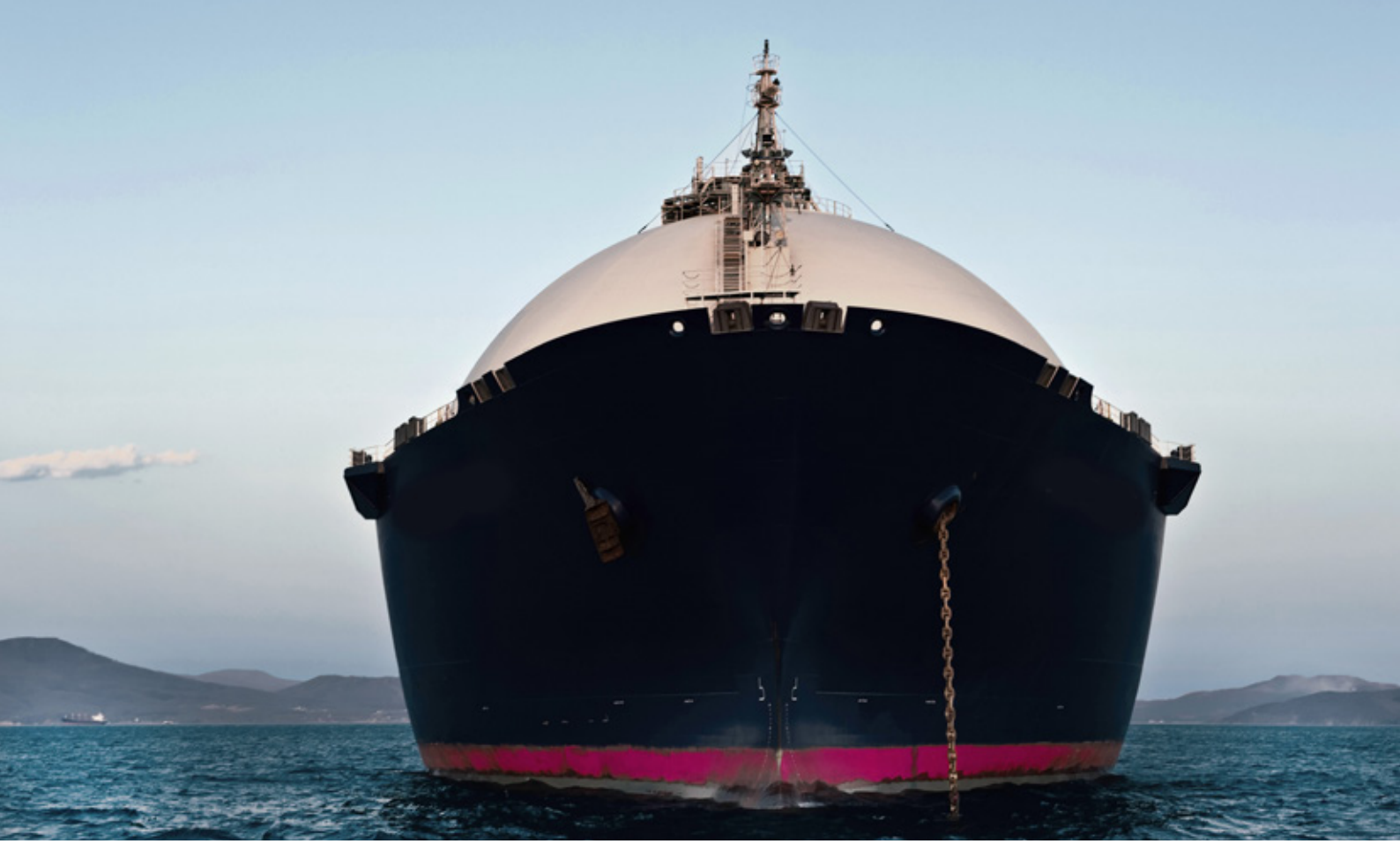
Strategic Report

Ten questions for the global gas market in 2023

Global Gas and LNG research teams

S&P Global
Commodity Insights



S&P Global Commodity Insights 10 Questions for the Global Gas Markets in 2023

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After the upheaval of 2022, there are potential signs of a loosening market in early 2023. How well markets stabilize this year, and at what price levels, will have lasting impacts on the eventual course of liquefaction investment and on global demand levels well into the future. In this paper, we present 10 questions on issues to look out for this year whose answers will have wide impacts on the LNG market and global gas more broadly.

