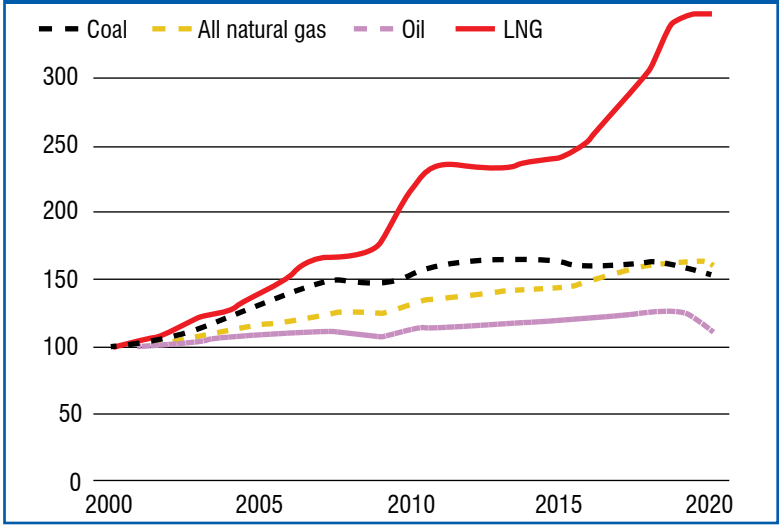
Global LNG – The Changing Dynamics

By Deepika Lal

While most of the sectors were hit by the pandemic, comparatively gas did well. According to BP, LNG demand growth significantly outpaced other fossil fuels such as coal and oil even in the pandemic-afflicted 2020. While LNG demand increased 0.8% year-on-year in 2020, demand for coal and oil plummeted 3.8% and 9.4%, respectively. However, while demand remained strong in 2021 too, prices were volatile, from record lows during the initial Covid-19 recession to record highs in latter part of 2021. The high prices were supported by the recovery of the global economy in 2021, soaring LNG demand in China and extreme weather events in Europe amid tight supply.

As we attempt to capture the events surrounding the energy scene, we see major changes in the global LNG map taking shape. The recent Russia-Ukraine turmoil has the potential to significantly change the world energy dynamics especially with respect to gas/ LNG supplies from Russia to Europe and its impact elsewhere on the supply options.

Indexed worldwide fossil fuel consumption (year 2000 = 100)



US and China Taking Lead

For long, Japan and Qatar have maintained the titles of being the world's biggest LNG importer and exporter respectively. This is

IHS Markit's estimate of LNG trade in 2021, in MMt

Exporter	Loaded supply	Importer	Delivered imports
Australia	83.0	China (Mainland)	81.4
Qatar	81.3	Japan	75.0
United States	73.6	South Korea	46.4
Russia	30.8	India	24.8
Malaysia	25.8	Taiwan	20.1
Nigeria	17.9	Spain	14.1
Indonesia	14.9	France	12.5
Algeria	12.3	United Kingdom	11.3
Oman	10.8	Turkey	10.4
Papua New Guinea	8.5	Pakistan	9.1
Trinidad	7.3	Brazil	7.5
Egypt	6.9	Italy	6.9
United Arab Emirates	6.3	Thailand	6.6
Brunei	5.7	Netherlands	5.9
Angola	4.0	Kuwait	5.9
Other	7.2	Other	44.0
Total	**396.3**	**Total**	**381.9**

Note: Delivered imports are net volumes and exclude reported cargoes and boit-off Volumes are subject to revision as customs data becomes available throughout the year Source: IHS Markt

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US witnessed the largest growth in LNG supply in 2021, adding 25 million metric tonnes (MMt) (52% increase) amid continued buildup of liquefaction capacity as well as the ramping up of output from plants turned down the previous year.

changing. China has already overtaken Japan to become the world's largest gas importer and the USA is soon poised to become the largest LNG exporter in 2022 from a position of being a net importer just a few years back.

US witnessed the largest growth in LNG supply in 2021, adding 25 million metric tonnes (MMt) (52% increase) amid continued buildup of liquefaction capacity as well as the ramping up of output from plants turned down the previous year. Average utilisation for US plants climbed from 43% in the third quarter of 2020 to 98% in third quarter of 2021. As such the US emerged as the third-largest LNG exporter (at 73.6 MMt) just behind Australia (83.0 MMt) and Qatar (81.3 MMt) for the full year of 2021 and is poised to claim the top spot in 2022.

