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Argus White Paper:

Pandemic and price war — The impact on global LPG markets

The first quarter of 2020 has seen unprecedented upheaval and disruption, not just to daily life, but also to energy and commodity markets — with LPG no exception. But while the pandemic has wreaked havoc across jet fuel, gasoline and diesel markets, the impact of Covid-19 on LPG — which is both an essential fuel and feedstock — has been somewhat different to other products

The combination of the Opec+ agreement falling apart and the Covid-19 pandemic has resulted in record lows in international LPG prices and upheaval to supply and demand dynamics across the globe. As coverage from *Argus*' worldwide editorial team shows, the impact on Europe, the Americas and Asia-Pacific has been profound — both within regions and in terms of the economics of moving LPG around the world.

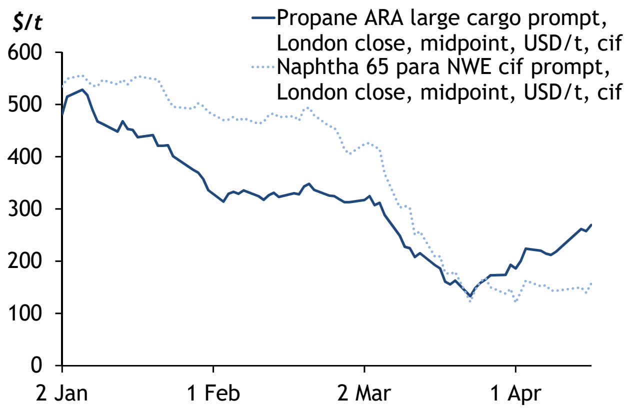
But falls in LPG prices have not matched those across the barrel, with propane and butane actually rising relative to other products — particularly competing feedstock naphtha. The length in LPG markets relative to other products, which has led to the product hitting record lows against naphtha in recent years, has temporarily dissipated thanks to the changing supply and demand dynamics — particularly in road transport markets.

Naphtha, as a key component of gasoline, has become suddenly long, as lockdowns in most European countries, the US and Canada, as well as many countries in Asia, reduce demand. Meanwhile, LPG, as an essential residential heating and cooking fuel, has not faced the same drop in demand — and in fact panic buying of cylinders has been reported in some countries, as fears of further restrictions on movement lead to stockpiling. But a potential change in this dynamic is on the horizon — when the lockdowns end, naphtha may regain a premium, while a long and deep recession could cause a critical lack of demand for consumer products and lead to LPG demand faltering.

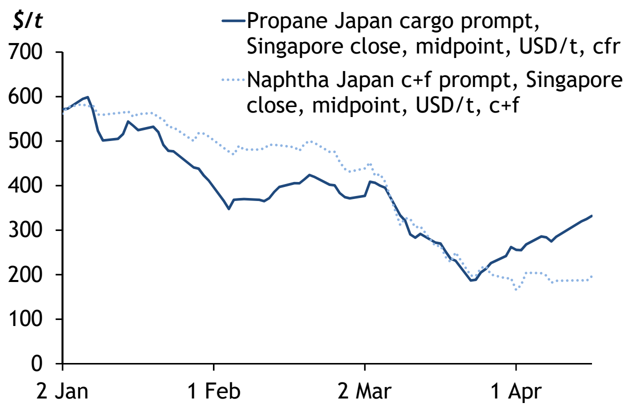
Until now, price trends in Asia and Europe have been almost identical — from mid-March, propane in both regions gained a premium to naphtha, which extended in the following weeks.

If the core reason for this is the imposition of lockdowns across the globe, then this premium is likely to prevail for April at least, as most European and many Asian countries — with the notable exception of China — extend stay-at-home regula-

NWE propane and naphtha prices



Japan propane and naphtha prices



LPG/NGL
illuminating the markets

tions into the second quarter. The result should be a pullback from LPG as a feedstock for operators with flexibility — particularly those in Europe, where there is traditionally most switching. The switch between petrochemical feedstocks may well have been the main reason that petrochemical consumers sold at least two very large gas carriers in March.

Furthermore, *Argus* cracker models show that cash cracker margins around the world underwent a large, if brief, spike because of the huge drop in feedstock prices. But the recent settlement of ethylene contract prices in Europe has reversed this trend and cracker margins are now heading down. The European April ethylene contract price is the lowest since 2009, suggesting that cracker rates will be reduced across the continent.

