A sea of challenges

The impact of IMO 2020 on petrochemicals

Petrochemicals special report

May 2019

S&P Global
Platts

Petrochemicals

WHAT ARE THE IMO 2020 BUNKER FUEL CHANGES?

During the past few years, shipping worldwide has come under increased scrutiny for its role in contributing to various environmental pollutants, with sulfur emissions dominating all discussions now as the deadline for the International Maritime Organization's global sulfur limit for marine fuels draws closer.

The IMO will cap global sulfur content in marine fuels at 0.5% from January 1 next year, down from 3.5% currently. This applies outside the designated emission control areas where the limit is already 0.1%.

Shipowners will have to either switch to more expensive cleaner fuels or use high sulfur fuel oil with scrubbers to comply with this rule.

Scrubbers, or exhaust gas cleaning systems, clean a vessel's emissions on board, allowing it to burn HSFO while still complying with the new sulfur limit. The technology works by spraying alkaline water into the vessel's exhaust, capturing sulfur and some other emissions as they are produced.

While restrictions on sulfur emissions in shipping are not entirely a new concept, as emission control areas in certain regions have long existed, the transition to the IMO 2020 rule is expected to be daunting because of the magnitude of the change as well as the costs involved and that too at a global level.

According to S&P Global Platts Analytics, the total global impact of this rule on various sectors in the energy space as well as other industries will cost in excess of $1 trillion over five years.

Some 60% of the bunkers will have to switch from HSFO to 0.5% sulfur overnight, calling for extensive planning among shipowners, charterers, ship crew and refiners, which will have to ultimately supply this 0.5% sulfur compliant fuel to help international shipping comply with this rule.

The petrochemicals industry will not be immune to this sea change as it will bring with it changes in feedstock pricing and supply chain economics — potentially higher freight rates for very large crude carriers, more bunker surcharges by container liners — for producers, who may be left with no choice but to pass the extra burden to consumers in the end.

The market price for crude oil and naphtha feedstocks will likely rise as crude runs increase to meet rising demand for distillate bunker fuels.

Platts Analytics' outlook, for example, assumes an average $5/b Brent price increase in 2020 above baseline trends over this year.

The rule is also set to undermine margins for simple refineries that turn a significant share of their crude run into HSFO while potentially boosting margins for complex refineries able to take advantage of it.

Accelerated refinery runs will likely lead to an oversupply of naphtha, ultimately benefiting naphtha-based petrochemicals production.

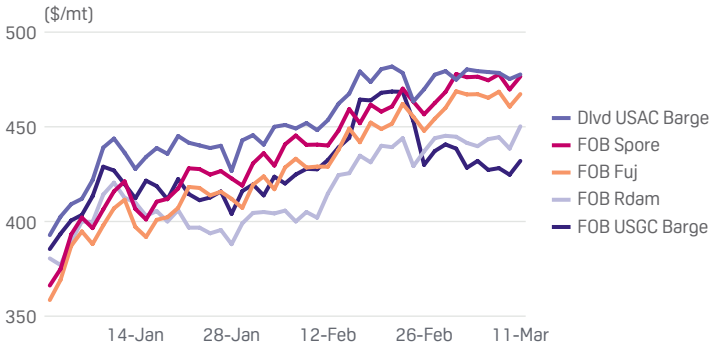
Industry participants are divided on the potential impact of naphtha supply and pricing, but Platts Analytics forecasts the supply of naphtha could grow by nearly 200,000 b/d or some 2.8% globally in 2020.

However, refiners trying to maximize middle distillates output will likely deliver tighter gasoline supply, in turn pressurizing naphtha as it gets drawn towards gasoline supply.

Meanwhile, some petrochemicals products such as methanol are also emerging as alternative fuel options, particularly for smaller vessels, to comply with the IMO 2020 rule.

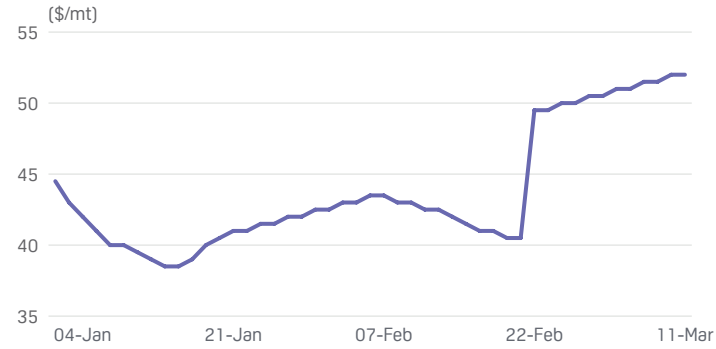
Supporters of methanol as a bunker fuel argue that it is economically viable and amply available worldwide.

