



LPG

Weathering the Storm

As 2022 begins and as the Covid pandemic continues to ebb and flow globally, LPG trade has gained its footing after remaining flat during 2020. Global seaborne LPG trade reached 121.9 million tons in 2021, up from 116.3 million tons in 2020 marking a 4.9% year-on-year increase.

AVANCE POLARIS
VLGC (Gas Carrier), 89,180 cbm, built by DSME yard in South Korea, delivered in January 2022 and owned by AVANCE GAS.

Photo: ©Avance Polaris departure from DSME Yard.

CHARTERING

Although the growth in LPG trade from 2020 to 2021 was less than the 7.1% 2016-19 annual average, before the onset of Covid Pandemic and its dramatic effects on the worldwide economy, the increase in LPG trade is nonetheless a positive reflection of increasingly encouraging macroeconomic sentiment.

After gaining its status as the world's leading LPG exporter in 2018, the US continues to increase its dominance. In 2021, it exported slightly over 50 million tons of LPG, an increase of 11.5% from the previous year, and now accounts for 41% of global exports, up from 39% in 2020. On the other hand, exports from the Middle East Gulf continued their long-term decline which has been evident since 2018. In 2021 the year-on-year fall was less than one third of a percentage point. Exports from the region totalled 34.7 million tons and represented 29% of global exports, a one percentage point reduction since 2020. The cut in Middle Eastern exports was largely a consequence of OPEC+'s agreement to reduce crude production. Going forward, LPG exports are expected to increase as the producer group continues to hike their crude output.

East Asia remains the world's major importing region importing 54.8 million tons of LPG last year, a 4.9% increase from 2020. The majority of incremental volumes were imported by China which took in 23.9 million tons in 2021; a substantial 14.5% increase compared with 2020. More than two thirds of the LPG imports to China was made up of the sub-commodity propane used in their expanding propane dehydrogenation (PDH) industry. India, the world's second largest LPG importer, also increased its LPG imports to 18.6 million tons, an increase of 7.4% since 2020. India's LPG use is centred on household cooking and transportation as well as the petrochemical industry. Japan's LPG import figures have been fairly stable over the last decade at about 10-10.8 million tons per annum. However, the reliance on North American product has increased substantially from about 14% in 2014 to 82% in 2021. This includes the emergence of Canadian imports from the Ridley Island Propane Export Terminal (RIPET) north of Vancouver.

LPG imports into Europe and Southeast Asia have been static during the last couple of years with fluctuations of less than 2% year-on-year. Southeast Asia imported 11.6 million tons in 2021, while Europe imported 22 million tons.

As we have become accustomed to over the recent past, geopolitical and climate issues continued to guide the momentum of LPG trade during 2021. The start of the

year was characterised by optimism on the back of the nascent global Covid vaccine rollout and the hope that the pandemic was coming to an end. This, along with supply cuts from the Middle East in line with OPEC decisions, raised freight rates as the longer haul exports from the US Gulf Coast reduced vessel availability. However, the positivity in LPG trade was relatively short lived. The so called 'Big Freeze' winter storm which hit Texas and Louisiana in mid-February led to flaring and plant shutdowns, some of which were not resolved for many months. The technical problems in the region led to reductions in inventories. At the same time, China had been oversupplied ahead of the Lunar New Year holidays and both occurrences led to a lack of enquiries and long positions in the East and West. At end-March, the container ship Ever Given blocked the Suez Canal for six days. However, this caused minimal disruption to LPG trade as the main flows do not pass through the Canal. In fact, delays at the Panama Canal caused more interruption to trade than the blocking of the Suez Canal during the year. Gas carriers experienced waiting times of up to 18 days if no transit slot had been booked, and some owners opted to reroute vessels around the Cape of Good Hope during the year. We believe that the risk concerning Panama Canal transit delays will persist and has the very real prospect of increasing as additional gas carriers are added to the fleet. Other events, such as delays at the Chang Jiang Kou pilot station caused by Covid restrictions limiting the availability of pilots guiding vessels in the Yangtze River added to delays and affected tonnage availability.