China — the world's largest LPG market and the fuel's biggest importer — is emerging from the epidemic following a six-to-eight week period during which its petrochemical and residential markets faced significant upheaval.

The country's LPG consumption was hit by government-enforced lockdowns to try to stem the coronavirus outbreak. Operating rates for propane dehydrogenation plants nosedived to 63pc during the first two weeks of China's stay-at-home orders. While most facilities were not in Hubei province, the original epicentre of the pandemic, restrictions on movement across industries stymied demand in a number of provinces. In addition, Chinese private-sector firms Oriental Energy and Zhejiang Satellite brought forward planned shutdowns to the beginning of March while the country was still in lockdown — and in advance of the return of US LPG to China, with Beijing having on 3 March granted waivers on the 25pc tariffs on US product. Operating rates are now returning to pre-pandemic levels, but questions remain regarding the longer-term outlook should there be significant and sustained global economic contraction.

Key autogas markets *'000 t/yr*

	Autogas demand	Share of LPG market %	Total LPG imports
Turkey	3,283	76	3,069
Russia	3,150	31	0
S. Korea	3,093	33	6,212
Poland	1,835	75	2,310
Ukraine	1,638	89	1,425
Italy	1,615	46	2,264
Mexico	1,293	15	4,952
Thailand	1,170	17	385
Bulgaria	395	90	325

LPG is, of course, also a transport fuel, and as we emerge from the Easter holiday season, there would traditionally have been a small uptick in demand from this sector in key markets — Italy, Poland, Germany, Ukraine and, to a lesser extent, Turkey, the world's biggest consumer of autogas. But with demand estimated to have fallen by up to 90pc by some market participants, countries where this segment dominates will face a fall in demand in April, which has the potential to filter up to regional prices and price relationships. In terms of total demand lost in the transport sector, a reasonable estimation based on modelling of gasoline markets indicates that global demand will drop by around 35pc, or 5mn b/d, in April alone.

The other key demand sector, and LPG's largest use globally, is residential heating and cooking. Demand here has held up, according to most market sources, particularly for LPG as a cooking fuel, which is mainly dependent on use in the home.

There are also other one-off drivers that are undoubtedly having an impact on global prices. India's decision to offer free LPG refills through its subsidy programme will no doubt offer some support to demand, and to Asian values, particularly in butane,

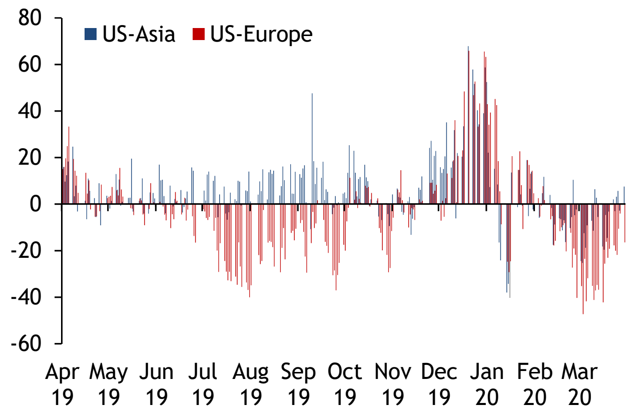
Chinese PDH plant operating rates

Producer	Location	Region	Jan %	Feb %	Mar %	Apr %	Comments
Tianjin Bohua	Tianjin	North	0	0	0	90	T/A from 28 Dec 2019, restarted on 30 March
Zhejiang Satellite	Zhejiang	East	100	73	35	95	maintenance from 3 Mar for 15 days
Ningbo Haiyue	Zhejiang	East	100	70	75	100	Operation raised to full rate
Shaoxing Sanyuan	Zhejiang	East	50	100	100	100	
Chambroad	Shandong	East	80	80	80	0	shut 25 Mar for a month
Yangzijiang Petchem	Jiangsu	East	100	100	0	50	T/A from 3 Mar, restarted 3 Apr
Yantai Wanhua	Shandong	East	100	100	100	100	
Shandong Shenchi	Shandong	East	45	0	0	90	T/A from 10 Jan, restarted 26 Mar
Qixiang Tengda	Shandong	East	90	80	80	85	operations raised to 90pc
Hebei Haiwei	Hebei	North	44	70	70	90	operations raised to 90pc
Ningbo Fuji	Zhejiang	East	100	100	100	100	
Dongming Petchemical	Shandong	East	100	100	100	100	
Zhejiang Satellite No 2	Pinghu, Zhejiang	East	90	73	73	95	Operations raised to full rate; new plant, 'started up Feb 2019, runs at full capacity
Hengli Petrochemical	Dalian, Liaoning	Northeast	100	100	100	100	
Guangzhou Juzhengyuan	Guangzhou, Guangdong	South	46	90	90	90	

which is the most heavily used grade in the country. Elsewhere in Asia, there has been some panic buying in markets where consumers are adjusting to new restrictions and beginning to prepare for a potentially long period of restricted movement.