MARINE FUEL 0.5% VALUATIONS INCH HIGHER IN Q1



Source: S&P Global Platts

FOB SINGAPORE MF 0.5% vs MOPS 380 CST HSFO



Source: S&P Global Platts

In addition to restricting sulfur emissions, it can also meet long-term challenges pertaining to nitrogen oxides and aid greenhouse gas emissions cuts, particularly because stricter rules are imminent.

In April 2018, the IMO announced its GHG strategy and targets to improve CO2 efficiency in shipping.

IMO has set targets that include a 50% cut in the shipping sector's GHG emissions by 2050 compared with 2008.

While the easiest way to decrease carbon emissions is to reduce a ship's speed, new fuels will also need to be embraced to meet this as well as other upcoming rules.

That may throw shipping and even petrochemicals into another phase of disarray but for now there's just enough time to focus on the immediate impact as well as the ripple effects of the fast approaching global sulfur limit rule.

Platts initiatives

S&P Global Platts started publishing daily cargo and barge assessments for residual marine fuels reflecting a maximum sulfur limit of 0.5% starting January 2, 2019 at Singapore, Fujairah, Rotterdam, USGC and USAC.

Platts will also start publishing bunker assessments for the grade at major bunkering destinations globally from July 1, 2019.

The new cargo and bunker assessments will reflect specifications for RMG fuels as defined by the ISO 8217:2010 specifications of marine fuels, but with a sulfur cap of 0.5%.

— *Surabhi Sahu, Rajesh Nair and Wu Kang*

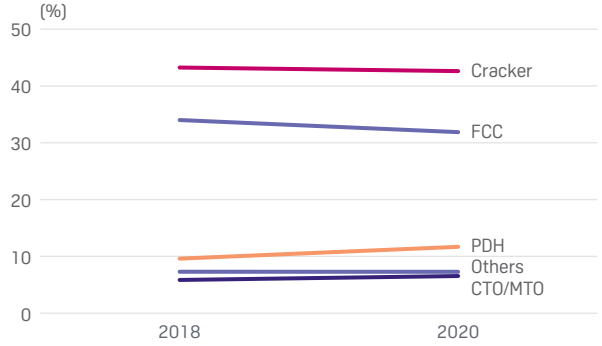
S&P GLOBAL PLATTS ANALYTICS: PETROCHEMICALS FACE FEEDSTOCK AND ARBITRAGE CHALLENGES AS IMO 2020 BUNKER FUEL CHANGES LOOM

The petrochemicals industry is expected to witness price spikes in 2020 as refiners and chemical producers adjust to the new environment, according to S&P Global Platts Analytics.

The IMO rule will create a major revamp of refining operations , pushing up the majority of oil and gas complex prices. Petrochemicals markets will be subject to various direct and indirect impacts due to changes to refinery and shipping operations.

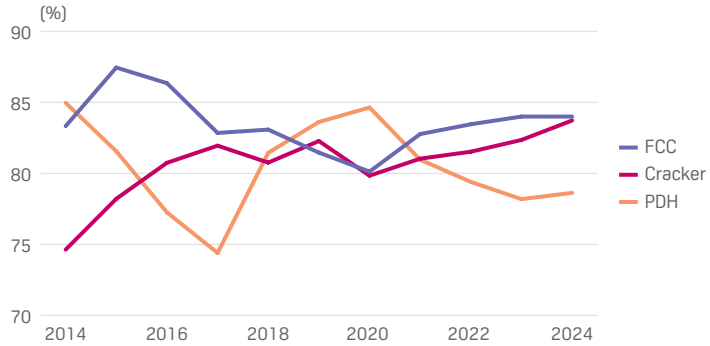
At the refinery level, increased demand for gasoil and middle distillates is expected to divert vacuum gasoil (VGO) from feeding into fluid catalytic crackers (FCC) and be used instead to create gasoil and distillate blends. This VGO diversion is expected to lead to increased demand for straight-run and heavy naphtha to compensate for the loss of FCC-related gasoline blending components.

PROPYLENE PRODUCTION BY SOURCE



Source: S&P Global Platts Analytics

GLOBAL PROPYLENE RUNS BY SOURCE



Source: S&P Global Platts Analytics

Additionally, the change in operations to lower severity FCC (max distillate mode) will reduce the availability of propylene from FCC production. Global FCCs that supply propylene to the chemicals market typically have a 6-7% propylene yield and a reduction to 5-6% yield would reduce refinery propylene supply by 15%.

According to Platts Analytics, 34% of global propylene was procured from FCCs, 43% from ethylene producing steam crackers and 10% from propane dehydrogenation units (PDH) in 2018. As a direct impact of the IMO 2020 mandate, propylene procurement from FCC units is expected drop by 2 percentage points to 32% and higher PDH runs will recover most of this drop in production.

However, historically, Asia-based PDH units run at an average rate of 77% and will need to ramp up to 85% in 2020, which according to one market source is "unsustainable as the majority of the recent PDH start-ups in China are unable to increase runs despite reasonable margins." Because of these supply constraints, Platts Analytics projects a 35% increase in Northeast Asian propylene prices in 2020.

