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LNG Winter 2020/2021 – a unique set of circumstances or a predictable inevitability?

The rapid rise in Asian LNG prices which saw Platts JKM prompt month delivery cargoes hit a high of $32.50/MMBtu on the 13 January 2021,[1] a 476 per cent increase on the January 2020 average price, will be long remembered in this still nascent commodity market. Demand for LNG for power generation and heating reached new highs across East Asia, (China, Japan, South Korea and Taiwan), as severe, cold weather swept the region. With some buyers scrambling to source LNG, the rise in price was accompanied by a scramble to charter vessels which could load promptly in the US Gulf Coast, thereby driving up freight rates to all-time highs. Spark Commodities assessed Atlantic LNG freight rates at a high of $322,250/day on 8 January 2021 compared to $93,250/day in the same week of the previous year[2] (see Figure 1). As the frenzied media coverage and comparison to the stratospheric price rise of Bitcoin[3] now subsides, it remains to address the varied drivers behind such a move and whether or not the circumstances could return to push LNG to ever greater highs.

This Energy Insight will briefly review the key drivers behind the meteoric rise in Asian spot prices, but will focus specifially on the impact on the LNG freight market and the factors that drove freight rates to rise to such high levels.

[1] https://www.spglobal.com/platts/en/our-methodology/price-assessments/lng/jkm-japan-korea-marker-gas-price-assessments
[2] https://app.sparkcommodities.com/freight/dashboard
[3] https://www.bloomberg.com/news/articles/2021-01-13/traders-win-in-lng-s-bitcoin-beating-rally-driven-by-winter-cold?sref=o7Vx5e7E

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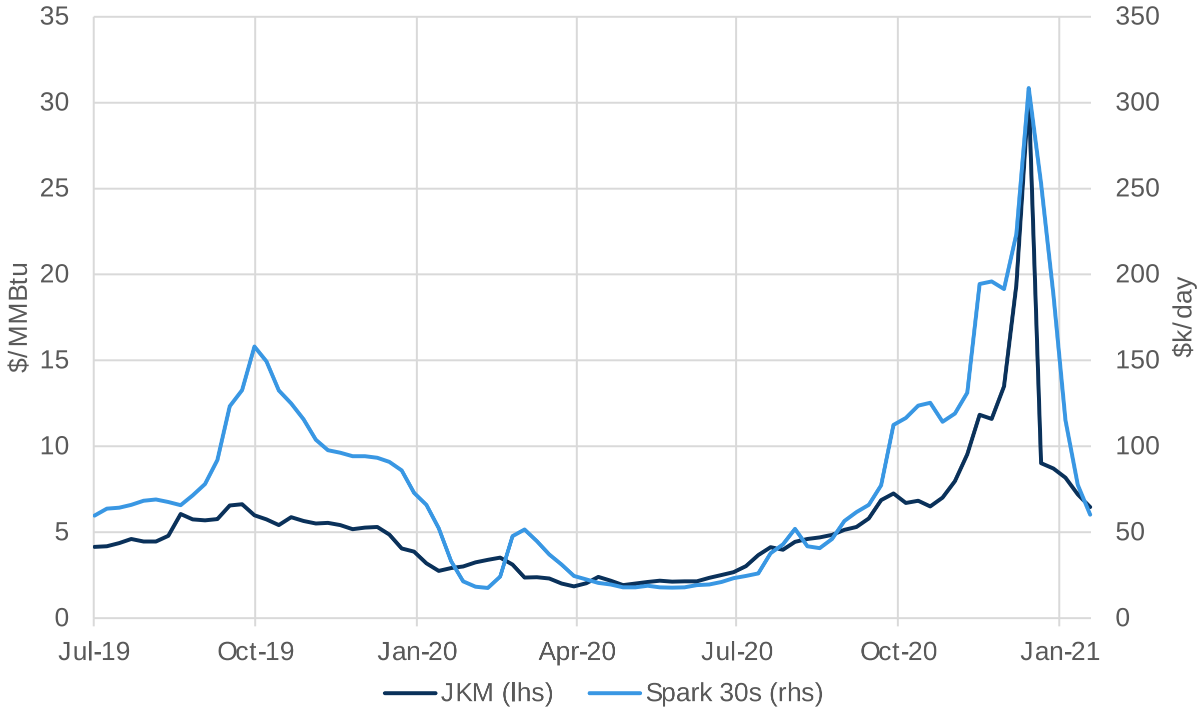
Introduction

Whilst the sudden onset of very cold weather in East Asia clearly took some local buyers by surprise, despite advance warnings heading into the season, there are various supply and logistical factors that came together to create, in effect, the perfect storm. The only saving grace is that this situation did not happen a few weeks later when much of the US Gulf Coast (USGC), home to the burgeoning US LNG industry, experienced its own period of extreme cold weather which shut down gas production and LNG export operations. It is nigh on impossible to comprehend what could have happened to LNG prices had this situation occurred.

Figure 1: Week average Platts JKM LNG vs Spark 30s freight rate

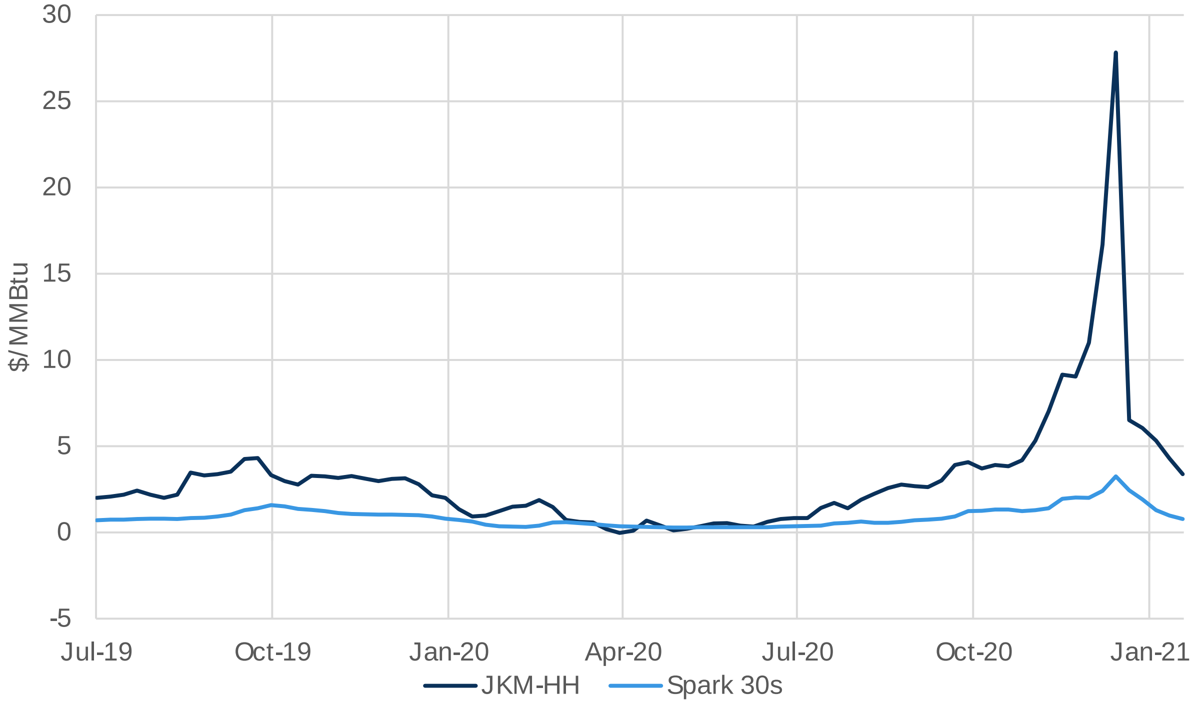


Source: Platts, Spark Commodities

Increased demand in the region can be seen as the trigger for the rapid rise in LNG prices but is not the sole or maybe even the primary reason why such high prices came about. Short term production issues in Australia in December played a contributory part but increased exports from the rest of the world made up for losses in molecules if not convenience for East Asian supply. The rise of US LNG exports and maximum flexibility in terms of spot availability placed the particular producer as the go-to source for prompt spot cargoes. Flexibility within the Qatari system allowed for diversions of cargoes away from North West Europe but could not address the needs of additonal spot requirements. The downside to such a situation for East Asia is that the route between the USGC and the region is beset with logistical issues. Either shippers have to contend with limits on Panama Canal transits, the most direct, shortest and cheapest option despite canal fees, or they have to send vessels the long way round, either via the Capes (Cape Horn or the Cape of Good Hope) or the Suez Canal. Having experienced a period of increased waiting times for laden vessels to transit southbound in October and November, the market rapidly shifted to supply more cargoes from the US using alternative routes. At the same time, they increased vessel speeds and diverted cargoes from European destinations to ship as much volume into East Asia as possible, hitting new absolute and seasonal highs in the process for December through to February. The increase in supply from a longer haul origin had the inevitable effect of increasing the ton-days for discharges into the region which highlights one of the key problems for the area. Any time incremental volumes are needed at short notice they have to be sourced from the furthest distance and most logistically constrained origin.

Freight rates on a dollar per day basis grabbed the headlines but, as seen in Figure 2, when converted into dollars per MMBtu and set against the price differential between JKM delivered in Asia and Henry Hub natural gas prices in the US, it is clear to see how the incentive to connect the dots and make cargoes work East was staggering. As long as the demand for LNG continued, the freight rate could rise further, and still allow for a profitable shipment. However, once short-term demand dissipated, it took just four days for JKM prices to drop from $32.49/MMBtu to $9.63/MMBtu, with an equally rapid fall in freight rates. It should be noted this fall in JKM price encompasses an element of seasonal decline as delivery moved from February to March. However, the decline seen in 2021 was still extreme. In the previous four years, the single day price decline between assessments for February and March delivery was an average of 10.9 per cent or $0.89/MMBtu compared against a drop of 64.3 per cent or $17.36/MMBtu seen in 2021. Whilst the differential had narrowed, the incentive was still present to ship LNG, at a far less frantic speed, and by that point there were already a significant number of vessels on route, moving gas into what would soon swing into an oversupplied market.

Figure 2: Week average JKM-US NG differential vs. Spark 30s freight rate



Source: Platts, Nymex, Sark Commodities

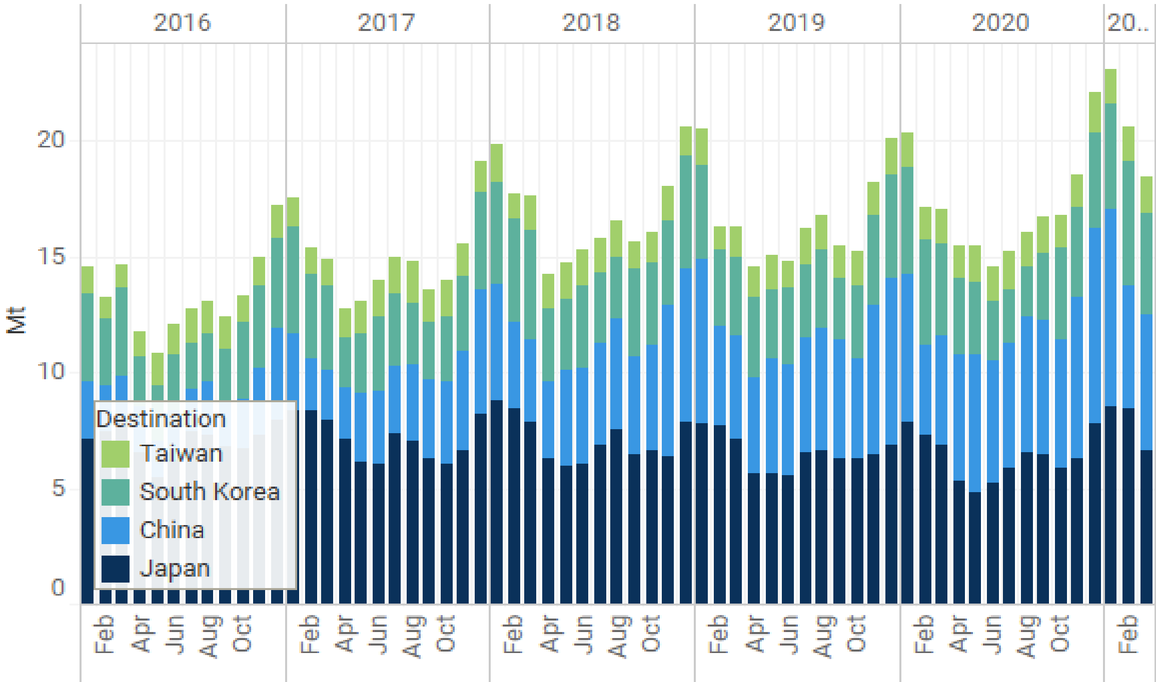
The LNG market demonstrated an incredible degree of flexibility to ship record quantities into East Asia in as short a time frame as possible, however there are limits as to just how much the process can be continually optimized. If buyers are unable to improve their demand forecasts and keep a steady ‘pipeline’ of LNG cargoes coming for resupply, they will have to address a more fundamental issue of lack of gas storage in the region. Europe, another significant LNG demand hub, was able to effectively sit out the extreme price action and draw down its storage reserves, as well as rely on pipeline gas from regional players. LNG imports into Europe declined into January from already depressed levels compared to 2019 but rebounded through the balance of the quarter as cold weather hit the region and gas was needed to stem further draws from storage. Current gas storage levels in Europe are down to those last seen in early 2018 and will require significant injections through the summer to prepare for next winter. Gas storage capacity in East Asia is a far smaller percentage of annual demand compared to that found in Europe, ultimately pushing the system to tolerance levels that are stretched at best and insufficent at worst, as demonstrated by recent events.

Winter demand and the changing LNG landscape

Weather conditions and reduced pre-winter imports created the demand environment leading to a surge in prompt cargoes

Medium range weather forecasting plays a vital role in the seasonal planning of LNG buying programs. The inevitable increase in demand for heating, either by direct burning of gas or through electricity generation, during the colder winter months is a core element behind the seasonal flows of LNG around the world. Figure 3 highlights both the growing trend in imports and the seasonal peak in imports, typically beginning in November and fading in February.