But seasonality is likely to change this picture in the coming month. Northeast Asia, North America and much of Europe traditionally experience a lull in demand in the second quarter as heating demand dissipates and restocking at the consumer and distributor level tend not to ramp up until the third quarter. This may put some normal seasonal pressure on prices, as will the lack of demand from the commercial sector in rural and off-grid regions around the world — many of which would also expect heightened activity and demand in this period.

Global propane arbitrage $/t



Supply issues

Supply-side issues are also beginning to have an effect — albeit more locally at present. More than 65pc of global LPG supply comes from processing of natural gas liquids (NGLs) associated with crude and natural gas production, and almost all of that supply is traded internationally, much of it seaborne.

But the remainder is produced in refineries, many of which are beginning to reduce their crude runs as demand for core oil products drops away — gasoline and jet fuel in particular — because of the travel bans and lockdowns. The knock-on effect on LPG supply has not been widely felt yet, but has the potential to significantly disrupt some local supply chains. A number of refineries in Europe have cut runs or stopped operations completely. With more potentially to follow, there is the chance for additional import demand to make up the shortfall.

And what about the arbs?

The impact of these changing supply and demand dynamics is having a particular impact on flows of LPG between regions, while price relationships between major producing and consuming hubs are seeing some unusual trends, and further volatility can be expected in the near future.

The global crash in commodity and related markets made arbitrage trading of large LPG cargoes difficult out of the two key export regions — the US and the Middle East — in March and early April. But in the past couple of weeks, LPG prices in the key trading hubs have realigned and, on paper at least, arbitrage economics support flows from the US to Asia for late April and May. Looking beyond this, the key question will shift from adjusting regional price differences to considering the more significant issue of the underlying level of demand and how much LPG consumption this can support for the rest of this year.

US LPG production was high in the early part of the year. There was record butane production and high propane output in January, adding to US LPG stocks, although a large proportion of production was also exported to Europe and to Asia in the first quarter. These exports were helped by a wide-open arbitrage to Europe and to Asia in January and February. For March, the economics of moving cargoes out of the US took a little time to re-adjust to the supply shock of the Opec+ deal collapsing, which led to an increase in crude production despite the drop in global demand because of Covid-19.

In an attempt to balance global supply, market forces will help with the process of price adjustments in Europe and the US to facilitate moving LPG to large consuming markets in Asia. But while prices can facilitate arbitrage movements, prices alone will not be sufficient to have any meaningful impact on the size of LPG demand, at least in the short term. The great unknown is how long the current disruptions will be in place, and what the recovery will look like as life returns to normal.

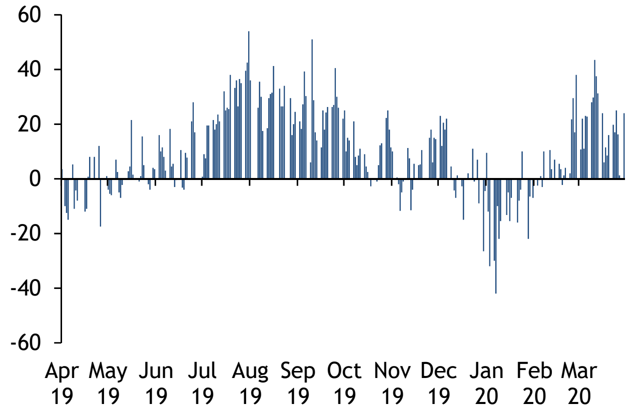
Looking to Europe

With European demand likely to falter in the petrochemicals sector owing to the high premium on propane compared with naphtha, it is hard to see how the number of large cargoes heading to Europe from the US can remain in line with typical flows. Northwest Europe received around 1mn t of propane in April-July 2019. It seems unlikely that Europe could absorb the same this year when petrochemicals demand looks likely to plunge and lockdowns are weighing on autogas consumption.