1. How many US LNG export projects will convert recent contract progress into final investment decisions?

Supply-side competition among US LNG export project developers remains very strong, and late 2022 provided another flurry of announced offtake contracts at several projects targeting an FID in early 2023. Timelines for some projects have slipped from earlier targets of H2 2022, but contracting activity remains buoyant, with competition among projects that are nearing their threshold contracted volume to begin construction likely creating a buyers' market.

Despite the strong uptick in global LNG demand and prices that began in late 2021, only two US LNG export projects announced FID in 2022: Plaquemines LNG Phase 1 (13.3 MMtpa) and Corpus Christi LNG Stage 3 (10.4 MMtpa). This does not reflect the scale of the rapid contracting momentum over the past year. This wave of contracts has enabled new proposals to quickly gain ground and resurrected other projects that previously appeared to have stalled. Timing is now critical for developers given the expected loose market in the late-2020s if the entire slate of currently proposed projects were to be built out. Given the high volume of proposed capacity that could reach FID in 2023, we believe that financing could become a challenge for projects that are slower to advance, especially given capital cost inflation.

In 2022, a total of 75 MMtpa of contracts were signed with US liquefaction developers, yet only two projects announced FID with a combined capacity of less than 24 MMtpa.

2. How much Russian pipeline supply will reach Europe in 2023?

Since September 2022, Russian gas deliveries to the European Union are more than 80% below five-year average daily flows of Russian pipeline gas. Following the outbreak of Russia's invasion of Ukraine, a mix of factors have progressively lowered flows to Europe. Gazprom canceled gas contracts with countries that decided not to accept the new payment mechanism to pay in rubles via Gazprombank, Russia imposed counter-sanctions on EuRoPol GAZ (the company that operates the 33 Bcm/a Yamal-Europe pipeline across Poland), and after an initial cutoff of flows over June and July, underwater explosions on three of the pipeline strings in the Nord Stream 1 and Nord Stream 2 systems in September practically eliminated the possibility of any quick re-start of this route.

Despite limitations, gas has continued to flow to European buyers through Ukraine, with the route remaining stable at an average of 41 MMcm/d from June. This has been contrary to widespread expectations that Russia would cut off flows, leaving only exports to Turkey and the Russia-friendly Serbia and Hungary via TurkStream. The continuation of exports via Ukraine could be due to a combination of factors. Gazprom has an enduring commercial gas business in Austria, Hungary, and Italy through its

Centrex group; Russia has a need to continue supplying Moldova and, more specifically, the Russia-controlled Transnistria region; and Gazprom may be counting on earning the revenue to fund the government budget and continue investing in projects like its Power of Siberia-1 and Far Eastern pipelines to mainland China.

Including onward sales to Hungary, Serbia, Austria, Italy, and Moldova, sales to Europe have averaged 72 MMcm/d since September. Other than the commercial benefits and revenues, keeping these sales ongoing is also likely important to the Kremlin as it continues to promise "cheap" gas to those European countries that might choose to soften their stances on sanctions and end their support for the Ukrainian war effort. However, given the stage of Russia's conflict with Ukraine and the "collective West," none of these considerations may hold up against the Kremlin's desire to escalate in the future.