Figure 3: East Asia LNG imports by destination country



Source: Kpler

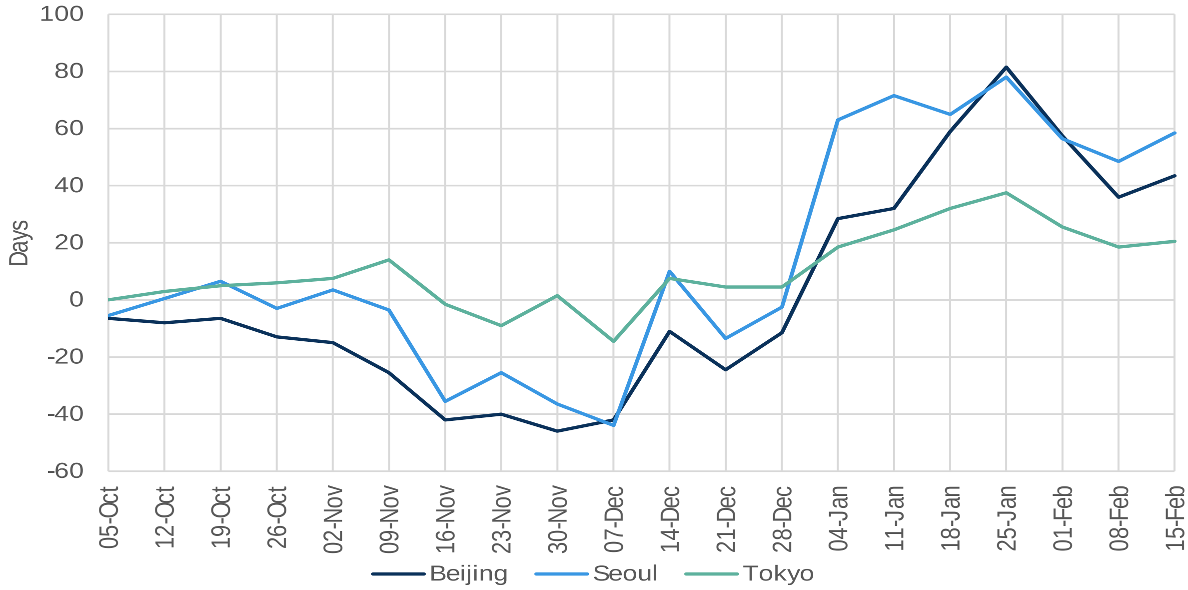
Chinese LNG imports continued to push ahead in 2020. Arrivals finished the year at 71mt, marking a gain of 6.3mt against a year earlier levels. An increase in imports through year end due to the cold weather in December was also a key driver. As seen in Figure 4, the start to winter in the region was relatively mild with heating degree days (HDD) data through November lower than the previous two-year average for both Beijing and Seoul.[4] By late December, this pattern had reversed with cumulative HDDs back on par with the seasonal average. The severe cold snap hit Seoul through the new year with Beijing following shortly after, taking cumulative HDDs significantly higher than in the previous two years (see appendix for further details on Chinese power demand).

For Japan and South Korea, the winter of 2020/21 was no different with preliminary forecasts pointing to colder than average temperatures through the season.[5] Despite these forecasts, imports through Q4 into South Korea and particularly Japan were down compared to seasonal patterns. In fact, Japanese imports in the fourth quarter were only marginally higher than those of 2019 when a mild winter was predicted,[6] and significantly lower than for the five years prior to that, down 1.85mt or 8.4 per cent,

[4] https://www.degreedays.net/
[5] https://mkweather.com/winter-2020-2021-forecast-for-asia/
https://www.accuweather.com/en/winter-weather/accuweather-2020-2021-asia-winter-forecast/832759
[6] https://www.accuweather.com/en/weather-news/accuweathers-2019-2020-asia-winter-forecast/601993

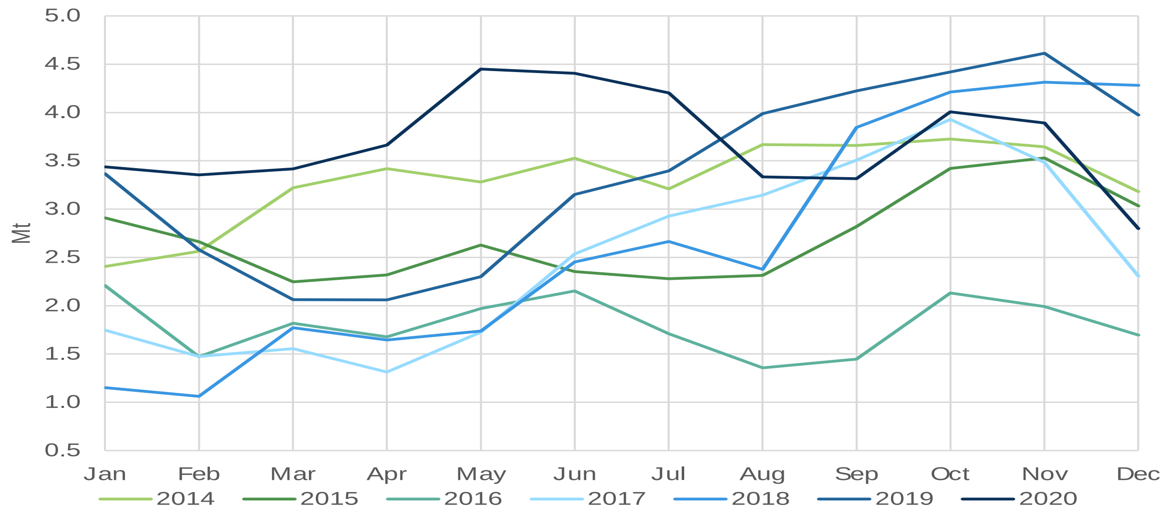
compared to the 2014-2018 average.[7] Imports into South Korea in the fourth quarter were at the upper end of the range for the previous six years, although imports through the second half of the year were in the middle of the range. Figure 5 shows how the high inventories and oversupply issue through the second quarter rapidly turned to an issue of dwindling inventories by the end of December.[8] That said, the situation was less marked in Tokyo but by the end of January the city was also experiencing colder than average temperatures. Problems in Japan were exacerbated for power generation companies as maintenance had closed all but one nuclear reactor through November and into mid-December.[9]

Figure 4: Weekly heating degree day cumulative difference for winter 2020/21 vs previous two-years average



Source: Kpler analysis of Degreedays.net data

Figure 5: South Korean natural gas inventories



Source: KESIS

[7] All LNG flows and freight related data used throughout this report is sourced from Kpler unless specifically referenced
[8] http://www.kesis.net/sub/subChartEng.jsp?report_id=7010101&reportType=0
[9] http://www.asahi.com/ajw/articles/13900336

How European dynamics led to the region being a key swing player

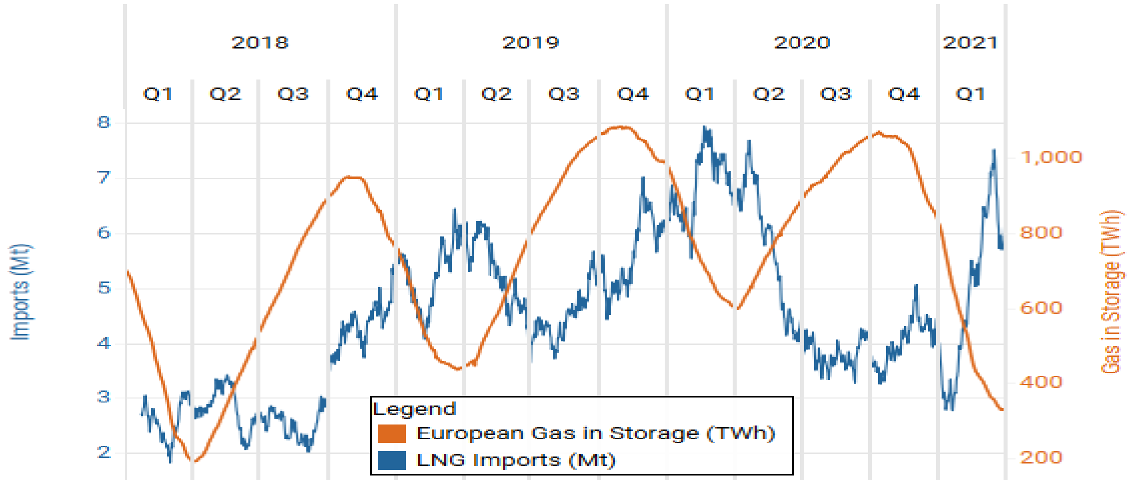
The dynamics of the European gas market is an important element of global LNG trade. In the past, record piped gas supply has kept LNG away from Europe.[10] Between 2013 and 2016, European LNG imports only increased by 7 per cent from 39.8mt to 42.6mt, about 50 per cent lower than Japanese LNG imports. While declining indigenous gas production opened the way for increased gas imports, it would be expected that Russia would maintain market share and that total demand growth in Europe would not absorb excess global LNG supply.

However, the situation changed with the first US LNG wave coming onstream and Russia fast-tracking the development of Yamal LNG. Europe's imports of LNG more than doubled between 2016 and 2019, reaching 89.6mt in that year and remaining remarkably stable in 2020 at 89.3mt despite the coronavirus outbreak strongly hitting the continent's gas demand through the first three quarters of the year.[11]

Europe has indeed become the swing balancing market for LNG as demonstrated by weak imports seen in the winter of 2020-2021 when prices in Asia skyrocketed and Atlantic Basin freight rates reached $322k per day (compared to a high of $158k per day in 2019):[12] imports between November and February only reached 23.6mt, down 37 per cent year on year (y/y) compared to the year before and 14 per cent compared to the winter of 2018.

Europe benefits from two main factors that place it as the world's key balancing market for LNG: large storage capacity and excess re-gas capacity. While last winter's extreme price moves in Asia highlighted the lack of sufficient natural gas storage capacity in Northeast Asia, Europe benefited from an extensive infrastructure, particularly in storage. Despite the multiple lockdowns across the continent last year, Europe's LNG imports remained strong in the summer, only down 10 per cent y/y. Between June and September, Europe imported 23.2mt of LNG compared to 25.9mt in 2019. As demonstrated in Figure 6, European players were able to take advantage of depressed LNG prices and weak market structure and refill storage caverns ahead of winter demand. As a result, storage jumped from 56 per cent in early April to 96 per cent towards the end of September.[13] As the number of cargo cancellations from the US surpassed 100 in July and August 2020, the flow of additional excess supply was cut and further refills into European storage halted.

Figure 6: European LNG imports against natural gas storage



Source: Kpler, AGSI+

[10] https://ec.europa.eu/eurostat/web/energy/data/database
[11] https://ec.europa.eu/eurostat/databrowser/view/NRG_CB_GASM__custom_679067/default/line?lang=en
[12] https://app.sparkcommodities.com/freight/dashboard
[13] AGSI+ (gie.eu)

LNG production and the onshore supply environment

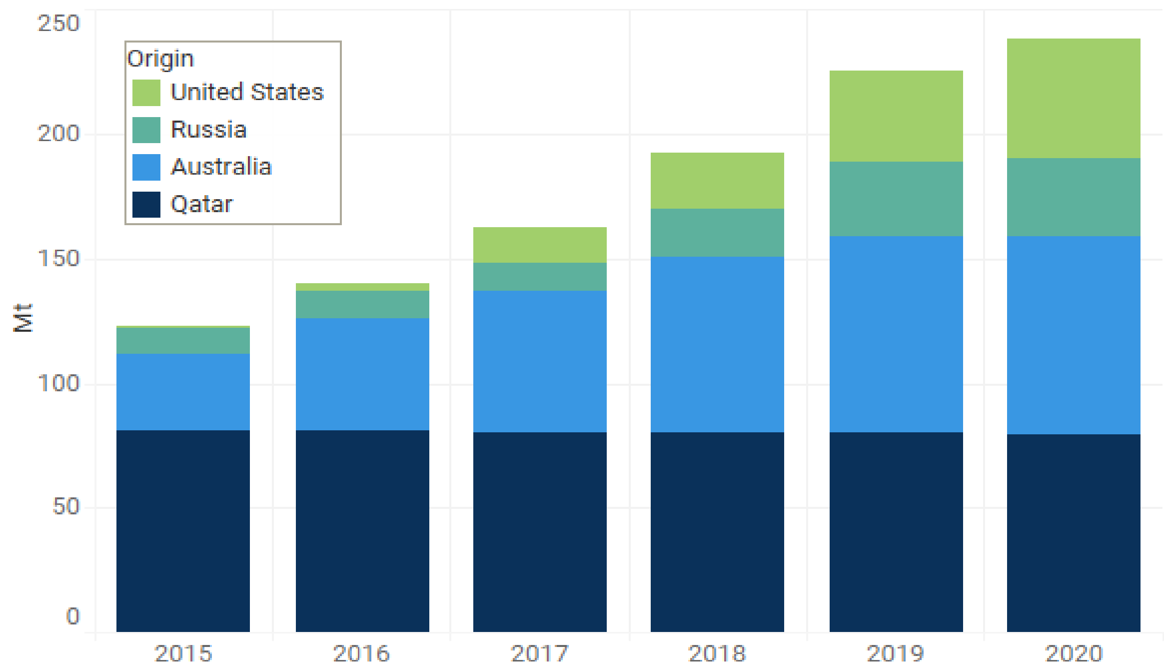
Overview of growth trend in major exporters

The US has become a major natural gas exporter with an increasing liquefaction capacity reaching 71mt in 2021. During the period 2015-2020, natural gas output in the US grew by more than 26.5 per cent[14] with nearly half of this production coming from Texas and Pennsylvania (43.9% in 2019). US LNG exports in 2020 reached a record of 48.6mt across the year, up from 37.67mt in 2019 and only 0.5mt in 2015 (see Figure 7). Annual exports rose despite COVID-19, as winter demand and export capacity growth outweighed the cargo cancellations in Q2 and Q3. Monthly exports hit an 18-months low of 1.97mt in July, but Just five months later, exports set a new all-time high of 6.12mt in December, a level close to that of Qatar and Australia. Exports in March 2021 have since surpassed even that record at 6.64mt over the month.

Australia has been the second driver of growth in LNG exports over the last five years, moving from 30.64mt in 2015 to 79.39mt in 2020. Australia's LNG has however not been as stable from month to month as others, as highlighted last December when output fell 7.2 per cent lower y/y on the back of outages at key installations. This happened on several projects simultaneously: Gorgon, Wheatstone, Ichthys and Prelude which could hit further LNG exports in 2021 and 2022 and coincided with the increase in weather related LNG demand in China.

Qatar's LNG exports have been much more stable, and the country retained its position as the world's largest LNG exporter in 2020 by exporting 79.6mt throughout, but at much higher prices for international buyers because of long-term contracts. Nearly 67 per cent of Qatar's exports are heading towards Asia. In the past five years, Qatar's LNG exports have varied by less than two per cent from a record high of 81.27mt in 2015 to a record low last year. Finally, Russia, thanks to Yamal shipments, pushed exports to a record 31.3mt in 2020 with a small increase compared to 2019, but up from 11.5mt when compared to 2017.