Shipping data seem to confirm that fewer vessels are heading to Europe. *Argus* data show that eight vessels have been cancelled from the April schedule. The cancellations, announced in March, have removed as much as 360,000t from the US Gulf export fixture list. Most of this, but not all, would have headed to Asia. For the remainder of April, loadings in the US Gulf coast are down and shipments from the US to Europe look set to fall.

There seems little prospect of any meaningful recovery in LPG consumption while the restrictions remain in place, seasonality comes into play and feedstock economics look unfavourable. The lack of demand means that any arbitrage flows to Europe are increasingly likely to look for storage, to try to ride out the current situation. Market dynamics could take on a

Asia net gain vs northwest Europe $/t



much darker view if storage fills before wider economics improve LPG consumption. But with the European forward swaps market in backwardation, this may hamper stockbuilding.

It is possible that US LPG supply will fall over the coming months. US onshore rig counts have fallen steadily since 2019 and are currently very low, the latest data show. Despite this, shale production and LPG supply have increased. This is in part down to how operators are managing their portfolio of active rigs versus rigs that have been started but are not yet producing. It is often these non-producing but open rigs that show up in the rig count as recently shutdown, meaning that as the rig count falls, production can appear to be unaffected. But from this point on, it is increasingly likely that rigs taken off line will have been fully operational, which should reduce gas flows to fractionators in the US Gulf coast region.

The arbitrage for large and mid-size cargoes from the US to Europe is closed for the time being. Further along the curve, the economics appear equally unworkable for anyone looking to move LPG from the US to Europe. The spread between the regions does not work on paper, and unless there is a relative rise in LPG prices in Europe — which seems unlikely — the number of large cargoes heading from the US looks set to fall, given the lockdown measures in place across the continent.

Easterly tailwinds

There is now a mismatch between markets west and east of Suez, with the beginning of an unwinding of restrictions in China and signs of economic activity returning in LPG-consuming sectors — most notably in petrochemical markets. This marginal upturn has reversed the downward spiral of LPG prices and resulted in prices starting to recover some of the ground they had lost over the previous month. Rising LPG prices in Asia and a decline in the US have opened that arbitrage route.

Arbitrage economics from the US Gulf coast to Asia are more than workable for deliveries arriving in May and June. Rising regional flows to India from the Middle East and to Asia from the US could provide the global LPG market with a roadmap to navigate the coming 2-3 months, when demand is expected to remain severely disrupted in western markets.

Spot market prices show that the spread between US export prices and delivered prices in Asia initially narrowed following the surge in supply from Opec+ producers, combined with the equally dramatic drop in demand caused by the lockdowns. A key element in calculating the arbitrage from the US is adding terminal fees to the underlying propane and butane price. Buyers of LPG from the main US export hubs will agree a volume of product and an associated terminal fee to cover the costs of loading a ship from a storage facility. Terminal fees for term contracts are often lower than spot terminal fees, which can make all the difference when calculating arbitrage economics.

The recent cancellations from the April loading schedule in the US Gulf helped to pull down prices in the region. US prices had been reluctant to drop, and as a result the arbitrage was closed given the disconnection with plummeting prices in Asia. But US and Asia markets have now revalued, and based on term contract terminal fees and current freight rates, the east-west arbitrage is now open. The arbitrage also looks workable over the next few months based on May and June swap values.

Unless the US can substantially reduce production of NGLs, exports will still be needed to clear what could be a huge supply overhang in the Atlantic basin. There is some doubt about whether current global demand can support the typical flow of LPG that leaves the US on a monthly basis, which can rise to over 1mn t/month during the summer.

US stocks are already high, and domestic demand will not be sufficient to absorb LPG that would normally head for export. US crackers are likely to continue to crack ethane, partly because of the different economics facing co-products. Ethylene and polyethylene demand are supported by relative strength in the packaging market for food, hygiene and medical products.

But it is uncertain how long this situation can persist. The Chinese, and to a large degree the wider Asian economies, rely on the export of finished or semi-finished goods. The US, much of Europe and India are currently in lockdown, which has resulted in a massive reduction in economic activity in markets that consume the finished and semi-finished goods produced through LPG-fed crackers. And the impact of these restrictions is expected to linger long into the year. The US Federal Reserve estimates that US economic growth may be reduced by 50pc in 2020, while growth expectations in the eurozone have been slashed. The Japanese economy was already struggling, and is expected to slip further into recession after contracting by almost 2pc in the fourth quarter. In these circumstances, it is unlikely that Asia can be the inspiration for a broad-based recovery in LPG demand. As a result, arbitrage flows will continue, but outright volumes look set to suffer.

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