At least three new China PDH units are starting up in 2019, with three more expected to start up during 2020 to

relieve the drops expected from refinery-based propylene procurement. Zhejiang Satellite Petrochemical in eastern China has started phase two of its 450,000 mt/year PDH plant from late January. It is capable of processing around 540,000 mt/year of propane at full capacity.

In addition, Fujian Meide Petrochemical, a wholly owned subsidiary of China Flexible Packing Group in southeastern Fujian province, is expected to put its 660,000 mt/year PDH plant into operation in the third quarter of this year. Dongguan Juzhengyuan Technology's 600,000 mt/year PDH plant in the southern Guangdong province is also scheduled to come on stream in the second half of this year, according to a source close to the plant.

If the latter two PDH plants are launched as per schedule, China will be adding up to 1.7 million mt/year of propylene production capacity in 2019, which can use up to 2 million mt/year of propane as feedstock at full operating rates.

Another major refinery operational impact on petrochemicals is the increased demand for straight-run and heavy naphtha to compensate for the loss of gasoline volumes due to FCC yield shifts to max distillates mode. As a result, the cost of production of major petrochemicals is expected to increase in 2020 as market players adjust to the new normal. According to Platts Analytics, the cost to produce ethylene from naphtha in Asia is expected increase by 14% to $654/mt in 2020 compared with $576/mt in 2018, while gasoil use as an ethylene cracker feed will be the most affected, with a 68% increase to $1,094/mt in 2020 compared with $649/mt in 2018.

Freight cost increases are expected to create a ripple effect across the world of commodity trade, with numerous changes along the long-haul traditional arbitrage routes leading to changes in trade flows of certain commodities including petrochemicals. The increase in freight costs will be steeper in petrochemicals due to the smaller size of chemical vessels compared with larger crude and refined products deliveries. With an assumption that freight costs for very large crude carriers will increase by 20-30% against current levels, chemical vessels are expected to see an increase of 30-40%, according to Platts Analytics.

Many industry experts have said that the petrochemicals sector will manage the issue of increased ocean freight costs by passing on the higher costs to end-consumers.

— *Eshwar Yennigalla*

NAPHTHA: KEY PETCHEM FEEDSTOCK OUTLOOK HINGES ON BALANCE BETWEEN MARINE FUELS AND GASOLINE

The impact of IMO 2020 transition on the Asian naphtha complex is broadly seen as a wild card. However, some market participants do harbor concerns that naphtha could be an unwitting victim, should refiners choose to maximize their gasoil production in a bid to feed low-sulfur marine fuel demand in the bunker market.

Light crude slates have been gaining traction among refiners due to the grades' low sulfur content. With more refiners using lighter crude and ramping up run rates through their main units, higher levels of light ends products — namely gasoline and straight run naphtha — are produced, market sources said.

The FOB Singapore 92 RON gasoline physical price against ICE Brent crude futures saw a deep plunge in the fourth quarter of last year, pushing cracks to a more than seven-year low of minus $0.78/b in February this year.

Downward pressure on gasoline cracks during that quarter contributed to weakness in the Asian naphtha market.

China has been the dominant gasoline supplier in Northeast Asia, which competes with European suppliers for the Middle Eastern market. State-run Chinese refiners such as Sinopec and PetroChina have large crude distillation unit capacity of around 3-4 million b/d throughout the country.

Additional volumes going into the barely recovered global gasoline market could depress naphtha crack spreads in Europe, the weakest region recently for gasoline cracks. That could potentially weigh again on the Asian naphtha complex, which depends on the performance of European naphtha and gasoline cracks.

"So the question really is, what is the net length of gasoline?" a market source said.

Another twist could occur if demand for gasoline continues to be healthy and refiners attempt to maintain reformer runs.

"Although the global increase in light crude supply is pushing up straight run naphtha yields, going into 2020, we expect demand for LSFO/gasoil to push FCCs to run lower rates or at a higher gasoil yield operating mode," S&P Global Platts Analytics light ends analyst Anthony Tso said.

"This will short FCC naphtha production and reformers have to run harder to back gasoline demand. We expect some tightness in the market then and by Q1, gasoline cracks should recover to around the $10/b level," Tso added.

The Asian naphtha complex might also be partly alleviated by the transition to IMO 2020, with more refiners consuming lower API gravity crude and naphtha surpluses being re-absorbed by the integrated petrochemicals complex.

The former option is seen likely to be taken by participants, as most medium-to-heavy sweet crude grades naturally

yield more fuel oil and middle distillates products that are suitable for blending to meet IMO 2020 demand as opposed to light crude.

The latter option is, generally, dependent on whether refiners opt to dispose of naphtha into the market or their capability of feeding more naphtha into their petrochemicals units downstream.