Figure 7: Major producer annual LNG exports by origin country



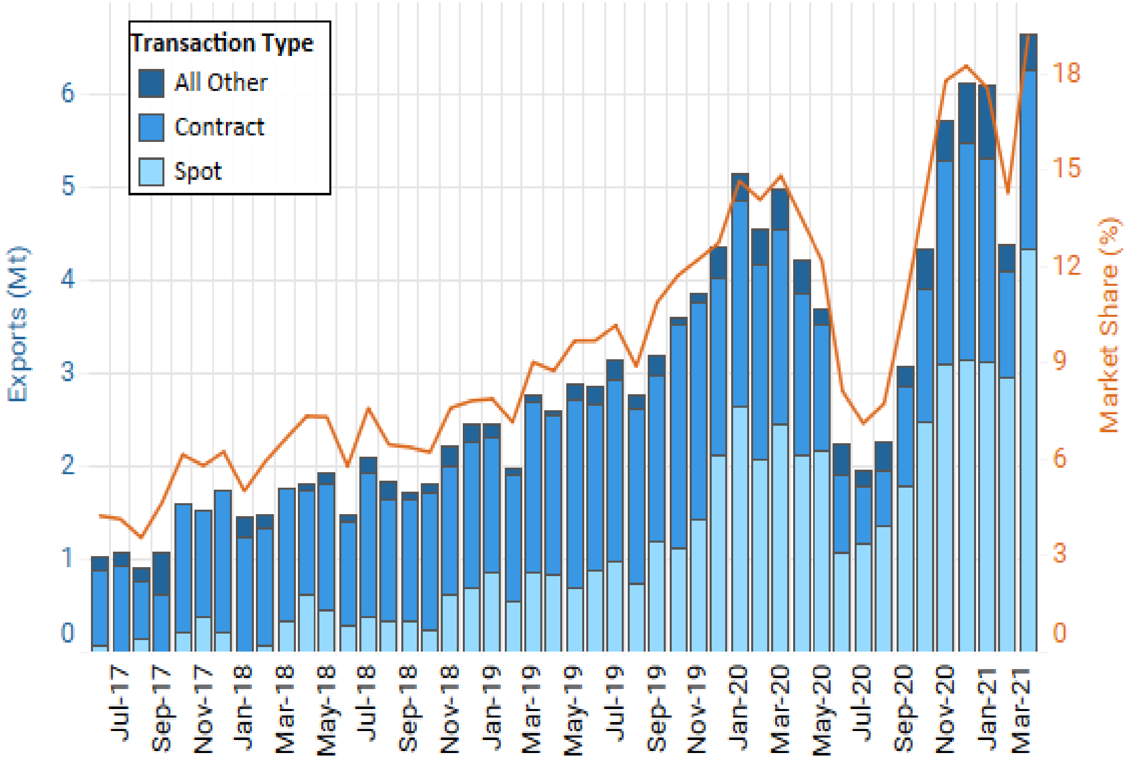
Source: Kpler

[14] https://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGW_mmcf_m.htm

Growth of spot contracts vs term contracts

The LNG trade has been gradually shifting towards a greater share of the spot market[15] such that in 2020 34.5 per cent of LNG was traded on a known spot basis.[16] This compares to 23.8 per cent in 2019 and after global LNG export growth was just one per cent year on year. This has been partly driven by increased volumes of US LNG. The United States therefore has become a key supplier of spot LNG cargoes, a development many years in the making (see Figure 8), contributing to the unprecedented surge in LNG freight costs at the end of 2020 and early-2021. US producers have rapidly ascended the ranks of the world's top short-term LNG suppliers. Only a few cargoes were sold on a spot or short-term basis from the US in 2017;[17] however, by 2019, US producers sold some 23.8mt on those contractual terms.[18]

Figure 8: United States monthly LNG exports by transaction type and total market share



Source: Kpler

The late 2020 surge in Asian demand for LNG inevitably pulled volumes from US producers with capacity to meet spot demand. In fact, exports from the United States to Asia-Pacific hit successive monthly records each month between November 2020 and January 2021. Yet this Asian pull on US spot capacity from the US Gulf Coast (Sabine Pass, Freeport, Cameron, and Corpus Christi) and East Coast (Cove Point) quickly ran into a route bottleneck at the Panama Canal, where US LNG exports transiting the canal hit a record high of 2.04mt in November 2020.

[15] Hartley, P. (2013). 'The Future of Long-Term LNG Contracts'. Baker Institute for Public Policy, Rice University http://bakerinstitute.org/research/future-long-term-lng-contracts/

[16] Kpler's tracking of contracts. Spot deals are those for which there are no existing contracts or details in the Kpler database to explain a trade. This could include existing Sale and Purchase Agreements; flexible, portfolio and group deals or tenders.

[17] https://giignl.org/sites/default/files/PUBLIC_AREA/Publications/giignl_2016_annual_report.pdf

[18] https://giignl.org/sites/default/files/PUBLIC_AREA/Publications/giignl_-_2020_annual_report_-_04082020.pdf

Freight and freight-based supply constraints

Rapid rise of US exports has led to potential for bottlenecks in the Panama Canal

As US exports have grown, they have had to search for additional outlets. These tend to lie predominantly in Asia given the rate of economic growth in the region, and more recently, the transition to cleaner burning fuels. In addition to changes within domestic markets, South Korea, Japan and China, three of the largest consumers of US-sourced gas, have limited resources of their own, so the US has become the most logical incremental supplier to the region.

East Asian economies continue to dominate US exports

South Korea imported 6.1mt of US-sourced LNG during 2020, eight per cent more than in 2019, while Japan took 5.0mt, up 29 per cent on 2019. China also saw a radical increase in 2020 and imported 3.3mt, having imported only 0.3mt from the US in 2019.

Geography dictates that route options from the US to East Asia are either short but constrained (transiting the Panama Canal) or longer (navigating Cape Horn or the Cape of Good Hope, or the Suez Canal for vessels that are diverted). Considerations of daily freight costs and extended journeys are weighed up against Panama Canal dues (which can reach $457,500 for laden LNG carriers and $408,000 for ballast vessels[19]), but growing usage of the canal can lead to congestion, causing inefficiency and increased delays, and resulting in increased costs.

For a vessel steaming at 17 knots, the Panama Canal route enables the journey from Texas LNG in the western Gulf of Mexico to Sodegaura in Tokyo Bay, Japan, to be completed in around 24 days, compared to around 38 days if the vessel is routed via the Cape of Good Hope. A routing via Cape Horn takes around 42 days. A voyage via the Suez Canal takes approximately 37 days, but canal dues mean that this route is less commonly used as it does not save a significant amount of time vs the Cape of Good Hope (and hence money on daily vessel hire rates), while still incurring additional costs. It is often used, however, for vessels that were initially heading to Europe, but changes destination because of a change in market economics. The primary route for US cargoes heading East is still very much via the Panama Canal - of East Asia's imports from the US during 2020, 77.2 per cent were transported via the Panama Canal compared to just 2.6 per cent that transited through the Suez Canal.

Despite the rapid increase in freight rates, the price differential between JKM and Henry Hub natural gas in the US through the winter ensured that whatever route was taken, it would still be a highly profitable move. A baseline voyage through the canal with no delays and charter rates of $100,000/day would result in freight costs to ship a cargo of LNG from the USGC to Japan in the region of $2.05/MMBtu. Without any change to route or duration but an increase of freight rates to $320,000/day would increase costs to $5.01/MMBtu. Any further deviation from this, be it through delays of eight days waiting for transit through the Panama Canal or taking a longer route would see costs increase by 14-30 per cent. Even with these subsequent increases, at $6.50/MMBtu to go via Cape Horn, the incentive to ship gas from the US to Japan was still strong.

Vessels quickly diverted to take advantage of price spike

As Asian LNG prices suddenly rose in the fourth quarter of the year, vessels heading to Europe were diverted to Asia to take advantage of the higher prices utilising the Suez Canal. Such flexibility being enabled because of the high levels of stored natural gas available in Europe. In December 2020, 0.36mt of a total of 0.8mt (45%) transited the Suez Canal on route to South Korea. As spot demand continued and prices increased further into January amid cold weather and supply interruptions, this quantity rose to 56 per cent. The diversions were not unique to South Korea and its accelerated demand.

[19] https://www.waypointports.com/panama-canal-additional-information/panama-canal-estimated-transit-expenses-lng-carrier/

Figure 9: Freight calculations for United States Gulf Coast to Japan LNG cargo routes

Sabine Pass, US to Sodegaura, Japan

Vessel	Sk Resolute
Speed	17 kn
Loaded quantity	4,170,717 mmbtu

Positioning and reposition locations, fuel consumption and costs held constant across all options

Route option	Panama Canal, No Delays	Panama Canal, No Delays	Panama Canal, 8 days wait to transit	Via Suez Canal	Via Cape of GH
Distance	9,228 nm	9,228 nm	9,228 nm	14,687 nm	17,163 nm
Duration	23 days 14 hours	23 days 14 hours	31 days 14 hours	36 days 23 hours	42 days 1 hour
Charter rate	100,000 $/day	320,000 $/day	320,000 $/day	320,000 $/day	320,000 $/day
Freight cost					
Time charter	0.64	1.99	2.61	3.07	3.38
Ports	0.07	0.07	0.07	0.07	0.07
Canals	0.11	0.11	0.11	0.1	0
Bunkers	0.34	0.34	0.44	0.51	0.55
Additional*	0.91	2.5	2.5	2.5	2.5
Total ($/mmbtu)	**2.05**	**5.01**	**5.73**	**6.26**	**6.5**

*Additional includes positioning, repositioning and cooldown costs

Source: Kpler

Japan also saw a significant increase in cargoes transiting through the Suez Canal during December and January. In October, 0.07mt of LNG made its way through the Middle East while 0.4mt transited the Panama Canal. In addition, 0.15mt travelled around the Cape of Good Hope aboard the *Marvel Kite* (177,000 m3), which loaded on 1 January 2021 at Cameron liquefaction plant in Louisiana, and eventually discharged in Osaka, Japan on 10 February, and the *Flex Ranger* (174,000 m3), which loaded on 13 January at Corpus Christi, Texas, and discharged in Nihonku, Japan on 24 February. Both vessels were routed via the Cape of Good Hope to avoid mounting delays in the Panama Canal. Later in January, as it became apparent that queues were easing, the *Marvel Eagle* reversed course near the Bahamas to head towards the Panama Canal rather than transit via the Suez Canal as originally planned.

Below is a list of known tracked diversions on the water, they do not represent the cargoes for which the destination had already been altered before departure.

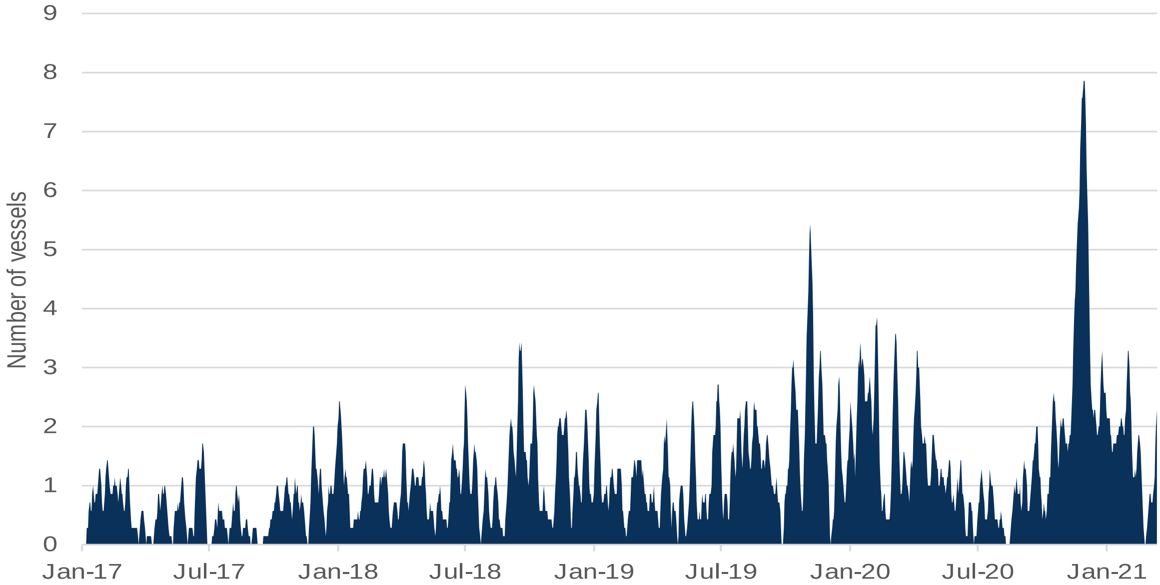
Vessel	Origin	Load Date	Original Destination	Diversion Date	New Destination
Elisa Larus	United States	11-Oct-20	France	20-Oct-20	Japan
Duhail	Qatar	06-Nov-20	Europe	09-Nov-20	China
Gaslog Greece	Trinidad and Tobago	23-Nov-20	Mediterranean	25-Nov-20	Panama
LNG Port-Harcourt Ii	Nigeria	29-Dec-20	Kuwait	29-Dec-20	China
Arctic Voyager	United States	05-Jan-21	Lithuania	12-Jan-21	South Korea
La Mancha Knutsen	United States	13-Feb-21	United Kingdom	27-Feb-21	Japan
Bw Magnolia	United States	13-Feb-21	Greece	17-Feb-21	Panama

The *La Mancha Knutsen* is an interesting example of the multiple changes carried out by shippers over the course of a single voyage. Having initially signalled for a United Kingdom discharge, the destination was soon changed to Panama after loading, indicating a diversion away from Europe to the East via the Panama Canal. Within days the destination was changed again, indicating Algeciras and ultimately the Suez Canal as the chosen route East.

Additional usage leads to Panama Canal congestion and new mitigation measures

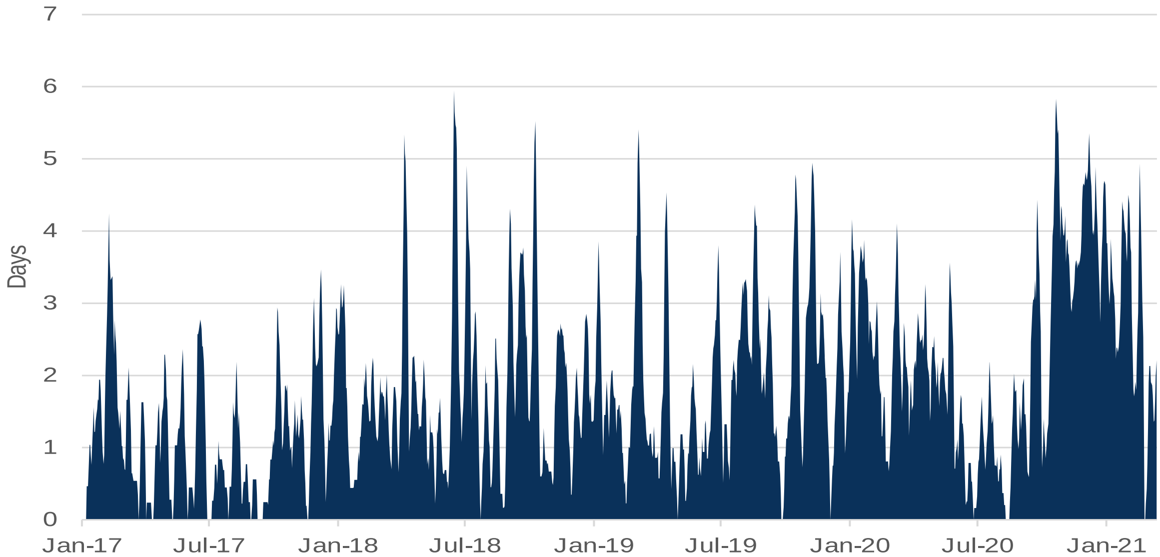
As the volume of gas heading from the US to Asia grew over the fourth quarter of the year, usage of the Panama Canal peaked in November as 2.04mt of LNG transited the canal during the month. By 25 November, the number of laden vessels queuing to transit had reached a high of nine compared to a 2019 average of 1.4 (see Figure 10). By that point, the average wait time over a seven-day moving window was running at 3.7 days compared to the 2019 average of 1.9 days. Average wait times were to increase further, hitting a high of 5.1 days on 8 December. This is not the record high tracked for wait times, with the moving average having hit 5.8 days on the 22 October of the same year (see Figure 11).