VLGC/LGC

VLGC freight rates were again volatile in 2021, particularly during the first quarter. The published Baltic freight rate from Houston to Chiba (BLPG3) for a 44kt cargo peaked at approximately \$182/mt in the first half of January and dropped by almost 70% to \$57/mt two months later. The arbitrage driven freight rate for this trade regained some footing thereafter and mostly remained in the \$ 80's/mt until November when rates exceeded the \$100/mt level again. A similar trend occurred on the Ras Tanura to Chiba route which peaked at close to \$120/mt in January before dropping by more than 75% to approximately \$28/mt in early March, before closing the year at \$73/mt. We calculate that the average time charter equivalent (TCE) for VLGCs was just under \$34,000/day during the year which represents a reduction of \$12,000/day compared with 2020.

The LGC segment experienced less volatility than their larger cousins, due mostly to the fact that a higher percentage are on long term charterers. Their average time charter equivalents were about \$29,000/day which is only slightly lower than in 2020.

MGC/Handysize

The midsize gas carrier market was stable in 2021 with TCE's in the \$750,000-820,000 range per calendar month for the 35,000 cbm and 38,000 cbm vessels respectively.

The Handysize carrier fleet saw earnings improve, averaging \$22-24,000/day during the year. As in 2020, higher earnings came on the back of petrochemical trade, especially related to US ethylene exports and backhaul cargoes from Asia to the Americas.



Petrochemical gasses

As with LPG, last year the petrochemical market was sensitive to major trends in the global economy. Notably, the spillover effects of Covid in both shipping and operations, while the weather had a measurable impact in the industry. Indeed, this mirrored all sectors of the fossil fuels industry.

Asia Pacific, the largest region in the global petrochemicals market, started the year with production cutbacks as an earthquake hit Northeast Japan in February. Although the natural disaster caused no major structural damage to plants around the region, power outages and unscheduled turnarounds lowered the output of ethylene and propylene in the first quarter. In China, PDH operating rates dropped to a multi-year low on planned turnaround and outages, eight PDH plants out of 19 were shut by the end of the first quarter resulting in a 37% decline of total PDH production capacity, driving propylene prices to 6-year highs.

The second quarter saw the commissioning of new crackers in China and South Korea. Meanwhile, other facilities restarted operations after long turnarounds. South Korea added 750 kt/yr of propylene capacity with the start-up of crackers at GS Caltex and LG Chem, which drove propylene prices down. Consequently, intra-regional arbitrage opened as European prices remained supported, prompting more discussions to move Asian-origin cargoes Westbound.

Heavy rains in Northwest Europe caused severe floods in Germany, The Netherlands, and Belgium, affecting movements along the River Rhine, and disrupting production and logistics. With Europe lacking product, imports from the Middle East supplemented domestic supply with 40,000 tons of propylene delivered in May.

By the end of summer, Asia's domestic propylene prices were negatively affected by rising output combining with weak regional demand. This motivated traders to look to the Americas as an alternative, attractive destination.

With the surge in east to west propylene trade up by over 30%, shipping proved to be a big challenge in the fourth quarter. Moreover, Covid cases in Asia were on the rise by the end of the third quarter, which led to the proliferation of movement restrictions and lockdowns. China faced a lack of pilots in the Yangtze River which hindered the movement of pressurized tonnage and left charterers facing high demurrage bills while owners handled scheduling delays and voyage cancellations. Consequently, freight rates strengthened while some owners were reluctant to call at Chinese river ports to avoid delays which had reached 10-14 days. As tonnage tightened, we saw cargoes being fixed more than a month in advance to ensure space could be secured while traders were reluctant to firm up cargoes without a ship in hand.



As lockdowns continued in East of Suez countries, demand weakened which triggered reduced global petrochemical trade towards the end of the year. In addition, weak Japanese demand contributed to a decline in production of basic petrochemicals, as the auto industry stagnated. Meanwhile, naphtha and crude prices strengthened on tighter global fundamentals which forced some producers to make economic run cuts to counter weak margins. Furthermore, butadiene prices started to decline in the wake of China's policy to reduce rubber production.