As for end-users in North Asia, most petrochemicals producers within that region expect to see more competitively priced naphtha feedstocks, in an environment in which shipping costs do not rise any further.

— *Sue Koh*

OLEFINS: PROPYLENE PRODUCTION LIKELY TO BE AFFECTED BY IMO 2020

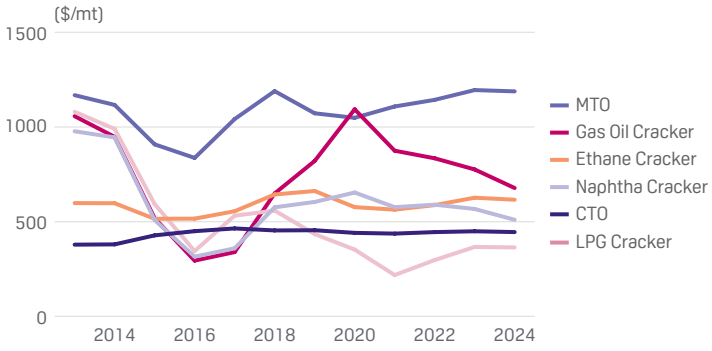
Olefins market participants in Asia are divided over the possible impact from IMO 2020. But most are leaning towards a naphtha-heavy scenario, which would likely support Asian olefins margins, and ethylene in particular.

Jonghyun Lim, assistant manager of Korea Petrochemical Industry Association (KPIA), said light naphtha supplies should increase as refineries boost their operations in a bid to produce more diesel. Lim also said in an interview that the increase in light naphtha will give petrochemicals companies a chance to improve their margins.

The Asian ethylene market is already under pressure, in line with rising ethylene supplies, especially in the US, amid expected startups of new steam crackers there.

In the US, steam cracker expansions are expected to continue in 2019. According to S&P Global Platts Analytics, the ethylene surplus in the US is expected to grow to 1.126 million mt in 2020, compared with 108,000 mt in 2019 and 293,000 mt in 2018.

ASIAN ETHYLENE PRODUCTION COSTS BY FEED



Source: S&P Global Platts Analytics

However, market sources said that the Asian ethylene-naphtha spread would likely remain above the breakeven spread of $300-$350/mt for 2019-20, as bearish naphtha prices are expected to keep feedstock costs low.

On the other hand, market sources predicted that propylene supplies would tighten as refiners potentially reduce operating rates at their fluid catalytic crackers (FCCs).

Platts Analytics estimates that Asia's propylene production from FCCs will stand at 18.127 million mt/year in 2020, down 0.6% from a year earlier. In Europe, propylene production from FCCs will likely fall by 1.5% from 2019 to 4.797 million mt next year.

Market sources said the supply impact to propylene due to lower FCC runs would likely be greater in Asia than Europe. Propylene supply in Europe comes primarily from steam crackers, representing around 70% of the total propylene production there, while propylene from FCCs is only around 25%. On the other hand, around 31% of propylene supplies come from FCCs in Asia, while 42% comes from steam cracking.

Due to limited propylene supplies in 2020, prices are expected to increase, according to Platts Analytics, which puts the average price for the year at $1,056/mt CFR, increasing to $1,300/mt in 2020. Europe's propylene price is expected to increase to $1,166/mt FD in 2020, compared with $1,015/mt in 2019, according to Platts Analytics.

In the US, market participants predict that around 5-10 million lb/day (827,814-1,655,629 mt/year) of refinery-grade propylene will be lost due to the IMO 2020 transition.

"It's tough though to determine which refiners will have this optionality, or are prepared for that," one US olefins trader said. "Two-thirds of refinery propylene production is designated in Texas Gulf Coast and Louisiana Gulf Coast. This can surprise the industry quickly. Refiners do not really spend too much time looking at RGP."

— *Fumiko Dobashi, Lara Berton andBrian Balboa*

POLYMERS: RISING CONTAINER FREIGHT RATES EXPECTED TO HAVE MINIMAL IMPACT ON TOTAL COST

In polymers, market participants expect polypropylene prices to increase in the second half of this year due to an increase in feedstock costs, as well as dry bulk container freight shipping.

Polymers players said naphtha supplies are likely to become tight, with higher production for low sulfur marine fuel resulting in less production yield of light-end products, such as naphtha and gasoline.

The polymer sources said a naphtha "cost push" would result in higher PP production cash costs and hence higher PP prices during H2 2019 and 2020. Some market sources estimate PP prices increasing by up to 20%, in line with their own projections on the rise in naphtha.

According to S&P Global Platts Analytics, Asia's PP prices are expected to average $1,390/mt CFR Far East Asia in 2020, compared with $1,157/mt predicted for 2019. In Europe, PP prices are expected to increase to $1,400/mt FD NWE in 2020 compared with $1,267/mt in 2019, according to Platts Analytics.