Figure 10: Panama Canal laden vessel waiting count (7-day moving average)



Source: Kpler

Figure 11: Panama Canal laden vessel average waiting time (7-day moving average)

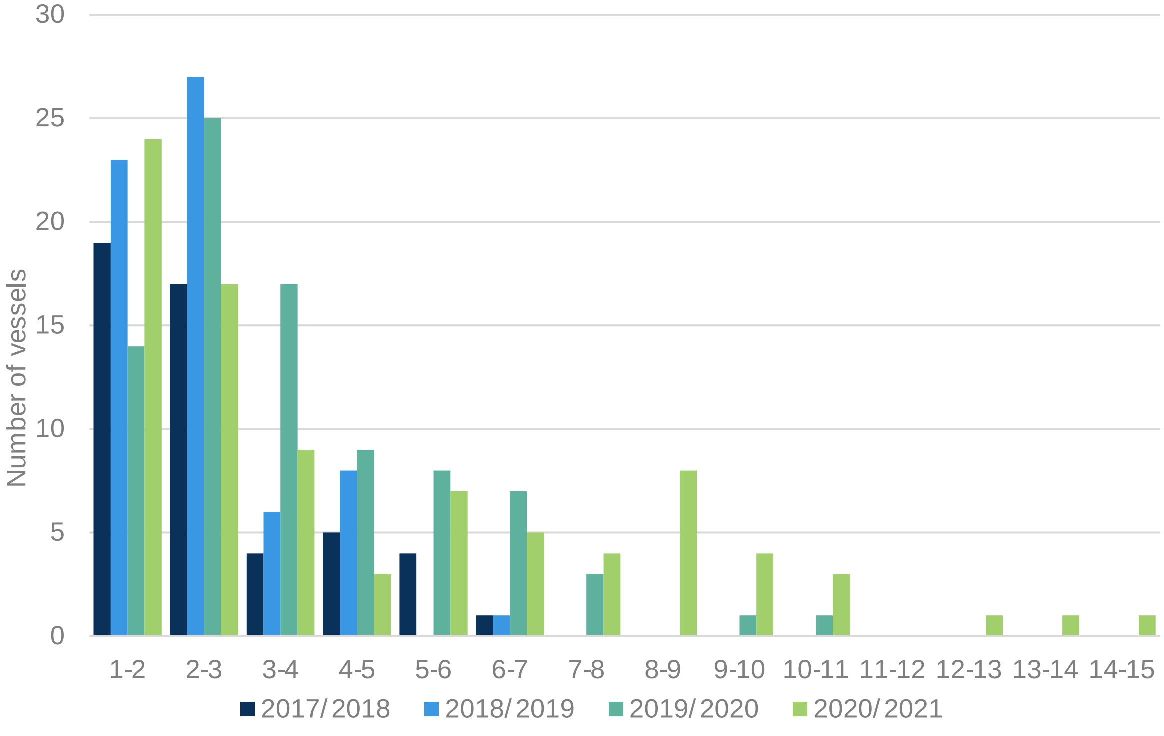


Source: Kpler

By the time that the Platts JKM price had risen to a high of $32.50/MMBtu on 13 January 2021, the queue of vessels waiting to transit the canal during the month had dissipated, with just two vessels waiting for an average of 2.8 days. Wait times did subsequently increase again later in the month, hitting 5.9 days on the 30 January. Throughout the whole winter season, some vessels experienced wait times of up to two weeks for a transit slot. Transit slots are allocated to specific vessels, which can exacerbate the waiting time for those that are late to join the queue and do not have an allocated slot. This group includes vessels that have had a late change of instructions, after initially being destined elsewhere, as highlighted above.

Figure 12 highlights how the distribution of laden LNG vessel wait times for Panama Canal transit from October 2020 to January 2021 displays a significant increase in longer waiting periods compared to the previous three winters. Over the last four years, the number of vessels held waiting for a Panama Canal transit has increased steadily, as expected with increased production in the US and growing demand for LNG in Asia. The winter of 2017/2018 (October to January for comparison) saw 50 cargoes waiting at some point throughout the season, increasing to 65 in 2018/2019 and 85 in 2019/2020. Last year saw a slight increase to 87 cargoes having to wait across the four-month period. During the winters of 2017 and 2018, only 17 per cent of all cargoes had to wait longer than four days. By the following winter, the number had risen to 34 per cent waiting more than four days to transit the canal, and from October 2020 to January 2021, the number reached 42 per cent. In the previous three winters, just one vessel was held waiting for a period of ten days or more compared to six last winter.

Figure 12: Distribution of laden LNG vessel PC wait times between Oct-Jan (days)



Source: Kpler

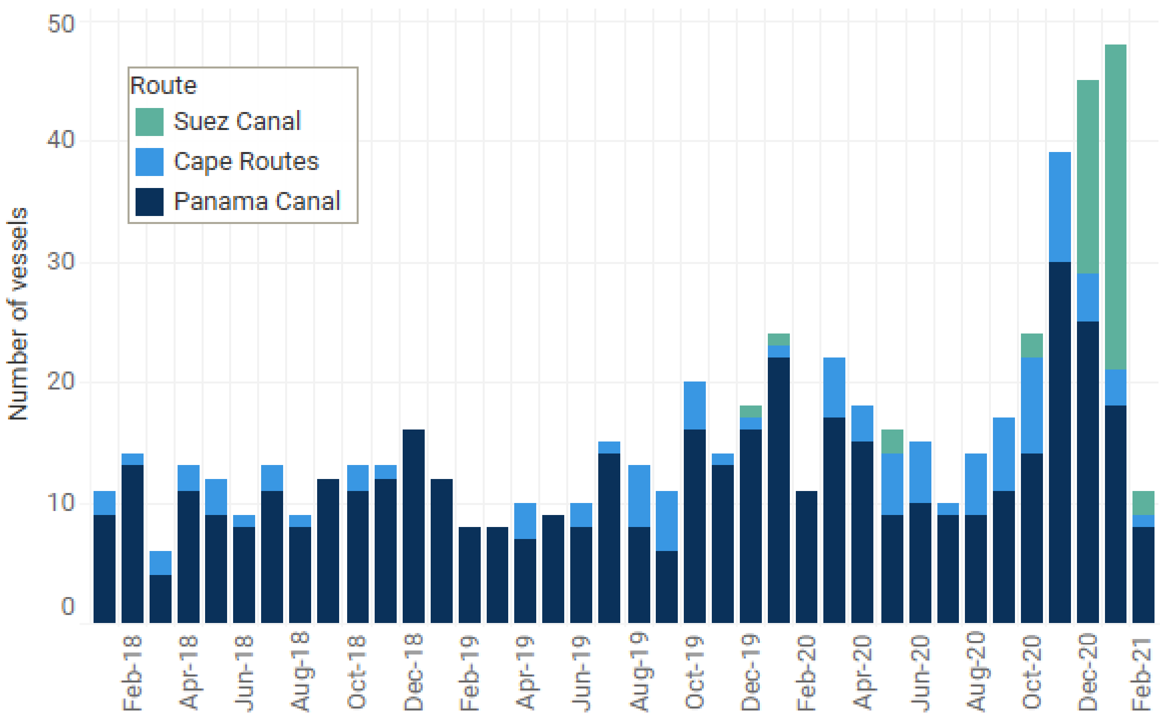
In total during January, 58 LNG vessels (38 laden) transited through the Neopanamax locks (the expansion in capacity in June 2016 allowed for vessels up to 120,000 DWT or 366m length compared to 52,500 DWT or 294m length), with a combined deadweight of 6.74 million Panama Canal tons. The canal has an allocation capacity of one LNG carrier per day in each direction, but in response to the surge in January traffic, the Panama Canal Authority (PCA) doubled the allocation. This action helped to reduce the waiting time by up to 50 per cent.

The PCA also modified the allocation mechanism to allow the re-allocation by auction of any slot for a Neopanamax vessel that becomes available within 96 hours of transit, thereby increasing the flexibility of canal usage for those without reserved slots.[20]

In Q4 2019, a significant number of cargoes was scheduled to be transported from the US Gulf of Mexico to Asia. On that occasion, congestion through the Panama Canal led to a doubling of single voyage times of up to 48 days. Whilst the number of cargoes transported between the US and Asia in Q4 2020 and Q1 2021 was even higher than the year before, voyage times did not increase dramatically (see Figure 14). Some of this is due to the actions of the PCA to reduce delays and increase efficiency, but as highlighted previously, some is also due to the re-routing of cargoes via the Suez Canal or the Cape of Good Hope, in order to avoid adding too many vessels to the Panama Canal queue. In January 2021 alone, 27 exports from the US bound for East Asia transited the Suez Canal, compared with a total of eight cargoes in the prior seven years. US exports to East Asia plummeted in February, dropping from a total of 48 in January to just 11 (see Figure 13).

Of the six laden vessels that had a Panama Canal waiting time of ten days or longer over last winter, four of them were delayed at the canal having arrived between late November and mid-December. By that point, with signals already received in the market about longer potential waiting times if transit slots have not been booked, and after a record number of cargoes had already moved through the canal from November's exports, the push to ship LNG through the canal decreased and alternative route options were selected. The market was essentially self-policing so as not to overload the canal further through January. The average number of days waiting to transit the canal southbound in January 2021 was 3.9 days and there were just two vessels held up for nine days. This would have been far higher if more vessels had not already opted for alternative routes.

Figure 13: United States monthly LNG exports to East Asia by route



Source: Kpler

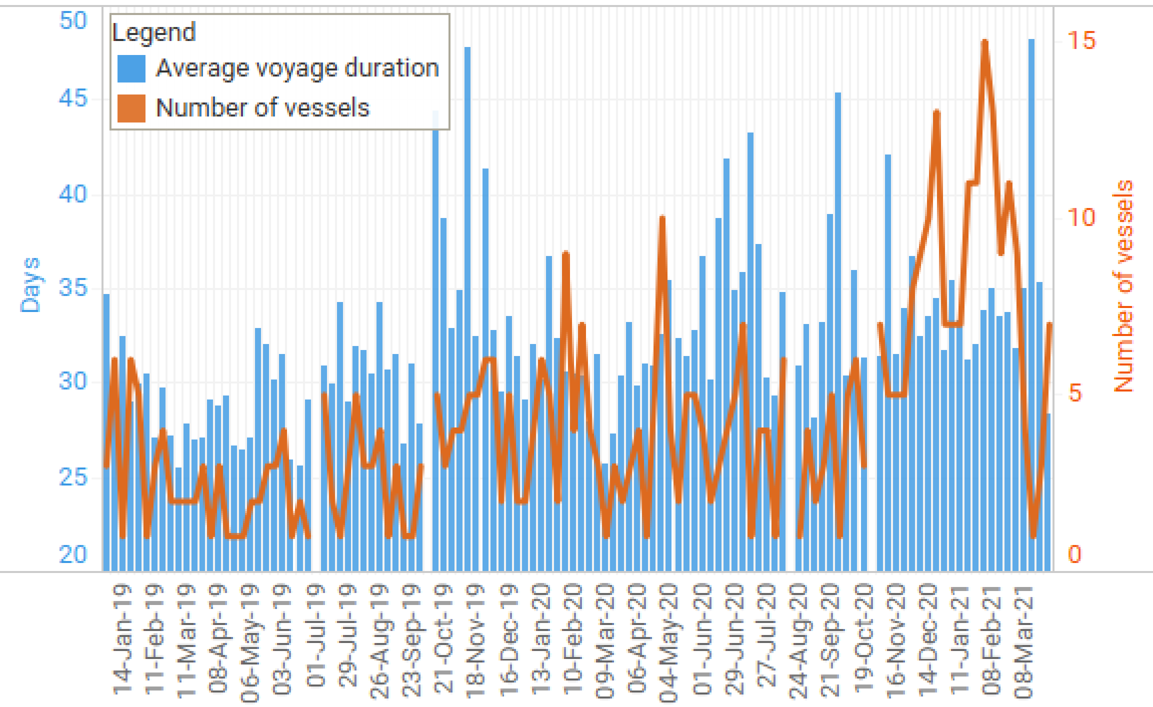
[20] https://www.hellenicshippingnews.com/panama-canal-lng-vessel-bottleneck-could-last-until-march/

US Gulf Coast to Asia voyage times less affected than expected

Despite the increased distance that comes from avoiding the Panama Canal and using alternative routes, average voyage times from the US Gulf Coast to Tokyo Bay were less affected than may have been expected. December average vessel speed was 13.8 knots, regardless of route taken. In January, it was 16.3 knots as vessels were instructed to increase speed because of the supply shortages in Japan. Average speeds include any waiting time to transit the Panama or Suez Canals.

Via the Panama Canal, this acceleration would reduce the voyage time by 4 days and 9 hours to 25 days and 6 hours (excluding any delays before transiting the canal). Travelling via the Suez Canal, however, the voyage is cut by 6 days and 20 hours from 45 days and 14 hours to 38 days and 18 hours. For charterers, it appears that an increase of 9 days and 3 hours (slow Panama versus faster Suez routes) was preferable to up to two weeks of delays at the Panama Canal.