Meanwhile, Mainland China climbed to the top of the LNG importing list of countries. Chinese imports reached 81 MMt in 2021 (increase of 12.3 MMt or 18%), overtaking Japan where imports were flat year-over-year at 75 MMt. This marks the first time since the early 1970s that Japan has not been the world's largest LNG importer. Some historical change. What is noteworthy here is that China has developed a huge appetite for LNG even though its transnational pipeline gas imports have increased significantly together with its domestic production.

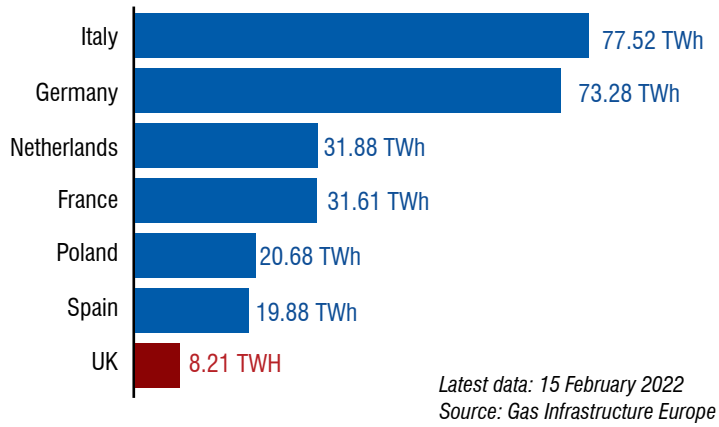
Strong Global Demand

2021 was a year of strong gas demand backed by economic recovery post pandemic. Given strong demand in Asia and South America and the early price arbitrage between NE Asia and Europe, European LNG deliveries fell by 9% (7 MMt) in 2021 to 77.2 MMt leading to lower European LNG imports. Besides LNG, pipeline gas supplies from Russia were also lower which led to depleting gas storage reserves in Europe which are currently at their lowest in years with winter demand not yet over. Gas storage across Europe is well below the 10-year average, with levels currently around 30% of storage capacity, according to Gas Infrastructure Europe data.

The need to replenish natural gas inventories in Europe could spur growth in 2022. Already we have been witnessing a surge in LNG price for deliveries into Europe. LNG inflows to emerging Asia may also expand, driven by post-pandemic demand recovery, domestic production declines and planned import capacity additions. It is likely that India's LNG imports will return to pre-COVID levels after a dip in 2021. Recent new entrants/potential entrants to the LNG importing family in Asia, like, Bangladesh, Philippines, Thailand, Vietnam, Myanmar and Pakistan are likely to put additional pressure on supplies. Import growth in the Middle East during 2022 is also expected, enabled in part by Kuwait's new Al-Zour terminal, while in Africa imports are set to be fuelled by the emergence of new importing countries -- Ghana, South Africa and Senegal.

China's LNG imports is expected to increase in 2022, driven by economic recovery, sizable regasification capacity growth and a push for coal-to-gas switching to improve air quality. Bangladesh could also see robust growth as domestic gas output slips and it continues a switch from oil and coal. However, price-sensitivity in south Asian countries including Thailand could make them watchful in their use of gas given high import prices.

Gas storage in European Countries
Selected countries, actual storage in terawatt-hours



