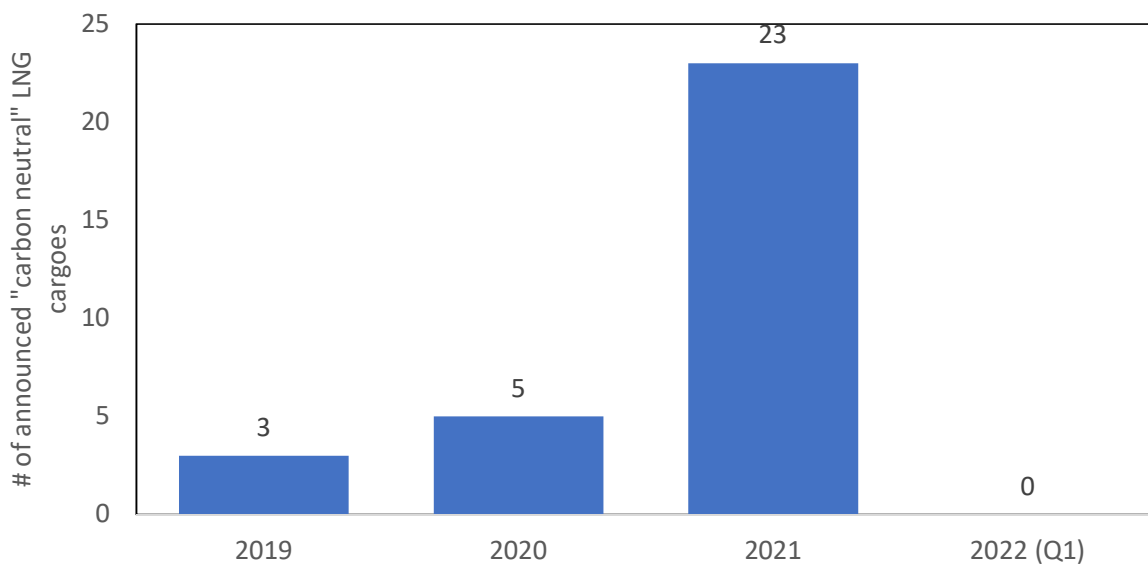


The Future of Natural Gas in a Carbon-Managed World: Is carbon neutrality a solution? Practices and impacts of LNG trading

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In June 2019, a **market for carbon-neutral LNG** was born. Shell signed an agreement to supply carbon-neutral liquified natural gas (LNG) cargoes to Tokyo Gas and GS Energy. A week later, the Japanese energy company JERA announced a similar shipment to an Indian customer. In 2020, four more shipments from various suppliers followed, all to clients in China. 2021 saw a boom, with 21 new carbon-neutral LNG cargoes announced for delivery to customers, mainly in Asia (Figure 1). Some expect this market to compete with conventional hydrocarbon products over the coming decades. However, in 2022, no new announcements about carbon-neutral LNG have so far been made.

Announcements of carbon-neutral LNG cargos by year



Source: KAPSARC, based on data from BNEF and company websites.