Figure 14: Weekly average voyage duration for East Asian imports from the United States and number of cargoes (based on week of import)

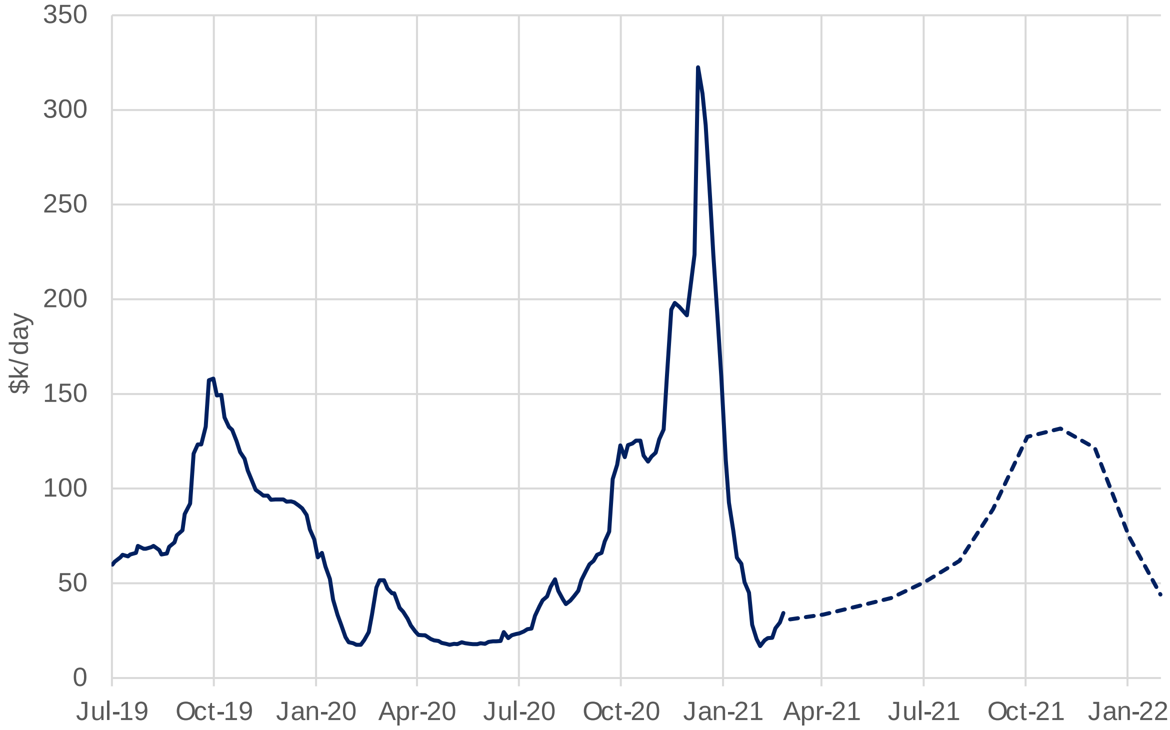


Source: Kpler

The main beneficiaries of these mitigating actions were the charterers of ships. As seen in Figure 15, Spark 30 Atlantic assessments show that freight rates rose to over $320,000/day in January[21] as traders rushed to arrange vessels to satisfy the dramatically higher demand in North Asia. They had been $100,000 per day just two months earlier, before the winter cold snap arrived, the consequences of low inventories in North Asia had become apparent and gas and electricity prices surged. The incentive for rapid voyages and minimal delays was clear. The difference between freight rates in the Atlantic and Pacific Basins tends to be minimal with historical variation within +/-$20,000/day. This price spread blew out in January as the immediate demand for vessels was focussed primarily in the Atlantic with the need to source vessels promptly to load cargoes from the US Gulf Coast (see Figure 16). On 8 January 2021 the price differential spiked at $100,750/day before returning to normal levels by early February.

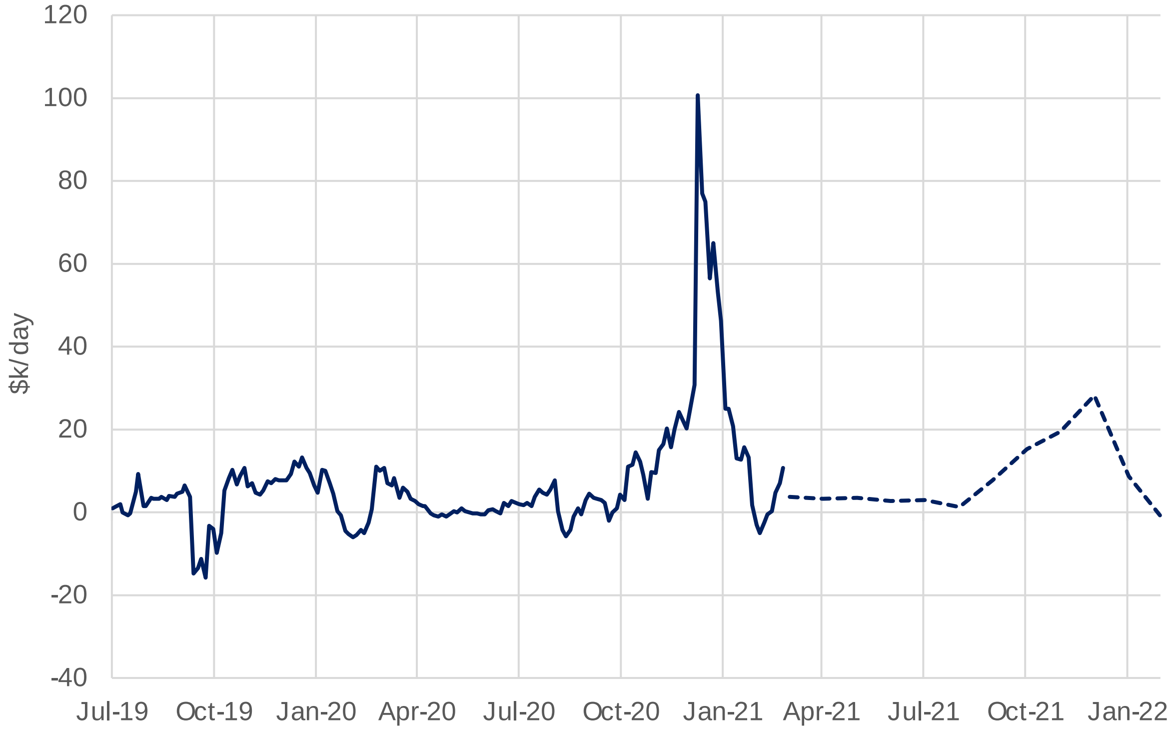
[21] https://app.sparkcommodities.com/freight/dashboard

Figure 15: Spark 30 spot and forward curve LNG freight rate



Source: Spark Commodities

Figure 16: Spark30 (Atlantic Basin) – Spark25 (Pacific Basin)



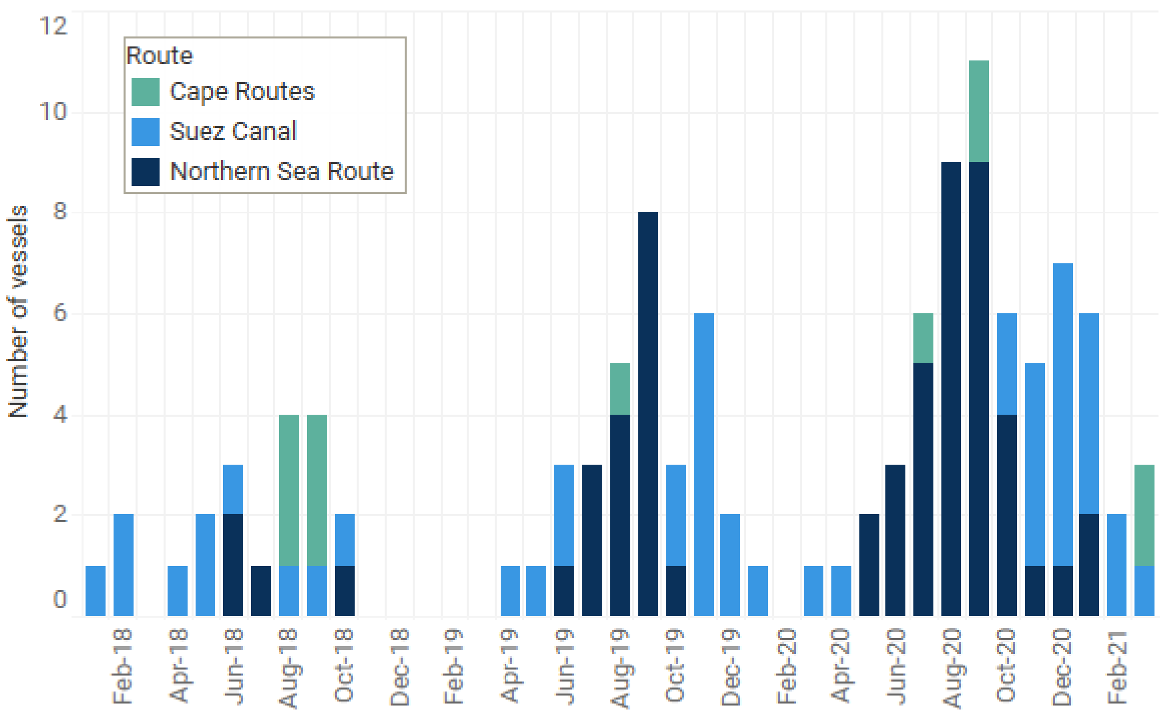
Source: Spark Commodities

Development of northern sea route for Russian exports

In addition to sourcing more cargoes from the United States, as East Asia's appetite for cargoes has grown, Asian LNG buyers have sourced more LNG from Russia's northern outpost at Yamal. This largely seasonal flow would see exports start in April and decline into the winter, as more cargoes are pulled into the European market and the preferable, but seasonally limited, Northern Sea Route (NSR) is closed. These additional flows from Yamal are low relative to the increase in flows from the US to East Asia but still provide flexibility for Asian buyers and an outlet for Russia when European demand is waning. As demonstrated in Figure 17, 2020 saw a change with not only more cargoes heading East during the summer months on lacklustre European demand, but then continuing into the winter.

Russia was among the few suppliers that was able to take advantage of high spot prices and redirect cargoes into Asia, drawing away from Russia's traditional determination to retain market share in Europe. Yamal shipments to Asia normally favour the Suez Canal route during colder winter months as transits along the NSR remain extremely rare at this time of the year as ice covers the Arctic Ocean. Nevertheless, four cargoes have taken the NSR between November and January with a further four making the voyage in October. The passage of the *Christophe de Margerie* in January marked the first occasion for an LNG vessel and was carried out without an additional icebreaker.[22] The *Nikolay Yevgenov* followed one day later with an LNG cargo bound for South Korea. After discharging in China, the *Christophe de Margerie* turned around and headed straight back to Yamal, where it arrived on 19 February, promptly reloaded and set sail for Zeebrugge. The *Nikolay Yevgenov* elected to take the warmer, but significantly longer, route via the Suez Canal and is expected to load in Yamal in mid-March. Opting for the more challenging NSR return leg enables a reload after just 24 days compared to the nearly twice as long 47 days offered by routing through the Suez Canal. No vessels attempted the NSR for February exports – clearly the incentive to ship to East Asia had by then passed.

Figure 17: Yamal monthly LNG exports to East Asia by route



Source: Kpler

[22] https://www.offshore-energy.biz/christophe-de-margerie-completes-late-eastbound-nsr-passage/

LNG fleet positioning going into winter

The interaction between Middle Eastern loadings and the rise in East Asian winter demand drives several notable capacity patterns

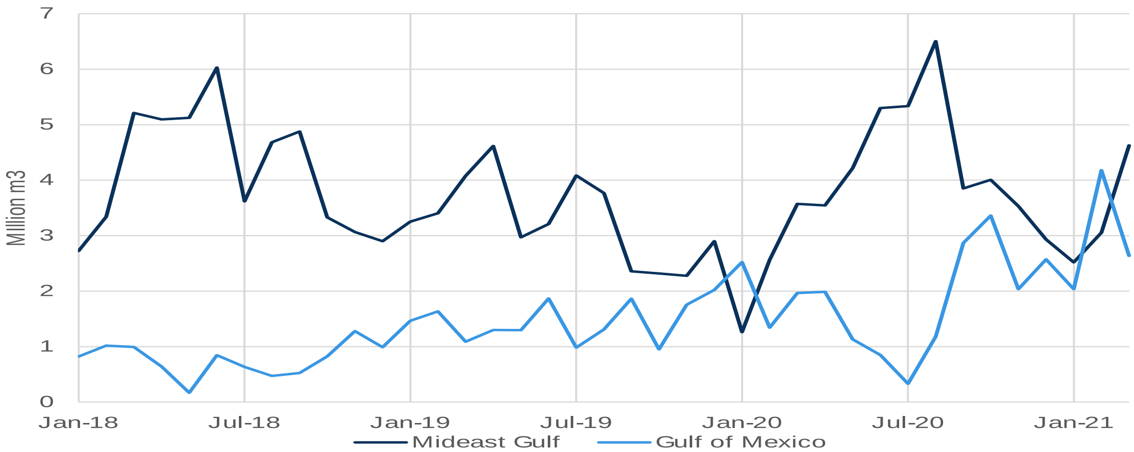
The typical fleet distribution for LNG vessels undergoes several seasonal cycles. The first involves the movement of volumes into East Asia beginning in mid-summer (June) steadily trending higher through the end-of-year before peaking in January. In the eight month period June to January of 2018/2019 and 2019/2020, total LNG exports towards East Asia increased by an average of nearly 4mt. Given much of this volume was sourced from the Middle East, ballast vessel availability in that region increased through the late-spring and summer months, holding at an average of 25 vessels per day between April and July, up from a low of just 15 vessels per day through the December/January period. Inversely, the number of ballast vessels in the north Pacific peaked at or just above 105 vessels per day between the months of December and March.

The normal seasonal ramp-up in departures towards East Asia was more extreme in the 2020/2021 period, given an unusually cold winter and a wide-open JKM price arbitrage. In the eight months ending January 2021, LNG departures increased by some 9.8mt, far surpassing the 4mt average gain realized over the previous two seasonal periods. It is important to note that much of this gain came late in the seasonal cycle (Q4) after initial underestimations of winter demand through Q3. This ultimately caused a record spike in ballast vessels in the north Pacific, which pushed to an average count of 120 vessels per day as of February 2021. This spike in demand was met by volumes from two primary regions – the Middle East and the United States.

The Mideast Gulf tends to act as a position to lay up ballast vessel capacity through the summer months when global demand is weakest, with shippers anticipating the increase in winter demand soon to come. As shown in Figure 18, in August 2020, average ballast Mideast Gulf vessel capacity initially pushed to a record high 32 vessels per day on exceptionally weak demand levels, a result of COVID-19. This quickly reversed in early Q4 as East Asian demand rapidly pushed higher. By September, vessel availability in the region was trending back into line with normal seasonal levels.

The United States has now become the other key player. Between July 2020 and January 2021, loadings towards East Asia increased by some 2.25mt, surpassing the average gain realized through 2018/2019 and 2019/2020 by 1.72mt. This had an obvious effect on ballast capacity within the Gulf of Mexico. The average daily count of ballast vessels held at just over 13 in September 2020, an all-time high and up by some 2 vessels against the norm for September realized in the previous two years. Elevated capacity levels tended to hold through to the end of 2020, a result of many vessel arrivals that had initially loaded out of the Middle East and discharged in East Asia. The United States was well placed to handle the widening JKM price arbitrage given a robust market for spot cargoes out of the USGC.

Figure 18: Regional LNG vessel ballast capacity



Source: Kpler

European demand follows a similar seasonal pattern to that of East Asia with exports out of Russia, Qatar and the United States driving ballast capacity positioning

The European variation in loading patterns plays a significant role in determining ballast vessel capacity, especially in the Mediterranean (Med). Through 2018/2019, ballast vessels within the Med region averaged 19 per day through July, with subsequent spikes in January and February of the next year (18 vessels per day on average). This pattern was magnified in February/March 2020 given record Russian shipment levels with average ballast vessel capacity spiking to nearly 21 per day. The Med tends to serve as a point for vessels to lay up early in the year when European demand tends to be the strongest.