Notwithstanding continuous declining butadiene prices into fourth quarter, Philippines' JG Summit confirmed that, they had achieved on-specification of butadiene at their new 70,000mt per year extraction unit in Batangas. As there is no downstream butadiene consumption in the Philippines, all production is set to be exported. However, in light of weak Asian buying interest amid low operating rates, their first export had to be deferred.

US butadiene prices rose on the back of supply shortages, which were related to shutdowns during the winter storms and hurricanes. In a rare move, US prices moved above Asian prices which incentivised imports from Europe and Asia. By the end of the second quarter, US import prices stood at about \$1,700/mt plus freight from Europe, close to 30% higher than the June contract price, this compared with \$1,300/mt (on a CFR basis) in Asia.

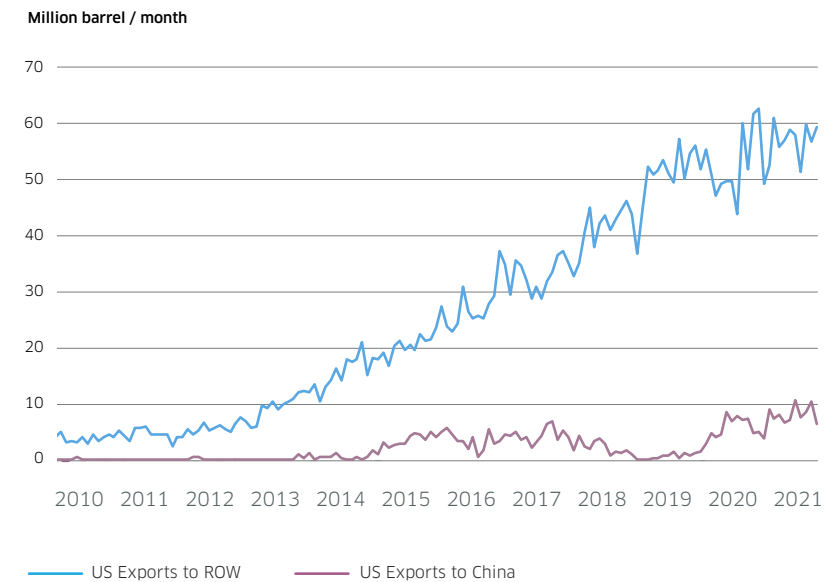
Following stronger US and Chinese prices, and with new butadiene extraction units in place, East Asian export volumes increased by over 80,000 metric tons while US Gulf exports fell by close to 72,000 metric tons in 2021 compared with the previous year. All told, these contrasting trends saw the global volume of butadiene trade remain relatively flat year-on-year, although with higher ton-mile figures.

The peak of the European ethylene maintenance season saw around 14% of capacity offline in May 2021. This included both planned and unplanned shutdowns which tightened the market. Shutdowns included one cracker in France, two units in the UK, issues in Italy, Germany and the ARA region, and an outage at a large merchant cracker on the ARG pipeline. In the aftermath of the floods and damages, Europe's balance tightened, and prices accordingly strengthened. This had the effect of decreasing European exports by 40% in 2021 compared with the previous year.

In the US, ethylene supply began to gradually increase from the beginning of the second quarter, although progress was slow given that producers were still recovering from cracker outages and extensive disruptions caused by earlier storms. As a result the shipping market focused on cargoes from the Middle East and East Asia instead. Ethylene prices lowered in the fourth quarter as additional tons were made available from Brazil, Italy, and the Middle East. We estimate about 750,000 metric tons of ethylene being shipped from the US Gulf in 2021 to Europe and Asia, as and when arbitrage windows opened and closed in various regions.

China imported 1.9 million tons of ethylene over January-November, 4% more than the previous year.

US LPG exports to China and the rest of the world



Overview of New Crackers in 2021:

Eleven new crackers started operations in Asia during 2021, with a total capacity of 9.15 m mt/yr of ethylene and integrated downstream capacities, including 5.9 m mt/yr of polyethylene (PE), 830,000 mt/yr of ethylene oxide (EO), 2.52 m mt/yr of monoethylene glycol (MEG), 1 m mt/yr of styrene monomer (SM) and 300,000 mt/yr of ethylene vinyl acetate (EVA).