Latest data: 15 February 2022
Source: Gas Infrastructure Europe

Inadequate Supply

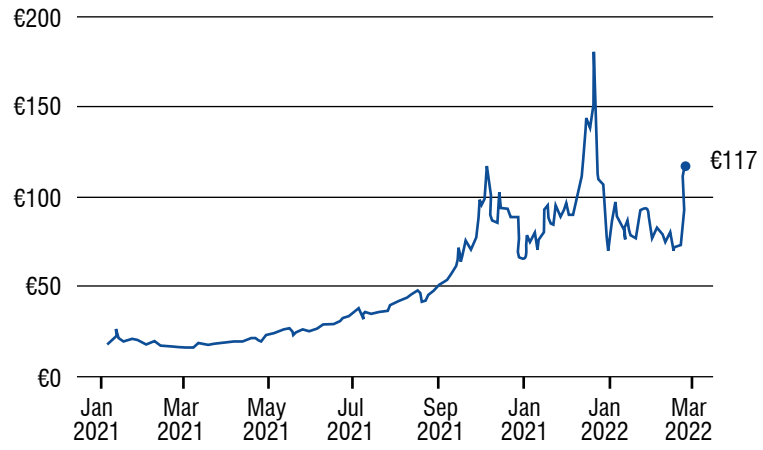
On the supply side, LNG markets were tightened in 2021 by supply disruptions and surge in demand, disruptions caused both by LNG capacity outages and upstream underperformance. Though LNG supplies

increased overall but throughout 2021, plants across the Atlantic and Pacific Basins faced unexpected outages and gas feedstock shortfalls from maturing production, dragging down average global utilization below the previous five-year average. About half of the LNG volumes lost to unplanned outages in 2021 (excluding the long-term disruption in Yemen) were due to upstream issues limiting feed gas availability, with the most severe incidents occurring in Nigeria, Trinidad and Tobago, and Malaysia.

LNG supply growth in 2022 is expected to remain strong. Almost 25 mtpa of liquefaction capacity is expected to start operations, led by the US, but projects in Indonesia and Mozambique could be delayed. The commercial start of Sabine Pass train 6 and the Calcasieu Pass terminal (both ahead of schedule) are likely to be the main contributors to US LNG production in 2022. BP's Tangguh train 3 in Indonesia and Eni's Coral South floating LNG off the coast of Mozambique are still struggling and are likely to be delayed. Gazprom's Portovaya (1.5 mtpa) project may have to navigate many hurdles before it is completed and operational.

However, the adequacy of gas supplies could still remain a concern on a combination of many LNG project delays, the relatively small number of new LNG FIDs in 2020-2021, and a structural decline in upstream spending since the early 2010s. Disruptions or supply issues at certain global plants could cap LNG growth and help keep the market tight. Projects that were initially targeting full capacity in coming years, including LNG Canada, Mozambique LNG and Golden Pass in the US could see delays. Unplanned LNG export outages could continue as some providers still have issues to resolve. Equinor's Hammerfest facility in Norway (4.2 mtpa) has been offline since September 2020 due to a fire, and may not return until second half of 2022. Shell's Prelude floating facility of 3.6 MMTPA is likely to remain closed till Q1 2022. Utilisation in Atlantic LNG in Trinidad and Tobago may stay pressured, with higher output hinging on successful restructuring negotiations and execution on gas backfill projects. LNG export growth at Pertamina's Bontang LNG in Indonesia and Petronas' Bintulu project in Malaysia could be hindered by upstream constraints.

Wholesale gas prices in the European Union
Price per therm, price in euros



Source: Bloomberg. Last update: 24 Feb 11:50 GMT

Russian gas supplies are also under pressure due to the ongoing Russia-Ukraine crisis. Russia supplies about 40% of Europe's imported gas and much of this gas transits through Ukraine. In the current war situation, there may be high chances of gas supplies cut-off during a military conflict or in retaliation for sanctions recently imposed by the US, EU and UK on Russian banks, some companies and individuals. This may dent the European gas storage levels further and Europe may need to depend on relatively higher priced US LNG which will further boost US exports. European gas prices have already responded by increasing following the sanctions.

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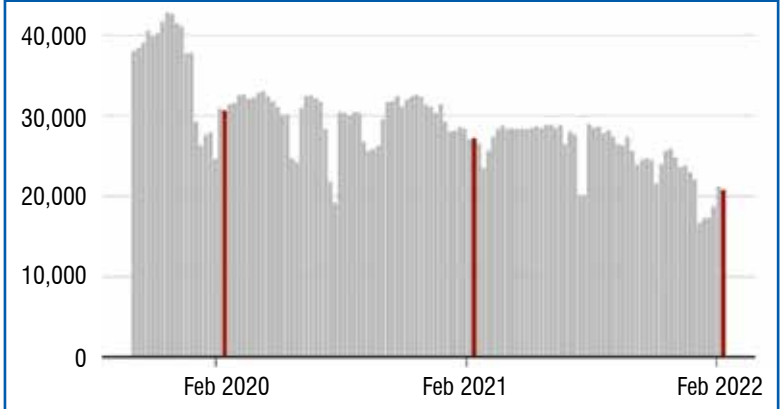
However, if the Russian taps are totally runed off, other exporting countries such as US and Qatar may not be able to fill the gap fully due to a lack of free short-term capacity. Further, though Europe still has the capacity to process or regasify the imported liquid gas, it would be difficult to deliver it to end-users as the distribution infrastructure is not tailored for a significant shift to LNG. Russia sends gas to Europe through several main pipelines - such as Nord Stream 1, Yamal-Europe and Brotherhood. The gas is collected in regional storage hubs, and then distributed across the continent. Russia has insisted that the opening of the new