The United States and Qatar have also come to dominate European gas markets, albeit in different ways. Qatar is largely a supplier that ships volume to Europe later in the seasonal demand cycle. Over the past two years, Qatari departures peaked in April, with exports averaging 2.71mt. The state has also shown a willingness to boost exports through Q3, the seasonal weak point for Europe. As mentioned earlier, Mideast Gulf ballast vessel capacity tends to be highest in the April to July period. Part of this is likely being driven by demand out of Europe.

The United States tends to ship volumes towards Europe at the seasonal high point. In 2020, departures towards the continent finished at a record high 3.04mt in February, up slightly against a strong January finish (2.88mt). As mentioned earlier, late-2020 was a strong period for US LNG loadings given a robust spot market. Many vessels that had originally laid up in the Mideast Gulf, discharged in East Asia and headed for the United States Gulf Coast.

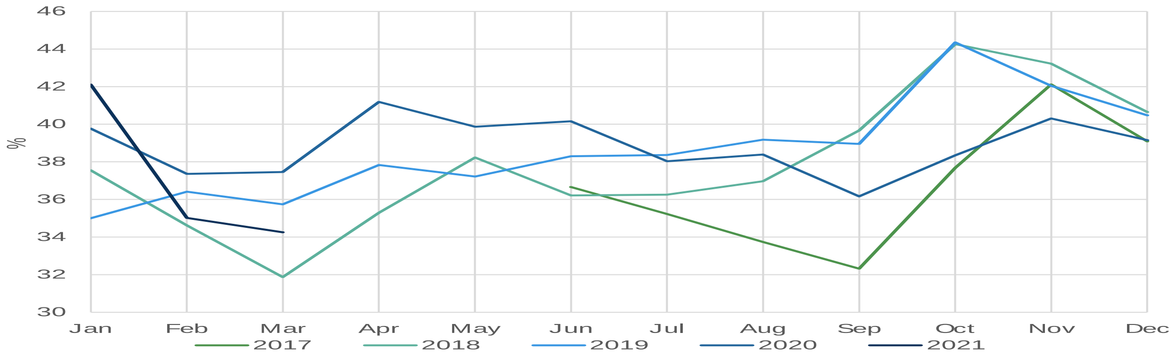
Vessel utilization developments in response to the surge in demand

Fleet utilization as an indicator to market activity

When looking to determine the impact of the surge in demand through the last winter on the LNG fleet, utilization split by vessel status (ballast vs. laden) is a useful metric to judge the situation. In this instance it is possible to see elevated floating storage levels in the summer pushing up the percentage of fleet laden during the summer, followed by the decrease of vessel activity moving into the autumn as exports from the United States decrease on the back of reduced global demand. Vessel activity was well below that of the previous two years through Q4 2020, setting up the need for a significant increase in laden vessels in January 2021 (see Figure 19).

As global demand for LNG waned in Q2 2020, floating storage built up through May hit a high of 2.17mt on the 23 June, 0.31mt higher than the previously recorded high on 23 October 2019. At the peak, the majority of floating storage vessels were to be found in Eastern Asia. The week of the 8 June saw 1.09mt from a total of 1.96mt located in that region. Floating storage persisted at elevated levels through to November at an average of 0.58mt across the month. The week of the 30 November saw this tonnage completely clear as the rush to source cargoes began to develop. In a sign of the speed at which the demand surge both came and went, by the 14 January there was a return to between one and two cargoes acting as floating storage at first in East and South East Asia, followed by the Mediterranean.

Figure 19: Laden LNG vessel fleet utilization



Source: Kpler

Average vessel speeds and voyage distances

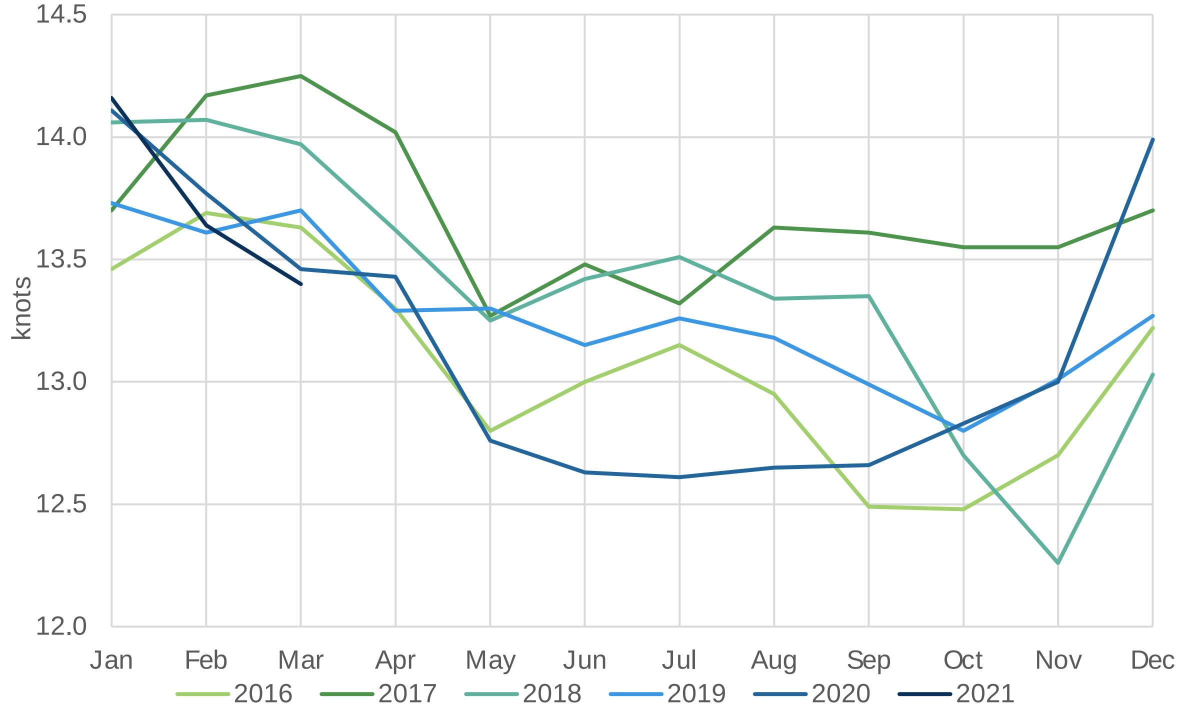
Average vessel speeds increase globally

As highlighted previously with regards to the voyage duration for vessels heading from the USGC to East Asia, vessel behaviours changed significantly through January in order to meet the immediate demand requirements. On a worldwide basis, across multiple routes, the LNG fleet saw an increase in average vessel speeds through December and January, far above that which is typical for the time of year. As shown in Figure 20, the increase in speed between November and December 2020 was 8.8 per cent compared to an average of 3.7 per cent in the previous four years. Vessel speeds in January were 2.3 per cent higher year on year, despite January 2020 representing the previous high for the month. This coming after the summer of 2020 represented the most prolonged period of low vessel speeds in the last five years on the back of dwindling demand.

Vessels heading from the USGC to East Asia averaged 16 knots in January 2021. Whilst not setting any records (the highest average speed recorded on the route fell in January 2019), it is worth bearing in mind that any waiting time spent at the Panama Canal is included in these calculations. There was no such increased congestion during January 2019. The implication being that for vessels travelling via the canal, the speed when transiting the Pacific Ocean was far higher this year.

Movements from Australia to East Asia also saw a significant increase in vessel speeds. From a low of 13.3 knots in August, average speeds hit a new high of 15.2 knots in January before returning to a more seasonal 14.6 knots in February.

Figure 20: LNG fleet average vessel speeds

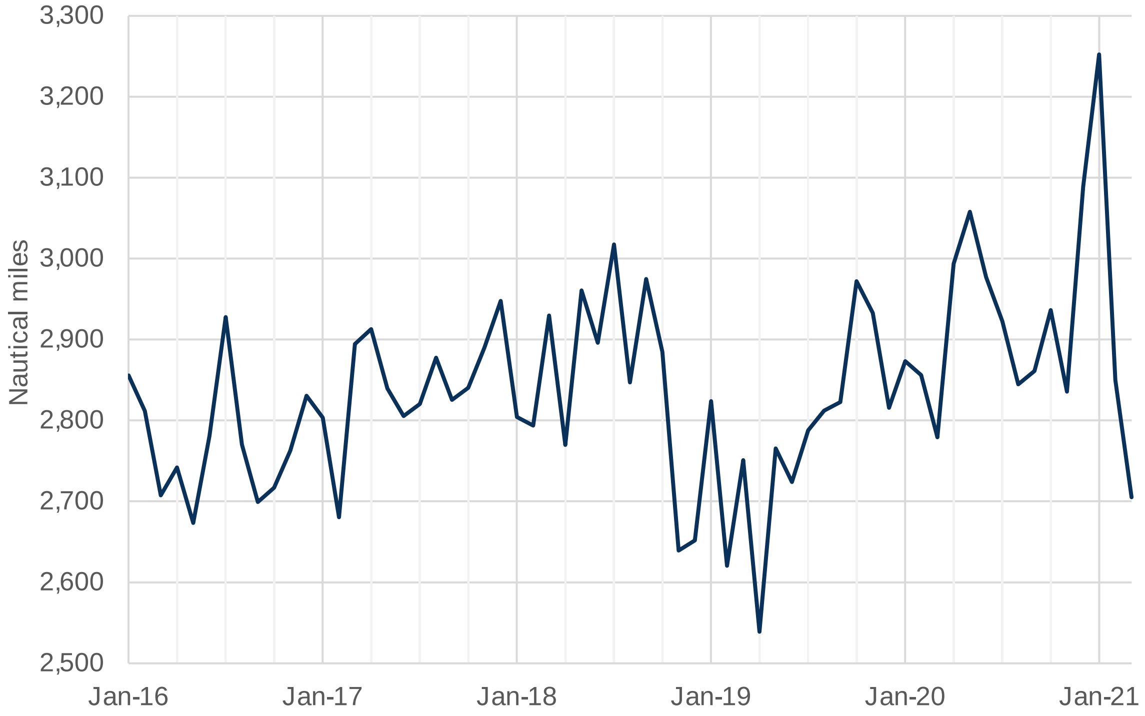


Source: Kpler

Average voyage distances increase on diversions and choice of route

With speeds increasing and average journey times between the US and East Asia remaining relatively stable, the balancing item in the equation is increased voyage distance. Global average voyage distances increased considerably in December and January, up 12 per cent and 17.2 per cent year on year respectively. As discussed in the section covering the issues caused by Panama Canal congestion, the move to alternative routes pushed shippers into longer and/or more convoluted paths. When factoring in reversals in direction mid-Atlantic or a continuation of a voyage through the Suez Canal and on to Asia, average voyage distances hit 3,252 nautical miles (nm). The metric of average voyage distance demonstrates minimal seasonality over the last five years, unsurprising given the relatively limited point to point connections within the market. As such the massive increase seen in December 2020 and January 2021 is all the more stark (see Figure 21). It demonstrates the flexibility and high level of optimization needed to respond to the immediate supply shortage in the East.

Figure 21: Month average LNG all laden voyage distance



Source: Kpler

Ton-miles increase as the combination of all metrics

The steady growth of the global LNG market dictates that ton-miles, a metric used to help gauge the demand in the shipping market where more tons or longer distance travelled results in more vessels needed or vessels engaged for longer duration, must increase largely in line with demand, as seen in Figure 22. Growth in global ton-miles on a rolling 12-month basis has ranged between 8.3-16.8 per cent in the last four years, peaking in October 2018. On a simple year on year comparison basis, 2020 is the only year where there has been a decline in ton-miles with an average decline of 0.8 per cent year on year between July and November. Demand in December 2020 returned to growth territory, up 8.1 per cent on the year with additional gains in January 2021, up 15.6 per cent year on year.

Ton-miles for imports to China actually peaked in December. Whilst imports increased slightly in January compared to December (8.46mt compared to 8.39mt), the country sourced more cargoes from shorter haul locations such as Malaysia or Papua New Guinea or medium haul from Qatar over the United States. Japan and South Korea both experienced peaks in ton-miles for their imports in January, as in a reverse picture to that for China, the increase of flows imported from the United States had an outsized impact. The global total ton-miles for February have corrected back down to more typical annual growth, even if at subdued levels (+3.2 per cent year on year).

Figure 22: Monthly total LNG all laden voyage ton-miles

Source: Kpler

LNG fleet growth vs. supply and demand growth

It could be argued that the question of whether or not growth in fleet capacity can keep up with increased LNG supply/demand is a moot point. Global imports through the winter of 2019/2020 were higher than those experienced the following year with no such spike in freight rates or LNG prices. Spark 30 (Atlantic Basin) freight rates peaked at $158,000/day in October 2019 compared to a peak of $322,500/day in January 2021.[23] Between those two periods, available vessel capacity had increased by 9.2 per cent, clearly pointing to the fact that overall vessel capacity was not an issue in the recent price spike. The same conclusion can be drawn at a macro level when looking at total fleet laden utilization on a percentage basis as highlighted previously. Figure 23 shows the development of available vessel capacity against global LNG exports over time.

Over the last four years, December's year on year growth in available fleet capacity has averaged 8 per cent. This compares to an average growth in annual exports over the same period of 8.1 per cent, or annual growth in LNG demand of 9 per cent according to OIES figures.[24] Growth in available vessel capacity is projected to reach 11 per cent by December 2021, compared to annual growth of just 1.8 per cent in LNG demand according to the OIES. As such it is not likely that global vessel availability will be the cause of any price spikes next winter – although that does not rule out any regional supply and demand issues leading to logistical problems.

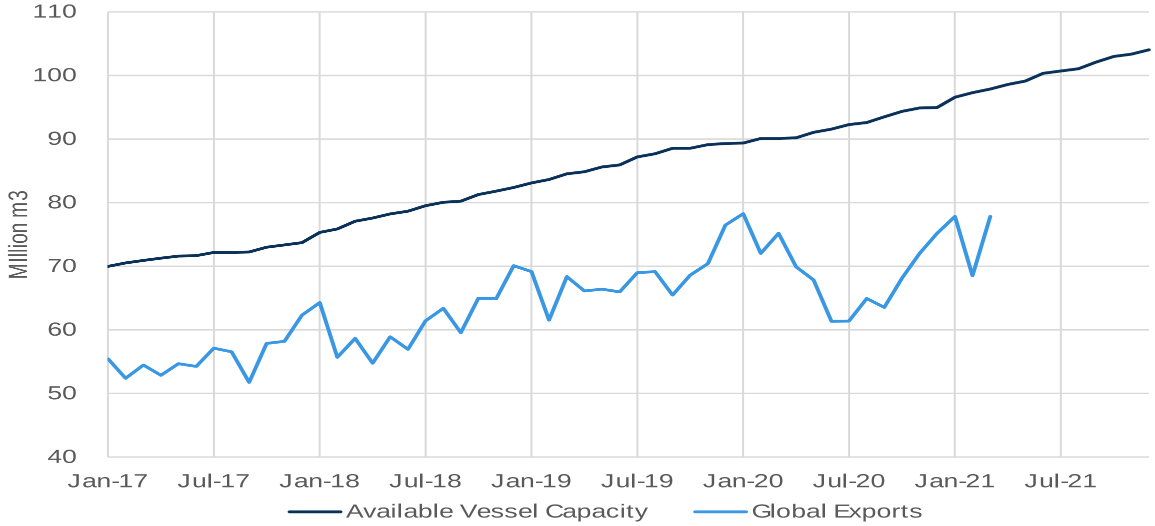
Average voyage durations decrease in response to price incentives

When combining the impact of increased voyage distances and vessel speeds it is possible to see just how the market was able to respond to the unprecedented surge in demand in East Asia. Despite record imports in January 2021 (up 11 per cent on the previous high of January 2019 if discounting the subsequently beaten record of December 2020), and the sourcing of increased tonnage from

[23] https://www.sparkcommodities.com/
[24] OIES LNG demand forecasts

significantly longer haul origins, there was a decrease in the combined average duration of cargo voyages through January.