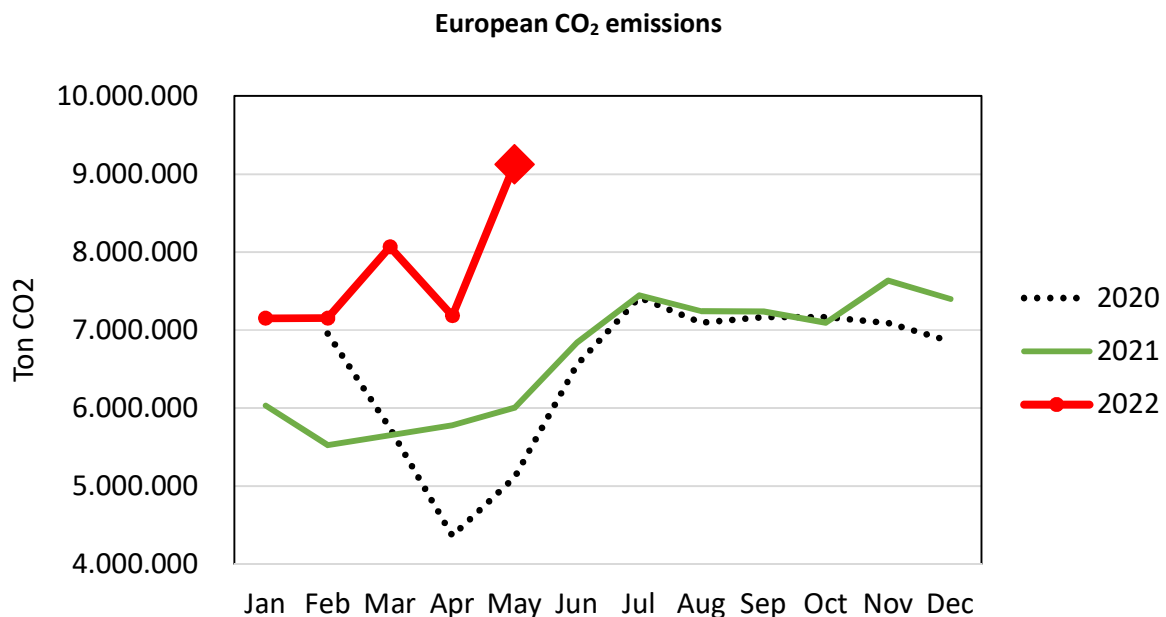
So, what is this market exactly? What is happening to it now? And what future awaits it? Carbon-neutral hydrocarbon products (not only gas but also oil, condensate, LPG, etc.) were developed as a response to the need to manage carbon footprint of hydrocarbon products.

Carbon-neutral LNG is physically the same as conventional LNG, **albeit with part or all its emissions offset by carbon credits**. There are several challenges for this new market. To begin with, **there is no commonly accepted definition of what a carbon-neutral LNG cargo is**. As a result, different producers offset different elements (and different greenhouse gases) of the LNG value chain using different methodologies. In fact, out of 31 "carbon-neutral" LNG cargoes publicly announced as of August 2022, only four provided information about the amount of carbon offset using their own methodologies, and only fourteen specified the source for their emissions calculations (out of them, four used their own methodology). This lack of transparency hampers the development of the carbon-neutral LNG market. Attempts to develop a universal methodology – for instance, the joint methodology developed by Pavilion

Energy, Qatar Energy, Chevron, and a methodology proposed by GIIGNL- are yet to evolve into a global standard.

The second half of 2021 saw **an unprecedented rise in global natural gas prices**, which has continued throughout 2022. Multiple factors contributed to it, such as unpredictable weather events, technical incidents, the long-term implications of COVID-19, a rapid increase in gas demand from recovering Asian economies, exacerbated by underinvestment in oil and gas projects. This year, in addition to the previous factors, geopolitics has impacted natural gas prices after the conflict between the EU's major gas supplier, Russia, and Ukraine escalated. In response to the sanctions placed against it by Western powers, Russia required its European clients to pay for its gas in rubles and stopped or reduced exports to non-complying customers in several countries, including those in Bulgaria, Poland, Finland, the Netherlands, Germany, Austria, and Italy, among others.

Concerns about gas supply **pushed environmental issues into the background in Europe**, with total European CO₂ emissions reaching a historical record of 9 million tonnes at the end of May 2022, according to the geo-analytics company Kayrros (Figure 2). Attempts to find alternatives to Russian gas had limited success so far, due to infrastructural limitations (e.g., LNG terminal capacity, existing pipeline routes). As a short-term solution, many countries are reintroducing coal. For instance, Germany decided to bring back 8.8 gigawatts of coal and lignite capacity; the United Kingdom restarted its coal plants, and the Dutch energy network operator Gasunie claimed that having no caps on coal generation would allow the Netherlands to cope with the loss of Russian gas.