- Chinese state-controlled firm Haiguo Longyou Petrochemical achieved production at its deep catalytic cracker (DCC). The DCC, located in northeast China's Heilongjiang province, can produce up to 400,000 mt/yr of ethylene and 550,000 mt/yr of propylene at capacity.
- Chinese private-sector firm Fujian Meide Petrochemical, a subsidiary of Fujian Soft Packaging, has started propylene production at its 660,000 mt/yr PDH unit in southeast China's Fujian province.
- Japanese refiner and petrochemical producer Eneos commenced ethylene production at its large Kawasaki-based cracker. The cracker has 540,000 mt/yr of ethylene and 300,000 mt/yr of propylene capacity.
- Chinese private-sector refiner and petrochemical producer Zhejiang Petrochemical (ZPC) started olefin production at its new 1.4 m mt/yr No.2 cracker in Zhejiang province. The cracker also has 700,000 mt/yr of propylene production.
- South Korean petrochemical producer LG Chem began olefins production at its new naphtha-fed cracker in Yeosu. The cracker has a nameplate capacity of 800,000 mt/yr of ethylene, 400,000 mt/yr of propylene and 140,000 mt/yr of butadiene.

- South Korean refiner and petrochemical producer GS Caltex started ethylene production at its new naphtha-fed cracker in Yeosu. The cracker can produce up to 700,000 mt/yr of ethylene and 350,000 mt/yr of propylene at capacity rate.

- China's state-controlled PetroChina Lanzhou Petrochemical commenced ethylene production at its first ethane-fed cracker. The cracker at Changqing in Yulin county in Northwestern China's Shaanxi province is fed with ethane from its Changqing gas fractionation plant and can produce up to 800,000 mt/yr of ethylene. The company has also built 800,000 mt/yr of polyethylene (PE) capacity integrated with the new cracker. The two PE units started up in advance, being fed by merchant ethylene supplies. China's Gulei Petrochemical (Gulei PC) began ethylene production at its new steam cracker. The cracker at Zhangzhou in Southeast China's Fujian province has output capacity of 1 m mt/yr of ethylene and 500,000 mt/yr of propylene. However, it can produce up to 1.2 m mt/yr of ethylene and 600,000 mt/yr of propylene.

- Chinese private-sector petrochemical producer Ningxia Runfeng New Material Technology achieved on-specification propylene production at its 300,000 mt/yr PDH unit in northwest China's Ningxia province.

- Chinese private-sector producer Jinneng Technology commenced propylene output at its new 900,000 mt/yr PDH unit in northeast China's Shandong province.

- South Korean petrochemical producer Hyundai Chemical started olefins production at its new heavy feed cracker in Daesan. The company, a joint venture between Hyundai Oilbank and Lotte Chemical, obtained on-specification propylene and ethylene production having fed in heavy residuals on 29 November. The new cracker has 900,000 mt/yr of ethylene and 450,000 mt/yr of propylene production capacity. It is integrated with a 300,000 mt/yr low-density polyethylene (LDPE)/ethylene vinyl-acetate (EVA) swing plant, a 250,000 mt/yr high-density polyethylene (HDPE) production line, a 300,000 mt/yr HDPE line and two 250,000 mt/yr polypropylene (PP) units.

Geopolitical and climate issues have guided the momentum of LPG trade during 2021