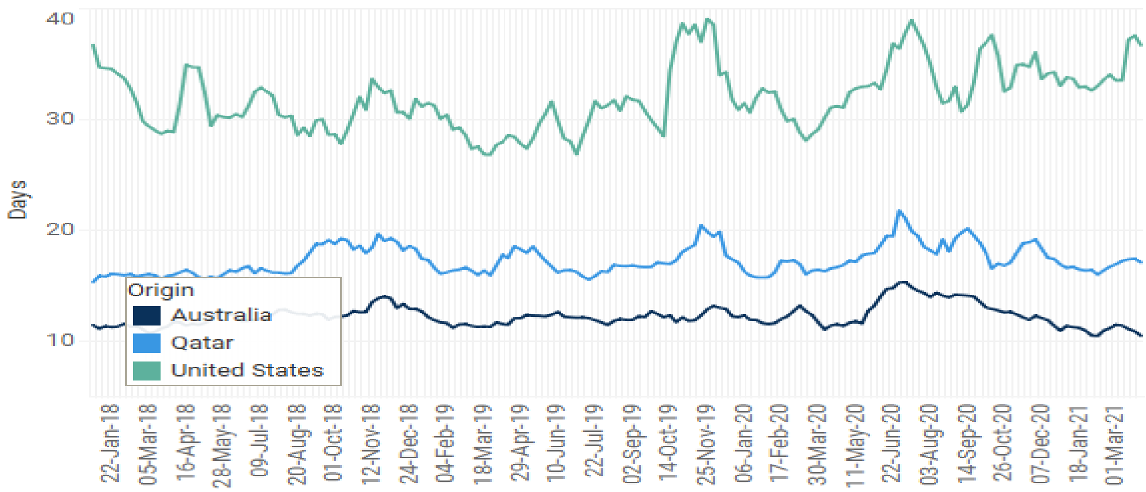
Figure 23: Total LNG vessel capacity vs global LNG exports



Source: Kpler

As discussed previously, through a combination of route changes, diversions and speed increases, cargoes arriving from the United States were able to avoid the serious delays and extended durations seen in Q4 2019 at the time of the last spike in Panama Canal congestion. As shown in Fugure 24, vessels moving from Australia and Qatar also shortened voyage times by increasing their speed in order to best capture the limited duration market incentive to sell additional cargoes into the region. As the pressure (and price incentive) to ship cargoes into the region has eased, so voyage durations have increased again.

Figure 24: East Asia LNG imports average laden voyage duration from major producers by arrival week (4-week moving average)



Source: Kpler

The overall increase in average voyage duration does highlight that the region needs to adjust to longer voyage durations on average, as an ever-greater share of cargoes (in particular, additional spot purchases) will be sourced from the United States.

It should be highlighted that the driver behind increased voyage durations through summer 2020 was the elevated and persistent level of floating storage and slow steaming brought about by the absolute drop in LNG demand due to the pandemic. Voyage duration is calculated as the simple difference between the departure time from the load port and arrival time at the discharge port.

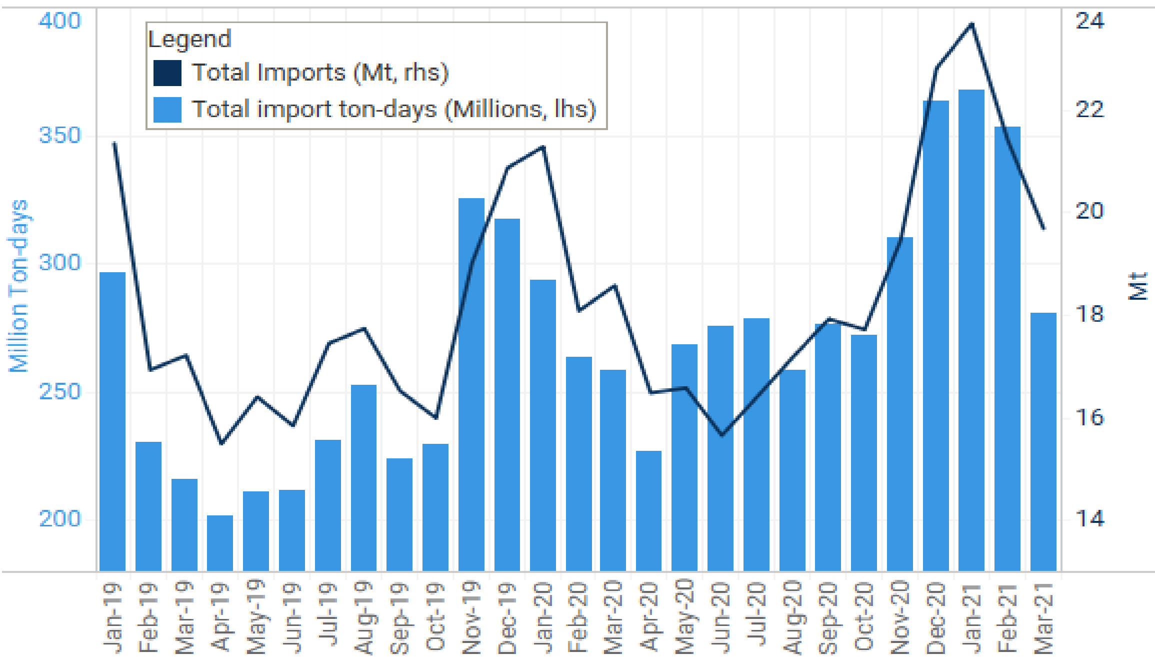
Ton-days give the best all round picture of how the market responded to the situation

The use of ton-days, a simple multiple of single voyage duration and the tons carried, is a further powerful metric to demonstrate the problems faced with sourcing a large quantity of LNG at relatively short notice for the East Asian market. It is possible to encapsulate all the factors surrounding canal delays and route selection in this single measure of total ton-days for imports into East Asia.

Despite significant growth in imports to East Asia over the years, the growth in the total ton-days for deliveries into East Asia has shown even greater gains (see Figure 25). Total ton-days for December imports were 363.2 million, up 14 per cent y/y, a moderate increase in growth compared to that for absolute tons. Total ton-days for January saw year-on-year growth of 24 per cent and 33 per cent for February, considerably larger percentage growth than seen for the tons imported.

This disparity between year-on-year growth in tons versus ton-days demonstrates how much of an impact the marginal cargoes from the US are having on imports into East Asia. Incremental supply from short and mid-haul origins such as Australia and Qatar are limited (even more so from Australia given recent outages), meaning that long-haul origin cargoes provide the marginal supply, as shown in Figure 27. Given the inherent increase in duration for these voyages, even using the most optimal Panama Canal route without increased delays for canal transits, the risks of not receiving a cargo 'in time' are greater.

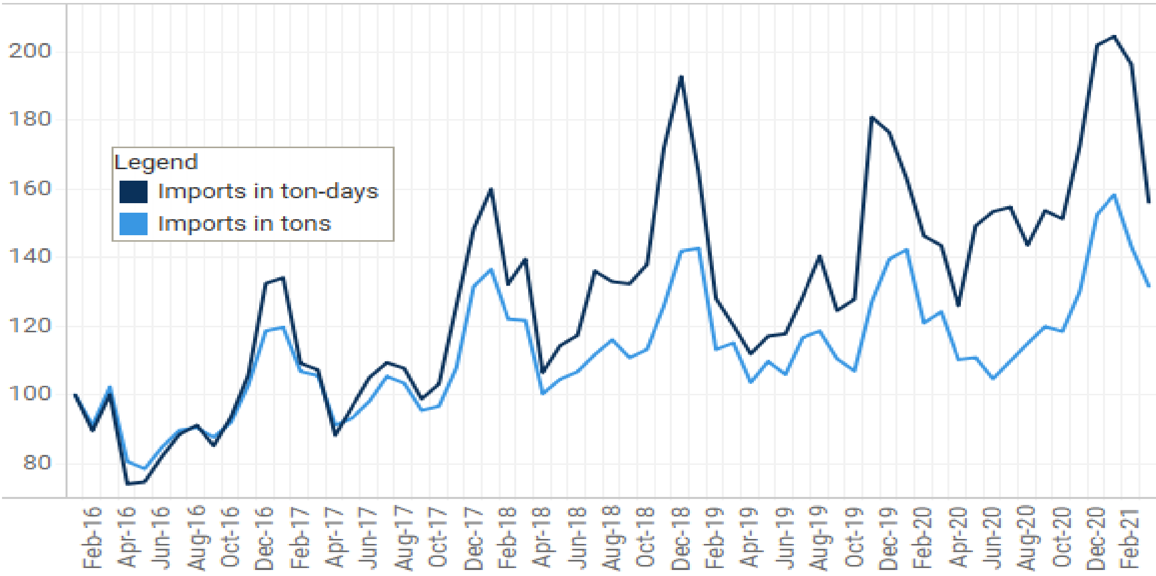
Figure 25: East Asian LNG imports in tons and ton-days



Source: Kpler

Figure 26 demonstrates how growth in imports in tons has lagged that for growth in imports in ton-days, indexed against imports in January 2016. By January 2021, imports measured in ton-days had increased by 103.6 per cent compared to January 2016, compared to an increase of just 57.8 per cent for imports in tons.

Figure 26: East Asian LNG imports in tons and ton-days indexed (January 2016 = 100)

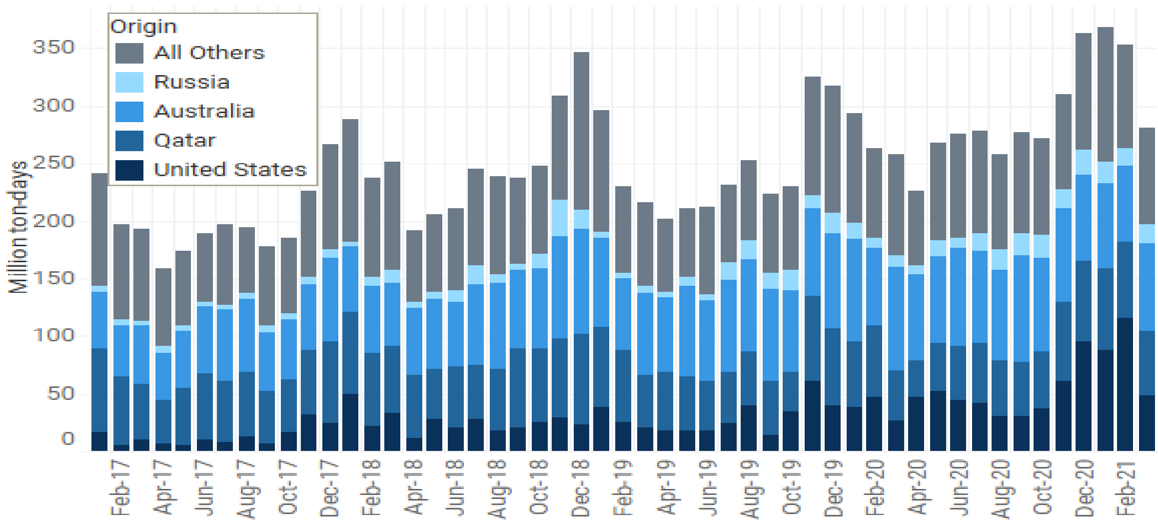


Source: Kpler

In the push to buy a large number of prompt delivery cargoes, it is inevitable that strain is placed on existing logistical bottlenecks, leading to further increases in the average duration of single voyages and ton-days. Despite the mitigating measures taken by market participants to avoid excessive wait times for Panama Canal transits, taking longer routes at higher speeds and diverting already on route cargoes from Europe to the East, ton-days for East Asian imports have to increase.

The region continued to demonstrate this long-haul buying program through February as whilst imported tons decreased by 9.6 per cent month-on-month, ton-days decreased by just 4.1 per cent compared to January as the proportion of cargoes from the US remained high. The collapse of JKM prices in mid-January (when accounting for a change in delivery month) and then further decline through February, point to the region having now overpurchased LNG at the top of the market. This is further corroborated by a marked increase in cargoes bound for Europe in March as the region absorbs global excess LNG and rebuilds post winter inventories, incentivised by seasonally weak price spreads.

Figure 27: East Asian LNG imports in ton-days by origin



Source: Kpler

Port, vessel and specification constraints are unlikely to have had an impact

Aside from the macro supply and freight focussed elements already discussed, there is a need to address potential limitations at the more micro vessel, receiver and port level. LNG is not an entirely uniform commodity with some variation in specification, largely based on the proportion of non-methane natural gas liquids (NGLs). Gas with a low concentration of NGLs is known as 'dry' gas, compared to 'wet' gas with a higher concentration. Depending on the market, varying percentages of NGLs can be 'spiked' to achieve the correct specification. This is quite a common occurrence in Japan where LPG spiking is a notable component of LPG demand. US Gulf Coast LNG specification is such that it is accepted globally, ensuring maximum optionality for shippers.

The Panama Canal and receiving port vessel constraints could, in theory, limit the potential supply of vessels, thereby increasing freight rates for appropriate vessels and increasing LNG prices on further tightening of supply potential. Since the start of 2020, the largest vessel to have loaded from the USGC was 100,000 deadweight tonnage (DWT) (182,000 cubic metres (cbm) capacity), well within the 120,000 DWT limit for crossing the Neopanamax locks. The total number of available vessels greater than this capacity was just 48 out of a total of 637 in December 2020. The vast majority of these larger capacity vessels are controlled by Qatargas and as such not applicable for use in the US export market.