How Russia's natural gas exports to Europe have changed
Total gigawatt-hour (GWh) by week, with second week of February highlighted



Source: Bloomberg. Last Update: 15 February 2022

In recent decades, demand for gas in some regions like Asia and the Middle East has risen sharply. This has knock-on effects on the market for LNG, which makes up about a quarter of Europe's imports.

Nord Stream 2 gas pipeline from Russia to Germany would help to calm Europe's energy crunch. The pipe, which runs under the Baltic Sea, was finished late last year but has yet to receive its operating license from Germany. However, in current situation the approval procedures for the Nord Stream 2 pipeline have been halted. The project faced resistance from the US and several European countries including Poland and Ukraine, and could further increase Russia's leverage over the continent and reduce transit fees earned by Ukraine for gas to pass through existing pipelines. Consequently, the Swiss-based company, Nord Stream2 AG, was one of the first targets of major sanctions against Russia and was proof of Germany's commitment to hit Russia economically, despite the damage it would cause to itself. Now, the project lies in tatters after costing billions and reaping no benefits.

That said, overall, Russian gas exports to Europe have been decreasing over the last couple of years - down 32% in February this year compared to February 2020.

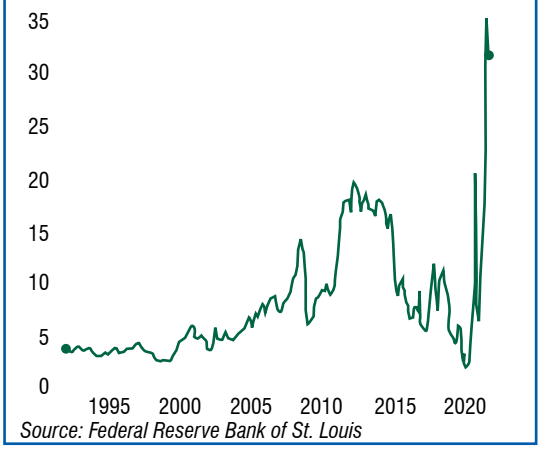
In recent decades, demand for gas in some regions like Asia and the Middle East has risen sharply. This has knock-on effects on the market for LNG, which makes up about a quarter of Europe's imports. When demand for LNG is high, supplies tend to be diverted to Asia to take advantage of rising prices. In addition, Russia has been expanding its gas exports to China via transnational pipelines, and in June inaugurated a gas processing plant in the far east of the country, which is expected to become one of the biggest in the world.

High LNG Prices

The combination of demand growth and supply issues led to the extremely tight gas market situation that prevailed throughout the final months of 2021. This was especially the case in Europe, where limited Russian pipeline supply flexibility and below average underground storage inventory levels prompted additional anxiety from the start of the heating season.

The tightness in the market led to LNG prices lurching from record lows under $2 per mmBtu in 2020 to record highs of $56 in October 2021. Spot LNG prices in Asia spiked to nearly $30 per million British thermal units (MMBtu) for a few weeks in January 2021 during extreme cold weather and transportation challenges before settling back to normal ranges in the first half of the year. However, by August both Asian and European spot LNG prices climbed well above their oil price equivalent and remained above it for the rest of the year. Prices ended December 2021 at $40/MMBtu — more than double the previous peaks achieved in the several years following Japan's 2011 nuclear crisis. Prices have been lower recently. Mild temperatures, together with higher LNG inflow, moderated European prices at the start of 2022, but every new sign of colder weather or tighter supply quickly prompts price increases. Despite rising prices, Asian LNG demand has continued to increase as most supply is priced at legacy oil-

Asian Liquefied Natural Gas (LNG) spot prices ($ per British Thermal Unit)



Source: Federal Reserve Bank of St. Louis

indexed contracts, currently trading at half the value of Asian LNG spot prices.