3. What role will LNG play in European gas markets in 2023?

During 2022, LNG imports rose sharply to make up 39% of combined European Union and United Kingdom gas imports (versus 23% in 2021). The sudden and drastic decline in Russian gas pushed LNG to a much larger role in Europe's energy mix. How this role evolves and whether it is sustained during 2023 remains an open question. Key factors driving European LNG requirements are likely to be the need to refill storage sites, the performance of non-gas sources of power generation, and demand response to the high price environment.

In 2023, Europe will likely, for the first time, need to survive a full calendar year with only minimal volumes of Russian pipeline gas.

Current storage levels and terminal send-out rates point to better than originally expected storage levels come the end of winter 2022-23. Still, at some point in the second quarter 2023, storage sites will need to be refilled. How European buyers—and policymakers, in cases of government financial backing—choose to refill sites and to what degree they are successful is likely to be a key factor in driving European LNG imports and regional gas prices.

During 2022, significant deficits in nuclear and hydro power generation would have been major catalysts for LNG imports even absent the cuts in Russian gas supply. If either or both of these performances substantially improve in 2023, it would reduce the need for LNG imports. The same can be said of the deployment of new renewables capacity and performance of the existing fleet.

The demand-side response to the events of 2022 range from declines of 5% in natural gas demand in some markets (such as Spain) to as much as 50% in others (such as Finland). The extent to which consumers respond to continued elevated gas prices during 2023 will influence the role LNG plays in each respective market.

4. Will mainland China return to demand growth as COVID-19 restrictions ease, and how will it meet its supply needs?

A rebound in mainland Chinese gas and LNG demand in 2023 could have far-reaching impacts, and Beijing's shift away from its zero-COVID policy is likely to trigger renewed growth in the economy and in energy consumption. Early in 2023, the disruption caused by COVID-19 restrictions may be replaced by the disruption caused by the wave of actual

infections amid low immunity levels. Despite this, we expect economic activity to show growth as the year progresses, and support will likely come from fiscal and monetary policies aimed at stimulating economic growth in the new era after zero-COVID. However, factors including surging renewable generation, coal availability, and high spot LNG prices will still serve as the key constraints, keeping mainland Chinese gas demand growth in 2023 to 6% in our current outlook. In addition, the expected ramp up of Power of Siberia 1 volumes from Russia will also affect LNG import demand.

Under weak domestic gas demand and high global spot prices, some established Chinese LNG importers ended up diverting or re-exporting cargoes into the spot market in 2022. This helped direct more LNG volumes to Europe, balance the global LNG market, and avoid otherwise even higher spot prices. Thus, a significant increase in LNG demand from mainland China could represent a big swing in the spot market. At the same time, if demand growth lags, the amount of LNG that mainland China could divert into the global market has increased. China's estimated flexible destination volumes in its LNG term portfolio will rise from 0.9 MMt in 2022 to 3.6 MMt in 2023. While LNG demand is expected to grow again in 2023, the competing impacts of fewer restrictions but higher infections complicate estimates of how much LNG may be diverted or re-exported.

China has another option for its gas supply—pipeline imports, including more Central Asian gas and Russian gas supply, most notably from Power of Siberia 2, none of which has yet to reach a commercial agreement. However, amid the current gas market environment with multiple markets competing for LNG supply, China may accelerate one pipeline import agreement or even sign up for two. If such steps are taken in 2023, the downward impact on the global LNG demand outlook for the late 2020s could be significant.

In addition to LNG, China has multiple new gas import options via pipelines from Central Asia and Russia.

5. Will price-driven demand destruction in smaller and emerging LNG markets be reversed?

LNG imports into smaller and emerging importers worldwide (defined here as global demand excluding Europe and northeast Asia) fell 14% to 70.6 MMt in 2022, their first year-over-year (YOY) decline since 2008. High spot prices depressed demand in many markets; volumes observed as spot in these markets fell by 39% to 19.4 MMt—their lowest collective level since 2013. Another year of high prices could continue to erode demand in these markets—many of which have been seen as drivers of long-term global LNG demand growth—with potential lasting impact.