In addition to potential limits on vessel size posed by USGC export terminals and the Panama Canal, there are also certain limits on vessels discharging. Over the last few years, of the 50 largest import installations defined by aggregated import volumes across East Asia, only nine have not received a vessel with capacity greater than 170,000 cbm. The majority have, however, received vessels with a capacity of 200,000 cbm or greater. Given that under the methodology for JKM priced cargoes, the maximum cargo size for the Pacific Basin assessment is 175,000 cbm, the installations with potential vessel constraints would not have contributed to the sudden increase in JKM prices.[25]

Future market developments

Examining export alternatives to that of the US Gulf Coast

Sempra LNG reaches a final investment decision to establish the Energia Costa Azul installation on the western coast of Mexico

Sempra LNG is attempting to find a method in which to do away with a less than desirable optimality decision currently in play for US LNG selling into Asia. Sempra LNG is looking to build a viable export terminal on Mexico's west coast. The Energia Costa Azul (ECA) installation achieved a Final Investment Decision (FID) in mid-November of last year, the only such project to manage such a feat in the year. At a cost of $2 billion, Phase 1 will be completed in 2024 and include a single train that will be able to ship some 3.2 mtpa. ECA is a brownfield project (originally an import terminal), helping to keep costs low. Long-term purchase agreements have already been established with Mitsui and Total for a combined 2.5 mtpa. Patrick Pouyanne, Total CEO, believes ECA could have as much as a $1/MMBtu cost advantage over plants in the USGC.[26]

From a purely economic calculation, the move to develop ECA makes sense. Unfortunately, there are political risks, especially when dealing with Mexico. The Obrador government was slow to approve Sempra's 20-year export permit and initially looked to extract deeper concessions from the firm. There also seems to be disagreements on just how much gas Sempra will be required to export via CF Energia (CFE), which currently purchases US natural gas that is not needed within the northern region of Mexico. Most importantly, the Mexican government could rescind Sempra's export permit at any time. While a less-than-likely scenario for now, these political risks will need to be factored into considerations around export terminals along the Mexican west coast.

[25] https://www.spglobal.com/platts/plattscontent/_assets/_files/en/our-methodology/methodology-specifications/lngmethodology.pdf

[26] https://www.sempra.com/sempra-energy-announces-fid-landmark-energia-costa-azul-lng-export-project

The Biden Administration will also have a hand in ultimately determining the fate of ECA. Sempra will need to gain permission to ship natural gas across the US – Mexico border. The Energy Department is tasked with determining whether gas exports are in the interests of the United States when volume ends up in countries without a free trade agreement.[27] The Federal Energy Regulatory Commission (FERC), which handles the approval of LNG export terminals within the United States, will not play much of a role in the Mexican ECA project. This is good news for Sempra. Biden's appointed head of the agency, Richard Glick, has a history of questioning the environmental friendliness of gas export plants.[28]

Developments to export LNG via the west coast of the United States remain tenuous with notable local opposition

Sempra is not the only player looking to capitalize on the need to ship LNG towards Asia. Last year, FERC gave approval to Pembina Pipeline Corporation to build an LNG export terminal, known as Jordan Cove, in Oregon. Commissioner Glick, who sat as a minority chair on the Commission, dissented from the FERC approval. The agency had initially denied approval to Jordan Cove in 2016. Even with Federal Approval, the project is running into fierce opposition from the state of Oregon, putting Jordan Cove on unstable ground. The terminal, with a proposed 7.8 mtpa, would have allowed LNG to reach Japan in just nine days, a big improvement against the nearly 25 days it takes for a vessel to travel from the USGC via the Panama Canal.[29]

Conclusion

When concluding what factors led to the incredible spike in JKM LNG prices by mid-January 2021, it is hard to overstate the lack of preparedness in some sectors of the market, going into what was forecast to be a colder than average winter in East Asia, especially given the scale of the reliance on long haul cargoes for resupply. The lack of availability of a large number of nuclear power plants in Japan likely led to a more extreme surge in gas demand, however the planned shutdowns were also a long time in the planning. As soon as signals started to show that demand was outstripping domestic supply and already committed cargoes, the market reacted accordingly. The United States consistently exported more LNG per week through December and January than at any time previously. Qatar ramped up production in mid-December and kept on going through January to see the total through the month only slightly lower than that of January 2020. Australia, still beset by production issues was unable to ramp up production. Exports from Russia were on a par with previous highs in December although more cargoes were directed East with use of the NSR despite extreme winter conditions. All told, producers did their utmost to capitalize on the situation and capture the record high margins, despite ongoing supply problems in Australia and apparent issues in November from Qatar.

It would be easy to solely blame the constraints placed on the market by having to ship incremental cargoes from the United States via the Panama Canal, but when looking at average voyage durations and the tonnage moved, it would be incorrect. Whilst the logistical constraints posed by the canal are real and significant, the options available to the market, and in fact the flexibility of the PCA itself to alleviate congestion at the time, demonstrate that it is not the only reason that prices spiked. Through the adoption of increased vessel speeds, alternative route selections, diversions and sourcing cargoes from atypical locations such as Yamal in the winter, the region was able to import record levels of LNG in December and January. That said, for an 11 per cent year on year increase in LNG imports into East Asia in January on a tons basis, there was a year on year increase of 24 per cent in imports on a ton-days basis, as an ever higher percentage of cargoes are sourced from longer distances.

[27] https://www.latimes.com/business/story/2021-02-24/how-far-will-biden-go-to-fix-the-climate-crisis-pay-attention-to-this-gas-project
[28] https://www.desmogblog.com/2020/06/18/oregon-jordan-cove-lng-gas-western-states-tribal-nations#:~:text=Originally%20proposed%20by%20Canada%2Dbased,way%20to%20the%20Rocky%20Mountain
[29] https://www.pembina.com/operations/projects/jordan-cove-lng-project/

This ever-increasing divergence between East Asian imports in tons versus ton-days only goes to highlight a key factor. The market could not address the issue that, when a large number of additional cargoes need to be sourced in a very short space of time, the incremental capacity is inevitably long-haul from the United States. A source which also brings with it logistical constraints on shipping routes. With relatively low gas storage capacity and supply options in the region compared to Europe which has multiple pipelines, mid-haul LNG sources and storage reserve options, East Asia is prone to short-term shortages unless there is sufficient planning ahead for the winter. Given the low level of imports of LNG leading up to the winter, the relatively low gas storage levels in the region and the sudden onset of cold weather (even if predicted in the mid-range forecasts) when alternative power generation capacity was depleted (Japanese nuclear installations in particular), it is clear that the surge of demand would inevitably create an extreme price environment.

Outside of relying on the expansion of export capacity from the west coast of the Americas, in order for East Asian buyers to become less prone to extreme demand driven price spikes, the region has to increase its preparedness to accommodate for longer single voyage duration marginal supply. If it is not possible to further improve the planning and optimization of cargoes for winter imports of LNG, then a more long-term solution of additional gas storage capacity must be addressed. Analysis by Shell demonstrates that whilst Europe has a natural gas storage capacity of 25 per cent of total annual demand, that number drops to just 7 per cent for China.[30] Operating at such fine operational tolerances has now been demonstrated to pose a significant risk. The pipeline like nature of LNG logistics and relative lack of short-term flexibility, despite moves made by the market at the time to compensate, has proven the region to be unable to cope when pressed, putting East Asian consumers at a disadvantage.

[30] https://www.shell.com/energy-and-innovation/natural-gas/liquefied-natural-gas-lng/lng-outlook-2021.html#iframe=L3dlYmFwcHMvTE5HX091dGxvb2svMjAyMS8

Appendix

China and Indian Markets

Chinese demand remains a key driver of global LNG markets

Chinese LNG imports accelerate to new highs in 2020 with Australian volumes continuing to dominate despite growing geopolitical tensions

Chinese LNG imports continued to push ahead in 2020. Arrivals finished the year at 71mt, marking a gain of 6.3mt against year earlier levels and higher by 51mt from five years ago. An increase in imports through year end due to the swing to cold weather in December was also a key driver. Australia is the most important source for LNG for Chinese buyers, a notable development given rising trade tensions between the two countries. Imports from Australia finished 2020 at 30.3mt, securing a market share position of 46 per cent, in-line with share levels that have persisted since 2016. Even through the latter half of the year, when China began to actively block imports of Australian thermal coal volumes, Australian sourced LNG continued to flow and there is little evidence of a change in policy so far through 2021.

The United States drove the bulk of Chinese import gains through 2020. Arrivals from the US finished the year at 3.39mt, up from near nil levels a year earlier. Chinese state officials appear to have eased import restrictions in April, reversing a 12-month policy that effectively ended any US volumes from offloading into China. In December, China imported a record 1.06mt from the United States, well above the previous all-time high 0.55mt (early-2018).

The gain in Chinese LNG arrivals was notable given a rare decline in power output on the year, driven by COVID-19 lockdowns early in the year

The fact that China managed to grow LNG imports at all through 2020 is notable given overall electricity generation finished up just 3.7 per cent y/y, the second weakest growth levels in more than two decades of weakness in output through Q1. Thermal power generation led the gain in absolute terms, adding some 110 bn kWh, albeit this marked growth of just 2.1 per cent y/y. The National Development and Reform Commission (NDRC) upheld strict coal import quotas for much of the year and began restricting thermal coal volumes from Australia in October. This weighed on the mix of generation with thermal coal falling one percentage point to 67.6 per cent of total on the year.

Given limited growth in thermal power output, the cut to coal imports alongside long-term Chinese goals to shift towards an increasingly greener mix of power generation were primary drivers allowing LNG imports to manage yet another y/y gain despite a weaker than average increase in overall electricity generation.

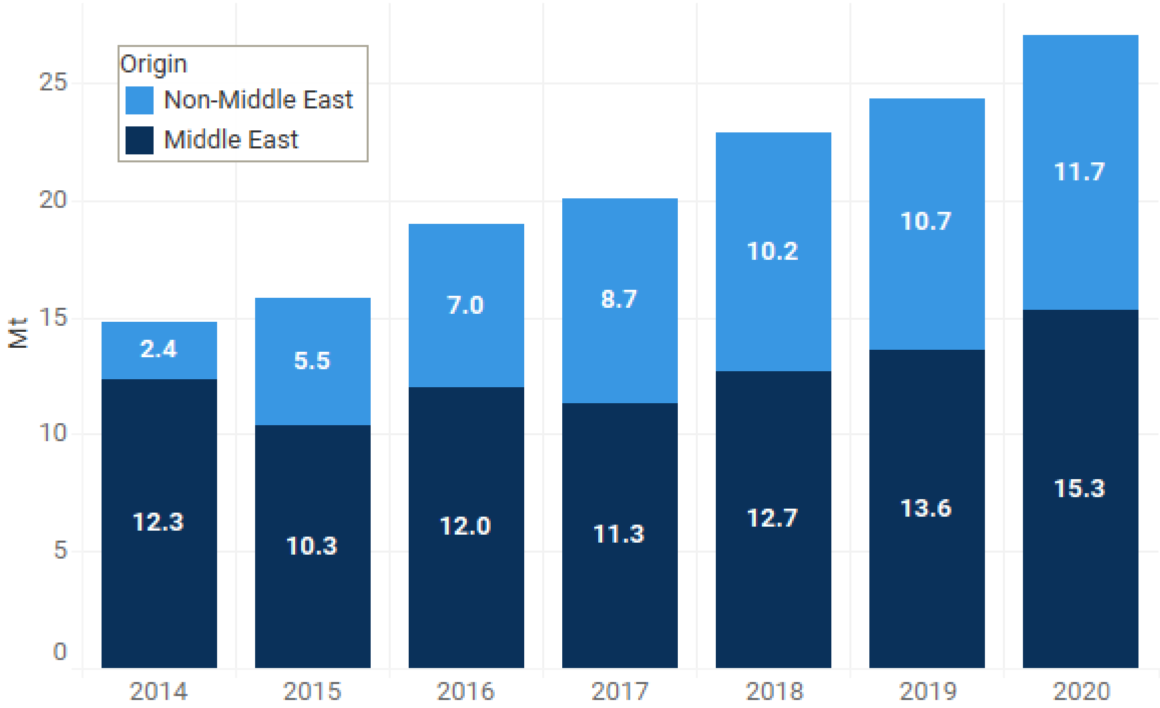
The slow rise of Indian demand as a competitor to East Asia

Indian LNG demand continued to push higher in 2020 with Qatar ceding further market share to the likes of the UAE, the United States and Angola

While East Asia remains the dominant growth engine for LNG, many producers have looked to India as an alternative outlet. Over the past five years, Indian LNG imports have increased by some 14.35 mtpa with arrivals through 2020 reaching a new high of 27mt (see Figure 28). Qatar remains India's most important single source of supply with volumes from the state finishing 2020 at 10.8mt. Nonetheless, Qatar has done little to keep up with the overall growth in arrivals into India over the past half-decade and thus, the state has realized a near 20 percentage point cut in market share over the period. Instead, the likes of the UAE (+3.2 mtpa y/y), Angola (+2.5 mtpa y/y) and the United States (+2.6 mtpa y/y) have been the biggest beneficiaries.

This shift in demand towards non-Middle Eastern based sources is having a notable impact on the average voyage time into India. Through 2020, the average time from departure to arrival into an Indian import installation was 15.3 days, up from 13.7 days just a year earlier, marking the highest average level on record. This fundamentally changes the way in which India will need to forecast ahead to ensure a steady supply of natural gas to meet domestic demand.

Figure 28: Indian annual LNG imports by origin group



Source: Kpler

LNG offtakes are failing to keep pace with gains in coal and renewables power generation as the energy mix places little reliance on gas-powered generation

While notable on an absolute basis, Indian demand for LNG is less impressive when viewed through the lens of domestic electricity demand. According to POSOCO (Power System Operation Corporation), the state places little reliance on natural gas. In 2020, installed gas capacity remained at just seven per cent of the total grid with coal (54%), renewables (24%) and hydro (12%), representing the three most important sources of power into the Indian grid. While true that coal has seen a ~7 percentage point decline in the overall mix since 2016, much of this has been filled by renewables output, not natural gas. On an absolute basis, renewables added the most capacity over the past half-decade (544,000 MW), followed by that of coal (170,000 MW) while gas added just (2,147 MW).[31]

With natural gas fired power generation acting on the margin of India's grid, the country is more sensitive to elevated LNG prices and will demonstrate marked reductions in imports during periods of a strong JKM. By January, gas/diesel/naphtha power output was down nearly 40 per cent. LNG arrivals finished in December/January at 1.9 mtpm, marking a decline of some 0.8mt against October. In total, Q4 imports finished up just 0.05mt y/y, a significant change compared to Q2/Q3 2020 when LNG offtakes managed growth of 1.03mt, a period of overly depressed JKM prices.

Indian imports of LNG are set to increase again in 2021 given ample additional import capacity, albeit upstream pipeline infrastructure will remain an inhibitor

Indian LNG arrivals are likely to continue posting growth on a y/y basis for some time to come. Indian LNG importation remains well under technical import capacity (42.5 mtpa). While arrivals into Dahej (16.9 mtpa, 97% utilization) and Hazira (4.98mt, 100% utilization) were the drivers of volumes in 2020,

[31] https://posoco.in/

offtakes into Kochi, Ennore and Mundra combined to just 3.24mt, only 27 per cent of nameplate capacity. These installations should slowly manage a pickup in loadings through 2023 as associated pipeline infrastructure is completed.

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