With container shipping potentially as little as $2-3/mt for routes originating from the Middle East, and the cost of PP resin around $1,080/mt CFR Far East Asia, companies are not overly concerned at the increase in bulk container freight costs.

The percentage of refinery grade propylene (RGP) produced from fluid catalytic crackers route will fall to 22.6% in Asia in 2019, down around 1 percentage point on the year, according to Platts Analytics.

— *Heng Hui*

AROMATICS: PRODUCERS HOPE FOR WIDER PRODUCT MARGINS, BUT FULL IMPACT REMAINS HAZY

The IMO 2020 regulations bring an array of potential consequences for the Asian aromatics market, but the net effect on aromatics remains uncertain so far.

A proportion of producers were of the opinion that the availability of naphtha would not shrink, and could possibly tip further toward over-supply.

With aromatics margins still high, amid relentless strength in Asian paraxylene prices, a further increase in supply of naphtha could push margins up further still, prompting higher run rates at aromatics units.

In 2018, several producers had been heard prioritizing aromatics production over that of refined products due to higher margins, most notably Indonesian state-controlled PT Trans Pacific Petrochemical Indotama (TPPI), which restarted its plant in Tuban, East Java in October 2018. The company had shut down the complex in May 2014 due to poor economics, opting instead to use reformate from the platformer at the Tuban refinery complex for gasoline blending, market sources said.

Any growth in supply of aromatics could spell trouble for those products that are already in excess. According to S&P Global Platts data, the Asian benzene-naphtha spread has been below breakeven since December, averaging $75.90/mt in the year-to-date, just half of the average breakeven spread of $150/mt.

On the other hand, the impact could just be limited, with two opposing possible consequences expected to "balance" each other out.

Firstly, while there could be less aromatics production from reformers, the general increase in refinery runs would point to more production of light naphtha, as opposed to heavy naphtha, thereby balancing the overall impact on petrochemicals.

Secondly, with regard to the potential increase in demand for aromatics for gasoline blending, one Asian refiner noted that, with global gasoline specifications moving towards Euro VI, demand for aromatics for the purpose of blending could increase amid higher RON requirements, although this could also reduce with a limit placed on the total volume of aromatics in gasoline. This is expected to balance out, the refiner added.

Overall, the effect of the IMO 2020 regulations on the supply and demand balance of aromatics is expected to be small. However, the increase in freight rates could change the traditional trade flows of petrochemicals, with sellers and buyers preferring to trade with short-haul voyages.

— *Tess Tseng*

SHIPPING: CHEMICAL TANKERS EYEING LSFO AHEAD OF IMO 2020, FUNDAMENTALS TO IMPROVE

As the maritime world gears up for the new sulfur emission norms for ships, there remain a lot of grey areas, but at least one thing is certain. Scrubbers are uneconomical for most chemical tankers. Many of the owners of this specialized segment are already steering clear of the idea of installing scrubbers. The reason is plain economics.

Some of the key chemical tanker operators do not consider installation of scrubbers as a viable solution for meeting the new sulfur regulations. Scrubbers collect excess sulfur while burning marine fuels, enabling the use of high sulfur fuel oil, while still meeting low emission limits.

According to shipping industry projections, no more than 3% of the global fleet of over 85,000 merchant ships is expected to have scrubbers installed by 2020.

Tanker chartering manager Stephen Kim with South Korean shipping company Pan Ocean said that installing scrubbers only makes sense for vessels of 40,000-50,000 dwt range and above.