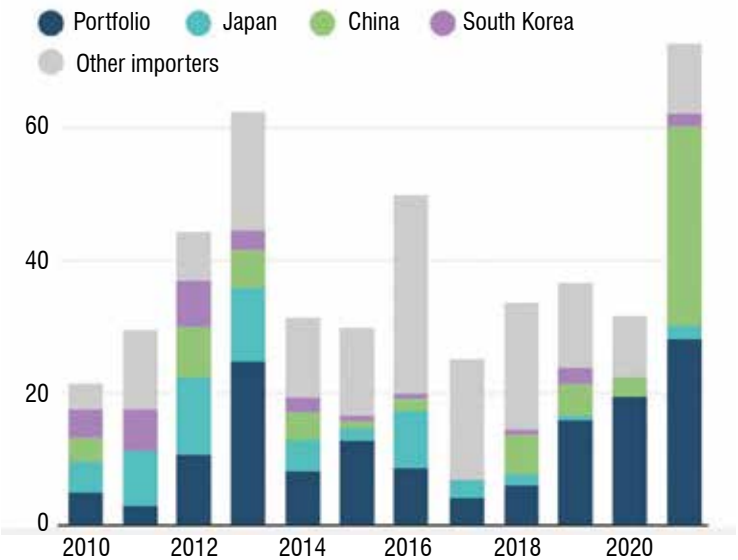
Weather patterns, physical, commercial and geopolitical factors will affect the prices going forward. European storage inventories would be low soon and though prices may come down as the winter is through the requirements to refill storage facilities will be high.

However, the longer term implications (of the Russia-Ukraine war) for global energy could be profound. On the surface it may seem virtually impossible for the world to get by without Russia which produces 10% of global crude oil and supplies 40% of Europe's natural gas. However, in the medium to long term, buyers will likely try to shift away from Russian supplies, especially those in Western countries. Russian LNG and pipeline natural gas may be hard to replace in the short or even the medium term but it will surely start the process of exploring alternatives to Russian supply. The Russian-Ukraine war is a wake-up call to western capitals and is likely to force them to re-visit their coal and nuclear generation options. Renewables could receive a boost including battery storage. It may also bring about a paradigm shift in Russia's energy exports with an eastern twist.

Long term contracts seeing a surge – mitigating volatility in price and managing risks

Long-term contract signings rebounded to an all-time high in 2021 after a pause in 2020. Over 65 million metric tons per annum (MMtpa) of firm, long-term contracts were signed in 2021, surpassing the previous record of 61 MMtpa in 2013. Asia accounted for 85% of global contracts signed, with China leading the pack. Mainland China was the largest specified end-market, with Chinese buyers signing around 25 MMtpa of firm long-term deals in around a dozen multi-decade contracts with overseas suppliers that will see the country double its imports from the US. Among sellers, signings were roughly evenly split between the US, Russia, Qatar and portfolio suppliers (although many of the latter are likely to source volumes from US projects). Three new LNG projects in the US – which would increase the country's production capacity by a third – are set to begin construction in 2022.

LNG SPA* volumes by signed year and import partner (millions of tonnes per annum)



*Mid-to-long-term Liquefied Natural Gas (LNG) sale and purchase agreements (SPAs)
Source: Rystad Energy - Get the data

While spot prices remain high, long-term contracted LNG is still a relatively good deal. The Japan-Korea Marker, the spot Asian benchmark, jumped 23% to $59.67 per MMBtu on March 3, 2022 according to S&P Global Platts because of the historic rally in European gas prices. Long-term contracts which are usually either linked to the oil price, or in the case of the US, the Henry Hub gas price. Oil indexation in long-term LNG contracts was on a declining trend for the past 10 years, a consequence of increased availability of uncontracted supply, more recently from Qatar, and reduced appetite for long-term contracts in favour of more spot exposure. However, long term contracts provide cushion against volatile spot LNG price.