Much of the price-sensitive decline in 2022 came from South Asian markets, where spot imports declined 41% YOY to 8.9 MMt, with the share of spot in the LNG import mix dropping below 30% for the first time in five years. Pakistan and Bangladesh were pushed completely out of the spot LNG market in the second half of the year. Our current forecast of spot LNG prices in Asia suggests that a spot buying rebound in the region will be impeded through much of 2023, with spot purchase opportunities likely to emerge in the summer months if prices are significant lower YOY as expected.

A region where the majority of LNG historically comes from the spot market, South American spot imports dropped 64% in 2022 to 3.7 MMt, driving a 53% decline in total imports to 6.4 MMt, the second lowest level since 2010. While healthy hydro reservoir levels in Brazil and rising domestic production in Argentina fueled this substantial drop, record-high spot LNG prices also contributed. Petrobras and other major spot-exposed

importers are now exploring their options to sign long-term contracts, but they will likely face challenging terms for near-term supply in the current market.

Beyond dampening LNG demand in existing markets, the continuation of high spot LNG prices into 2023 could also slow the adoption of LNG as a fuel in new markets. There are nearly twenty countries outside of Europe currently proposing to add their first LNG import terminals. Many of these are located in emerging markets with a lower ability to pay for high-priced fuel imports. While we currently expect that around ten of these markets will be able to start LNG imports over the next three years, progress could stall as high spot LNG prices make it difficult to sign contracts at reasonable prices and competition for FSRUs from Europe constrains infrastructure availability.

6. Will emerging signs of illiquidity in the European market push trade away from hub linkage?

Europe's process of liberalization and march towards a liberalized market model of national hubs trading on basis differentials has run into its first major hurdle since the Third Energy Package in 2009. High prices and volatility driven by the loss of Russian volumes, low storage inventories and infrastructure bottlenecks stretched credit and risk limits for market participants in 2022. This was then compounded by mandated storage injection targets, with direct government intervention in some national markets, which reduced the storage-based trading and balancing activity that previously managed volatility and supported liquidity. TTF Month Ahead Prices briefly broke above $90/MMBtu in August and the International Commodity Exchange has reported TTF Futures Open Interest (unsettled derivative contracts) down almost two-thirds on pre-crisis levels bringing them to 2018 levels, with other exchanges and Over-The-Counter data reporting similar trends.

In 2022, new contracts sold to portfolio buyers reached 38 MMtpa, accounting for 56% of global contracted volumes.

This has raised questions about the future of Europe as a liberalized market and whether there will be a retreat from its position as the liquid balancing market for global LNG. Infrastructure bottlenecks, driven by lack of LNG regasification capacity and pipeline interconnectivity, has seen UK's NBP and Spain's PVB be more reflective of global gas prices in 2022 with Dutch TTF, Italy's PSV, German THE and Central European hubs carrying a significant premium at points. The EU's price cap that takes effect in February, based on an absolute price level at TTF and a premium to a reference LNG price, is one proposed solution that aims to reduce this level of exposure. However, this could largely be redundant given infrastructure buildout and other identified limitations in the mechanism.

Whether 2022 was a blip or a more structural change will come down to fundamentals, market dynamics, and regulatory factors.

The relevance of TTF and other European hubs as a benchmark and pricing point will likely remain important globally but LNG benchmarks, like Platts Northwest Europe Marker, could increase in importance. These markets will need to balance through LNG imports; at present there seems to be limited appetite among European end-users for long-term LNG contracts, with hub-indexation and spot pricing remaining preferred to oil-indexation. This has left much new LNG contracting activity for volumes that could find their way to European terminals to aggregators. Therefore, it may be that while liquidity and trading continue to be reduced in Europe, the hubs themselves will remain an important benchmark. However, with European hubs more volatile and less easy to

hedge along the curve, focus and liquidity could then shift to European LNG Markers for trading and position management for LNG players.