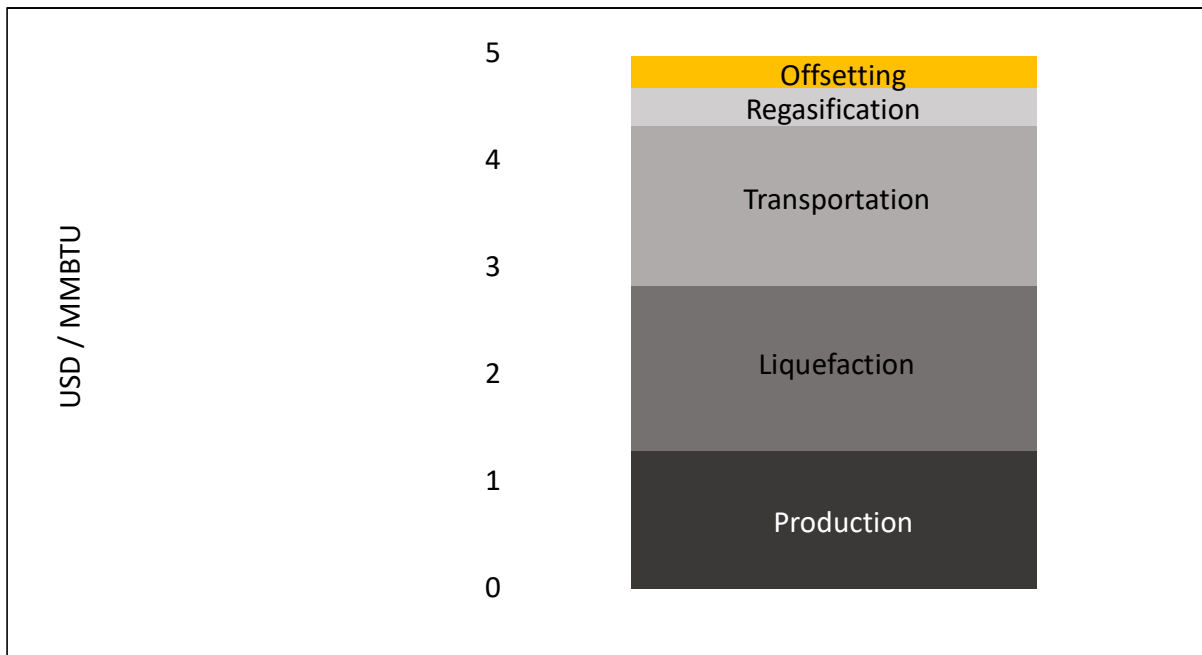


Source: Kayrros

Paying a premium (even if limited) for carbon neutrality appears more challenging in current market conditions, despite the fact that offsetting does not add considerable cost to production. For example, according to KAPSARC estimates, at the average 2021 carbon credit price of \$3.82 per tonne of carbon dioxide (CO₂), offsetting well-to-wheel emissions would cost an extra \$13 per tonne of LNG. Using LNG

from Qatar as an example, that would mean an increase in production costs of only approximately 6% (next figure).

The approximate cost structure for LNG delivered to Zeebrugge (Belgium) from Qatar with offsets for emissions from well to wheel



Source: KAPSARC based on data from Nexant World Gas Model.

Will the nascent carbon-neutral LNG market cease to exist? Not necessarily. Some producers have already put money into emission reduction technologies (including capital-intensive carbon capture, utilization and storage (CCUS), and expect a return on their investments. Moreover, global emission mitigation targets are still in place, and solutions to cut emissions will be a priority, especially after a weak performance in 2022. Once natural gas prices are normalized, importers will most likely focus again on their climate pledges, highlighting the benefits of carbon-neutral hydrocarbons again.