Going forward, the contracting activity is expected to remain strong with Chinese buyers again expected to lead the way and account for most of new long-term contracts signed. On the other hand, despite high spot prices, long-term contracting for Japan is anticipated to continue softening in the face of energy transition uncertainties and greater confidence in the

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trading capabilities of the major buyers. Hybrid and Henry Hub-linked contract are expected to remain in vogue in 2022 due to the price benefits of Henry Hub contracts and availability of new US supply. In contrast, fewer long-term JKM-linked deals are expected as buyers remain fearful of the associated price volatility.

Risks Going Forward

The volatility and absolute level of LNG prices would give project developers and governments cause to rethink their plans, especially in countries where there are affordability issues. India is one such market – and in 2021 the country's LNG imports fell for the first time since 2013. Other emerging markets like Vietnam, Pakistan and Bangladesh also imported less LNG as prices remained high. Going forward, in Asia, the rationale to switch from coal to gas may diminish, as if spot LNG prices remain high they will translate into higher oil-indexed contract prices.

Hundreds of billions being spent on LNG facilities also represents significant risk. According to a survey by IEEFA in December 2021 only a fraction of planned LNG terminals and new gas power plants were likely to be built across five key emerging markets, as a result of ongoing market conditions. Bangladesh, the Philippines and Vietnam are likely to see just 34%, 27% and 20% of their announced gas power capacity realised, respectively, showed the analysis, which considered factors like the initial valuation of projects, the credit risk appetite in the lending sector, as well as the ongoing price volatility. That could delay LNG boom.

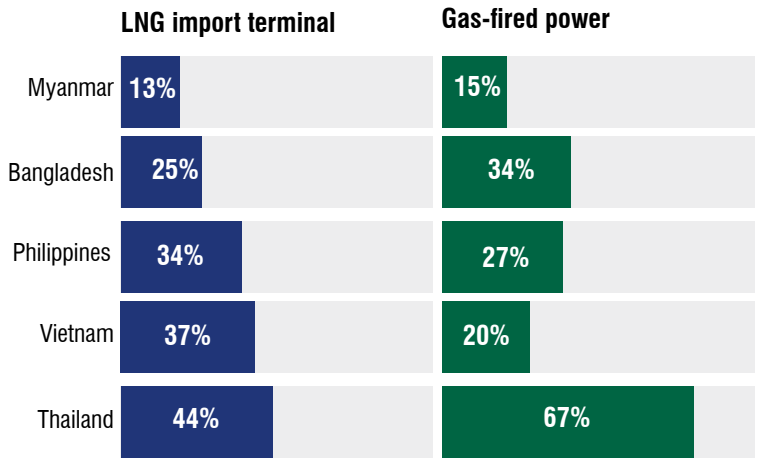
Increasing investment in renewables and batteries world over may take the focus away from gas and the gas demand may suffer because of that. Several developments act against LNG case, such as the announcement from the new German government in November 2021 that renewables would account for 80% of the electricity mix by 2030 to the fact that more than 90% of the world's economy is now operating under a net-zero pledge. The growth of renewables and Net zero has gone from a rich country fad to a global trend in the second half of 2021. One country that has already signalled a definitive move away from LNG is Japan In July 2021, updated government targets showed the country aiming to produce 20% of its power from natural gas in 2030, down from a previous target of 37% set in 2019. The government also announced it wants to increase generation from renewables from 18% in 2019 to 36–38% in 2030.

With the start of Yamal LNG plant in 2017, Russia now holds a greater share of global LNG capacity. In 2021, besides pipeline gas Russian LNG was the third largest supplier into Europe, behind the US and Qatar. According to ICIS LNG Edge, just over 18% of Europe's LNG was supplied from Yamal in 2021. While Russian pipeline gas volumes have fallen, this has in effect been offset by strong Russian LNG. Not only pipeline gas but also Russian LNG is embedded in the European market. Therefore, the war could have huge implications for the European energy market especially the gas markets.

Total capital expenditure for the world's upcoming LNG liquefaction and regasification plants ($bn)

Source: GlobalData

Share of announced capacity likely to be realised in South East Asian countries, according to IEEFA analysis (%)



Source: Institute for Energy Economics and Financial Analysis (IEEFA)