7. Where do LNG tanker charter rates go after a historically volatile 2022?

Spot LNG tanker rates in 2022 hit all-time highs as Europe bid up the spot LNG product market to help cover the shortfall in Russian pipeline gas. A big driver in the run-up in tanker rates was the expectation of a robust LNG winter market. Shipowners quickly fixed all available tankers on multi-month/year deals well before the winter, claiming to be "sold out" until Q2 2023. Additionally, traders held on to excess tonnage in order to participate in floating storage plays or just to have shipping length available if a trading opportunity arose. The lack of available tonnage in the sublet market and shipowners claiming to be "sold out" drove rates for modern 2-stroke tankers close to $500,000/day by early November. However, a mild winter in both Europe and Asia has tempered LNG demand expectations, resulting in spot tanker rates dropping by 50% during 2H December.

Going into 2023, many of the same market conditions that were responsible for the run-up in rates are still in play, as well as some new ones. All these bullish factors, coupled with the entrenched conflict between Ukraine and Russia, could result in a robust spot LNG market. One major bearish factor to consider, however, is new shipping supply. 48 new conventional LNG tankers are expected to be delivered throughout the year, which exceeds the incremental shipping needs of the 11.6 MMtpa in new liquefaction expected online this year.

8. Will new liquefaction technologies set to enter operation in 2023 change the model for new projects?

In February 2022, Venture Global's Calcasieu Pass LNG exported its first cargo, only 2.5 years after FID was reached, despite construction delays at many other projects amid the pandemic. After achieved this eye-catching timeline using modular construction of its Baker Hughes processes in Italy, the market will be watching whether further advances in liquefaction technologies can be made via the rapid completion of plants using new technologies or designs in 2023.

Among the most ambitious fast-track LNG solutions yet is the Fast LNG liquefaction scheme from New Fortress Energy (NFE). It calls for modular liquefaction modules installed on converted jack-up rigs alongside floating storage units to provide 1.4 MMtpa in capacity. The company aims to complete construction on five Fast LNG units by mid-2024. It plans to deploy them to the Gulf of Mexico—two off the coast of Louisiana and three off the Mexican coast. NFE finalized an agreement with Mexico's Comisión Federal de Electricidad in November 2022, which will provide 15 years of gas supply via the existing pipeline network to create an LNG hub at Altamira. After completion of the first Fast LNG unit at Kiewit's shipyard in Texas (targeted for March 2023), NFE aims to have it operational at Altamira by the middle of the year. The pace of progress on the first Fast LNG project could illuminate whether this new technology has a chance to accelerate previously accepted minimum timelines for liquefaction development,

at least for relatively small-scale floating LNG, and whether it will be adopted by new project sponsors going forward.

Beyond North America, another prominent fast-tracked liquefaction project scheme has come from Eni in the Republic of the Congo. In August 2022, the company acquired the Tango FLNG liquefaction barge formerly deployed in Argentina in order to begin LNG exports from its producing Congolese gas assets in 2023. A second phase, awarded at the end of December, will also see a second FLNG unit built by Wison for deployment in 2025. Assuming the projects move ahead largely on schedule, they will be some of the fastest liquefaction capacity developed, going from first proposal in early 2022 to first exports in a little over a year. However, there is limited scope for this timeline to be replicated around the world, as the fast timeline for Congo-Brazzaville FLNG is aided by the world's only existing idle movable liquefaction capacity (the Tango barge) and gas fields already under production.

9. What are the prospects for liquefaction projects facing geopolitical challenges in Russia and Mozambique?

The supply-demand balance in the global LNG market over the rest of the decade could be altered significantly by the near-term course of developments at several geopolitically challenged projects. Most pivotal are those in Russia, hit hard by sanctions in 2022, and Mozambique, where the 12.9 MMtpa Mozambique LNG project halted construction amid an Islamist insurgency in early 2021 and has yet to resume on-site work.