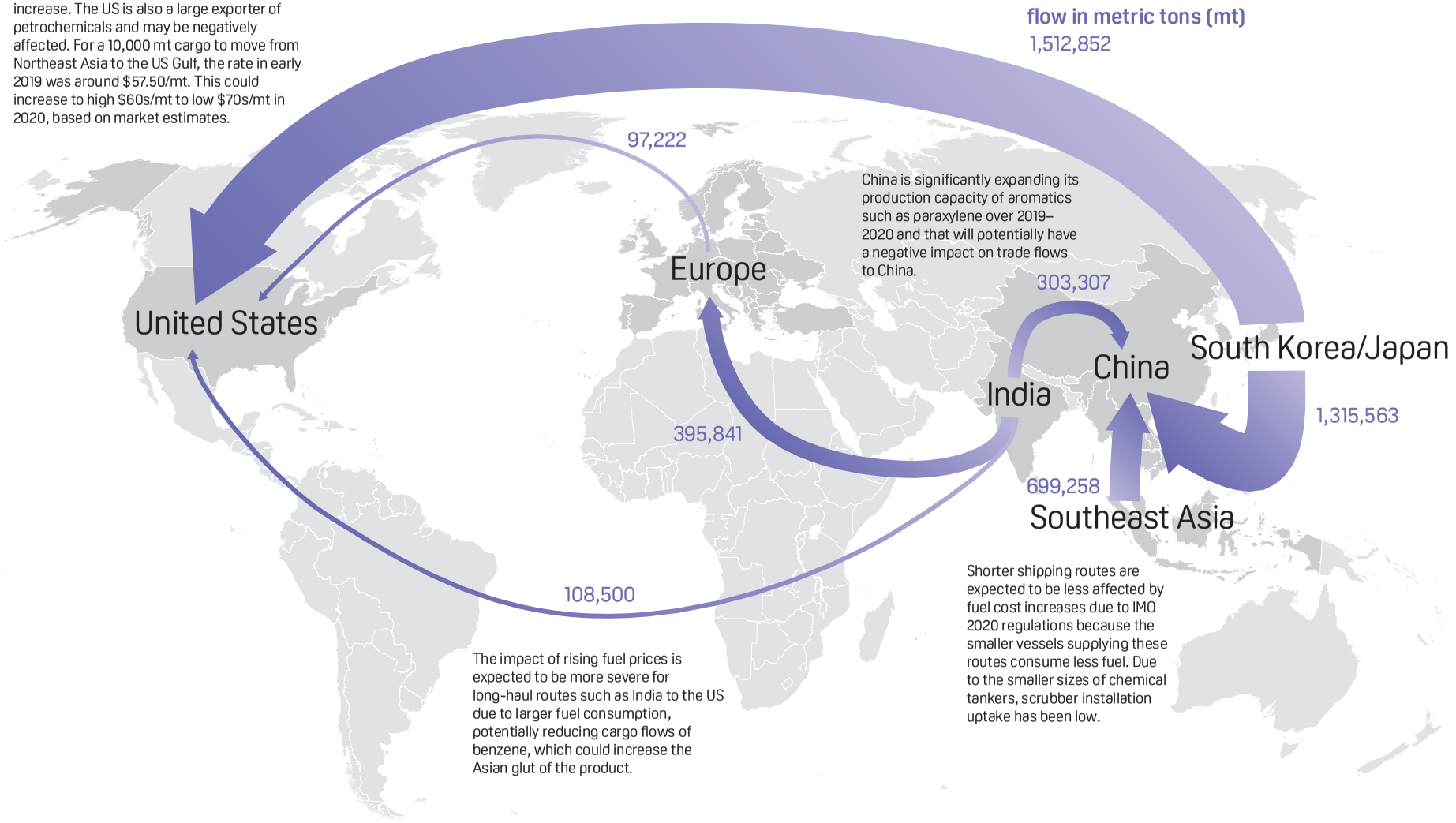
"Small vessels may not have space to install scrubbers," he said.

Industry estimates indicate that the majority of chemical tankers are smaller than 30,000 dwt.

WILL GLOBAL TRADE SHRINK WITH RISING RATES?

Benzene is one of the most globally traded aromatic petrochemicals and could therefore be among the products significantly affected by rising freight rates in the wake of the IMO 2020 sulfur cap. Due to oversupply in Asia, large volumes of benzene are regularly shipped to other regions such as the Americas and Europe. One of the few certainties ahead of the IMO 2020 changes is that freight rates will increase – but how much and how fast remains to be seen. Could there be significant changes to the trade flows as freight cost increases and shipments become less economical?

Shipment volumes between S. Korea/Japan and the US could shrink as freight rates increase. The US is also a large exporter of petrochemicals and may be negatively affected. For a 10,000 mt cargo to move from Northeast Asia to the US Gulf, the rate in early 2019 was around $57.50/mt. This could increase to high $60s/mt to low $70s/mt in 2020, based on market estimates.



To cite one example, Stolt Tankers has so far installed hybrid scrubbers on only four of its vessels, all at the newbuild stage, while as of March this year, Odfjell has not done so at all.

"The chemical tanker industry is one of the segments with the lowest scrubber uptake among shipping peers, said Bjoern Kristian Roed, Odfjell's manager of investor relations and research in March. The Norwegian company operates one of the world's largest fleets of chemical tankers comprising 83 such ships.

"Chemical tankers are smaller and consume relatively less fuel, and also spend a lot more time in port than the bigger ships, which have typically opted for scrubbers," Roed said.

Market sources point out that, in order for a scrubber installation — which may cost $2-6 million — to make economic sense, the vessel should ideally be a large consumer of fuels.

Even though information on the availability of supply, future pricing, and handling characteristics is currently scarce, "Stolt Tankers...will switch to low-sulfur fuels for most ships in its fleet," said Stolt-Nielsen's spokeswoman Ellie Davison. The Norwegian tanker company operates 155 tankers with a total capacity of 2.8 million dwt. It has been testing new 0.5% fuels from several suppliers, Davison said. Odfjell is doing something similar.

Can rising fuel costs be passed to charterers?

Pan Ocean's Kim said he expects freight rates to increase by at least 15% in 2020 due to a rise in fuel costs and other logistical factors. He said other industry participants are expecting an even higher increase in rates of up to 30%.