THE FLEET

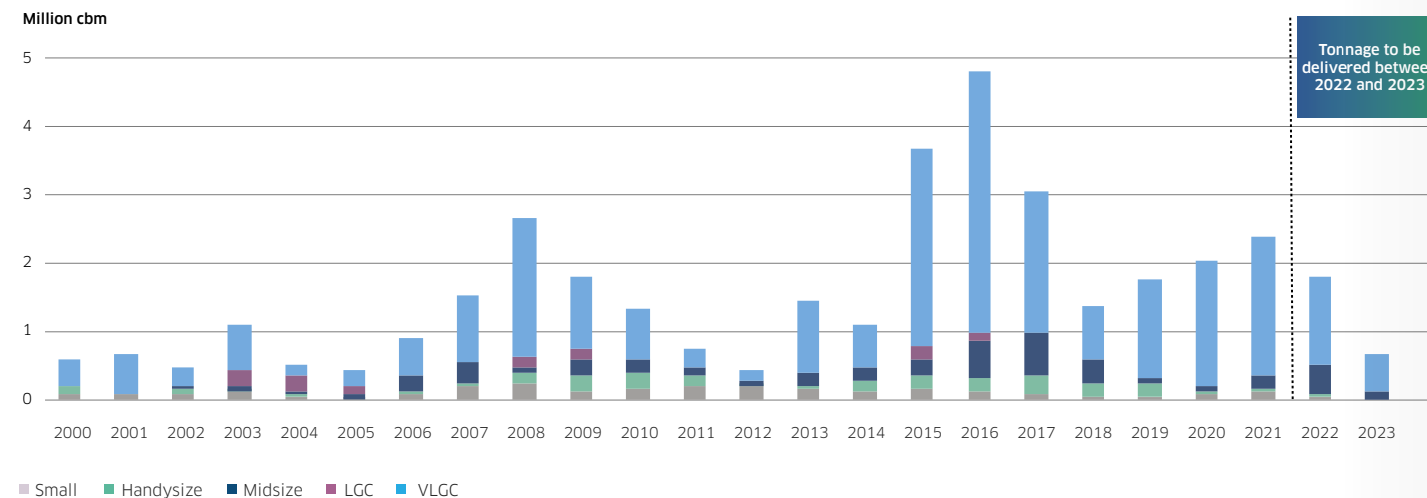
Eighteen VLGC's were delivered in 2021, compared with 21 in 2020 and 17 in 2019. The order book, however, currently stands at 80 vessels which represents 25% of the current fleet. There are some 50 vessels over the age of 20 which may become scrapping candidates over time.

As with recent years, there were no LGC deliveries during 2021, and none were ordered. The last new buildings joining the fleet hit the water in 2015 (3 vessels) and 2016 (2 vessels). Therefore, the fleet composition remains unchanged at 21 vessels. The recent trend has been to abandon this segment and to favour the improved economies of scale afforded by VLGCs.

Baltic Exchange Liquid Petroleum Gas Index



LPG tonnage delivery and orderbook by vessel type since 2000



By the end of 2021 there were 106 MGC's after one demolition and four deliveries in the year. The order book stands at 34 vessels scheduled to be delivered in the next three years.

Seven Handysize vessel are on order for delivery by the end of 2023 adding to the 126 currently in the fleet. No Handysize vessels were delivered in 2021, whereas two were in 2020.

2021 sparked a renaissance in the S&P market, particularly for the VLGC's. Circa 20 transactions took place, with the average age of vessel exchanging hands being 13 years of age. Most of these deals have been reported against the needs of Indian imports, and those of the Indonesian requirement for long term employment. With few owners having such age ships to sell, this competition has maintained, if not increased the buoyancy of the asset values.

In the Midsized market, four vessels exchanged hands for further trading. The average age being about 20 years old. Whilst the Midsized market is generally less liquid than the larger class in terms of second-hand S&P, the most interesting sale is arguably that of the Ex GasChem Hamburg which was sold to affiliates of Japanese Owners MOL. It is understood that this was against an employment for the need for a vessel that can eventually carry ammonia for the bunkering industry.

Developments among gas carrier owners

In August, we saw another consolidation of gas fleets as Navigator Gas and Ultragas finalised their merger. The combined fleet now totals 56 ships including 7 x 22,000 cbm, 5 x 12,000 cbm and 6 x 3,700-9,000 cbm. This makes them the leading owners in cubic capacity in the petrochemical gas shipping market.

Additionally, BW Epic Kosan also bought the Bow Gallant and Bow Guardian, both 9,000 cbm semi-refrigerated ships from Odfjell, taking their fleet to 78 vessels.

Jaccar Holding announced that they will be selling all their assets over the next four years which include the Evergas fleet of 8 x 27,500 cbm and 2 x 85,000 cbm ethylene/ethane carriers and 6 x pressurized carriers on which their charter is expected to expire in 2024.