The fifth EU sanctions package in April 2022 blocked export of liquefaction technology to Russia, seriously challenging the ability of Russian LNG projects to reach completion. While the first of Arctic LNG-2's three 6.6 MMtpa trains was more than 90% complete at the war's outbreak, and we expect it to come online in 2024, we expect multi-year delays in the completion of the other two trains after the exit of foreign contractors. Even the completion of the first train may hinge on the use of a Turkish Karpowership 300 MW floating power station to substitute for Baker Hughes gas turbines.

Like the later trains of Arctic LNG-2, other projects in Russia's plans are unlikely to make significant progress until either trade restrictions end or domestic technology advances sufficiently. NOVATEK has been developing the Arctic Cascade liquefaction technology for several years now, but it has become clear that its development will take significantly longer than originally planned. The process could conceivably first become viable for medium-sized trains within several years. NOVATEK signed a contract in December 2022 with a Rosatom subsidiary to cooperate in the development of Russian mixed refrigerant liquefaction technology, including the production of cryogenic heat exchangers, likely targeting this train size. However, the pace of technological development is uncertain, and delays continue to cede space in the market for liquefaction proposals elsewhere in the world.

In Mozambique, there is a case for optimism regarding the restart of construction. Troops led by Rwanda and the Southern African Development Community (SADC) have made great strides toward reestablishing stability in northeastern Mozambique since their deployment in July 2021, with a particular focus on the area surrounding the LNG project. After evacuating the project site in early 2020, TotalEnergies continues to be

cautious in its expectations for returning its workforce to Mozambique. However, the government has recently increased the pressure to restart construction given the importance of the project to the country's economy.

10. Will interest in carbon capture and offsets return to the LNG market?

With the market focused on unprecedented high spot prices and the wide ripple effects of Russia's invasion of Ukraine in 2022, much of the momentum toward carbon-neutral and carbon-tracking LNG production and sales appears to have dried up. While still a miniscule segment of the market, there were 23 cargoes and at least two new SPAs publicly announced to be carbon-neutral or otherwise offset in 2021; 2022 only saw a single such cargo. The premium associated with carbon capture and storage or offsets was likely a major deterrent to such trades being struck in 2022, raising the question of whether, and how quickly, efforts to track and lower the carbon intensity of LNG trades will pick up steam again.

Carbon-neutral LNG trade went from at least 23 cargoes and 2 SPAs in 2021 to just 1 cargo in 2022.

To be sure, even if individual LNG trades and contracts over the past year have rarely mentioned carbon with any prominence, upstream and liquefaction infrastructure investments have continued to show an understanding that net emissions reduction will become increasingly valuable in the future. This has included regions where efforts were previously in their infancy. For example, a number of positive developments have taken place in Southeast Asia over the past year. In Malaysia, Petronas had taken FID on the Kasawari carbon capture and storage project. With the EPC awarded to Malaysia Marine and Heavy Engineering, this project will allow the capture of 3.3 million tons of carbon annually and paves the foundation for low carbon gas supplied to the MLNG complex. Similarly, PTTEP awarded a FEED contract to Technip Energies for CCS at the Lang Lebah gas field in Sarawak, with FID targeted for 2023. In Thailand, PTTEP is also conducting a FEED study on the Arthit gas field to capture and store carbon. With plans to implement this project by 2026, it will be Thailand's first carbon capture project that will provide a template for other offshore fields in the Gulf of Thailand. In Indonesia, bp has issued the EPC tender to incorporate carbon capture, storage and utilization for the Tangguh liquefaction complex. The plan of development was approved by the government, facilitating a 30-year extension for the project's PSC.

CCS remains oft-cited as an advantage by sponsors of new projects throughout the world that are seeking to reach FID amid the current wave of liquefaction. Some new tailwinds could drive forward development of CCS in liquefaction in the coming year. For example, the Inflation Reduction Act of August 2022 significantly increased tax credits for building CCS facilities in the United States. It is possible that this may prompt developers to give further shape to proposed capture facilities at projects.

For more information

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