In March, it cost around $45/mt to move a 10,000 mt parcel of aromatics on the key Persian Gulf-East China route, according to S&P Global Platts data. Industry participants now forecast a rate of around $52-58/mt next year on the same route.

However, the impact of higher freight rates would likely be relatively lower on shorter routes due to lower fuel consumption, sources said. As a result, long-haul arbitrage shipments could become less frequent.

"Considering the current HSFO-MGO price spread, when burning more expensive compliant bunkers, small tankers will likely need a 10%-15% increase in freight in order to maintain current earning levels on a voyage," said Samir Apte, director at ship-brokerage Odin Marine Specialty Tankers Singapore. The corresponding projection for large tankers is 20%-25%, he added.

The average spread between HSFO 3.5% and marine gasoil delivered Singapore in 2019 up to March 15 was at $174.70/mt, according to Platts data.

The question remains on the extent of success shipowners will achieve in passing the incremental cost of fuel to charterers.

Definitely the additional costs will be passed to the charterers, but there is still uncertainty over its timing, said one Singapore-based chemical tanker operator, adding that whether the costs would be transferred partially or fully would depend on factors such as demand and supply. He also expects the competition and fragmented ownership structure in the intra-Asia market to make it harder to pass the full cost to charterers immediately.

"The freight increment needed to recover fuel costs will vary by trade and by the eventual fuel price increase, but it is likely to be significant for all shipping sectors," said Stolt's Davison, while not making any specific forecast on such increases.

Strong fundamentals

Going into 2020, major chemical and parcel tanker operators expect fundamentals to improve in the market, lightening the load of potentially higher fuel prices.

One of the key supportive factors is the possibility of large petrochemical tankers also being used in the clean petroleum products market, with demand for clean petroleum products, especially MGO, expected to increase. According to industry sources, this increase in demand will likely cause freight rates to rise for both large and smaller tankers.

"If gasoil demand for blending does significantly increase due to the IMO 2020 bunker requirement, then I can imagine more demand for moving products and consequent buoyant CPP markets," said Odin's Apte.

Most shipowners seem to be veering towards using low sulfur fuels such as LSFO and MGO, according to Douglas Raitt, regional consultancy manager with Lloyd's Register Asia. Lloyd's Register's fuel oil bunker analysis and advisory service, or FOBAS, is widely used across the globe.

Most shipping industry participants expect an increase in trade flows of MGO, for which there will be greater demand for product tankers, part of which will be met through large chemical tankers.

It is becoming increasingly common to test and use gasoil volumes as marine fuels. Demand for MGO is expected to at least double next year, said Ralph Leszczynski, Singapore-based director for research for Banchero Costa, a global shipping brokerage and consultancy.

"Strong CPP markets will take swing tonnage (predominantly IMO II/III Handy and MR vessels) away from the chemical tanker market causing tightening of supply and an upward push to freight rates," Apte said.

More Medium Range, or MR tankers will veer towards the oil products market and this in turn will improve the margins for chemical tankers, one of the operators said, echoing the same sentiment.

Supply-demand balance may improve

Another factor which works in favor of the chemical tankers segment is that the newbuild-spree has already slowed down, with fewer new ships expected to enter the market over the next few years.

"The chemical tanker industry has been hamstrung by an oversupply of tonnage for some years, resulting in weak freight rates. This oversupply should balance out during 2019, leading to a more positive balance next year," said Stolt-Nielsen's Davison.

It is difficult to predict how that shift translates into rates, but positive developments are expected for ship operators, she added.

Freight rates bottomed out in 2018 and should gradually increase through this year, said Odfjell's Roed.

— *Gustav Holmvik and Sameer Mohindru*

METHANOL: MARKET EXPECTS DEMAND FROM SHIPPING INDUSTRY TO GROW AFTER 2020

Stricter environmental regulations from 2020 have raised questions on how shipowners will cope going forward. While the industry has a variety of options, including 0.5% sulfur fuel, scrubbers and LNG, interest in methanol bunkering has risen considerably in recent years. Methanol has lower sulfur, nitrogen, particulate matter and carbon emissions than gasoil-based fuels, making it compatible with the 2020 marine sulfur fuel limits.

Global production capacity of methanol is also set to increase significantly in the near future as market players are looking to monetize access to cheap methane, especially in the US and Iran. Greater availability means that producers will be incentivized to move to non-traditional applications too.

Looking at cost, installation of a small methanol bunkering station can cost around Eur400,000, according to a report by the Methanol Institute published in 2015, while a bunker vessel could be converted to run on methanol for around Eur1.5 million. This compares with a bill of about Eur50 million to build an LNG terminal, and Eur30 million to build a new LNG bunker barge, according to the report.

There is currently only one ferry bunkering methanol, the Stena Germanica. In addition, Waterfront Shipping, a wholly owned subsidiary of Methanex Corp., has seven methanol-fueled chemical tankers.

Despite its advantages, the shipping industry has been slow to adopt methanol as a bunkering fuel, but this could change when the IMO formally approves guidelines covering the safety of ships using methyl/ethyl alcohol as fuel next year.

Methanol has a flashpoint of 11 degrees Celsius, meaning that it is flammable, and does not meet the current International Convention for the Safety of Life at Sea flashpoint limit for marine fuels, which is 60 C.

Last September, IMO's Sub-Committee on Carriage of Cargoes and Containers agreed on draft interim guidelines for the safety of ships using methanol as fuel.

This September, the sub-committees of IMO's Marine Safety Committee will provide more feedback on safety considerations to the working group, and the interim guidelines are expected to be formally approved by the Marine Safety Committee in the first half of 2020.

"Currently we have eight vessels trading internationally, in 2019 that number will shoot up to 12 and we have a few more pilots that will probably join the global fleet at that time as well, but they are going to be a bit smaller," Chris Chatterton, chief operating officer of the Methanol Institute said, speaking in an interview with S&P Global Platts. "We will see meaningful gains in 2021, 2022."

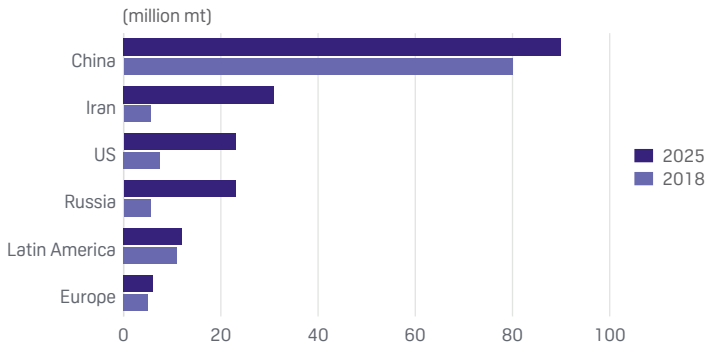
However there are some disadvantages to take into account.

More expensive than other fuels

Methanol has unfavorable density and energy levels, lower than traditional fuels. Out of LNG, fuel oil and methanol, volumetrically methanol gives the least energy per cubic meter. As shown in the graph, due to its low energy density, when comparing current spot prices, methanol is around 50% more expensive than fuel oil.

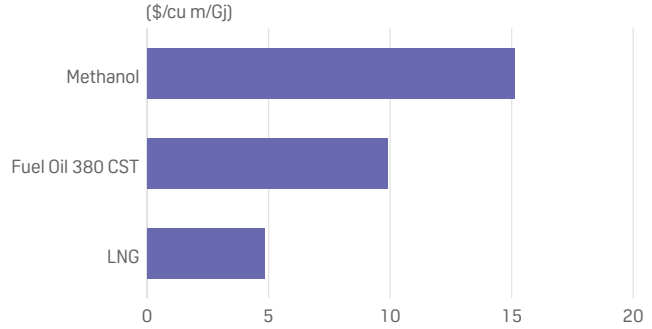
Furthermore, an initial strategy to reduce the shipping sector's greenhouse gas emissions by at least 50% by 2050 could limit the use of methanol, with the life cycle emissions generally higher than that of fuel oil and LNG.

GLOBAL METHANOL CAPACITY TO INCREASE SIGNIFICANTLY



Source: S&P Global Platts, companies

UNFAVOURABLE DENSITY AND ENERGY LEVELS MAKE METHANOL MORE EXPENSIVE THAN OTHER FUELS



Source: S&P Global Platts

While methanol as a marine fuel vies for a more prominent role in the short to medium term, de-carbonization policies are paving the way for more widespread use of renewable methanol in the longer term.

Current global production is estimated to be around 100,000 mt/year, with sites in Iceland, the Netherlands and Canada. But over the next few years there will be new volumes coming on stream.

Earlier this year, Dutch methanol producer BioMCN, one of the largest producers in Europe, announced plans to produce renewable methanol using green hydrogen. Specialty chemicals producers Gasunie and Nouryon are investigating the possibility of using a 20 MW water electrolysis unit to convert electricity into hydrogen in Delfzijl, in the Netherlands. BioMCN would then combine the hydrogen with CO2 to create methanol. A final decision is expected later this year.

"With the additional capacity of biomethanol and renewable methanol coming to market, whether through gasification or electrolysis combined with CO2 capture, conventional methanol is already being blended with biomethanol and renewable methanol to produce a lower carbon fuel, today," said Chatterton.

"The latest methanol production technology incorporates CO2 capture and re-injection in the production cycle, producing lower CO2 methanol by up to 30%," he added.

The challenge for methanol is to take the market share in the next few years. Meanwhile demand for renewable methanol could grow in the longer term, if zero-carbon vessels will be needed after 2050.

— *Lara Berton and Esther Ng*

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