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MARCH 2019

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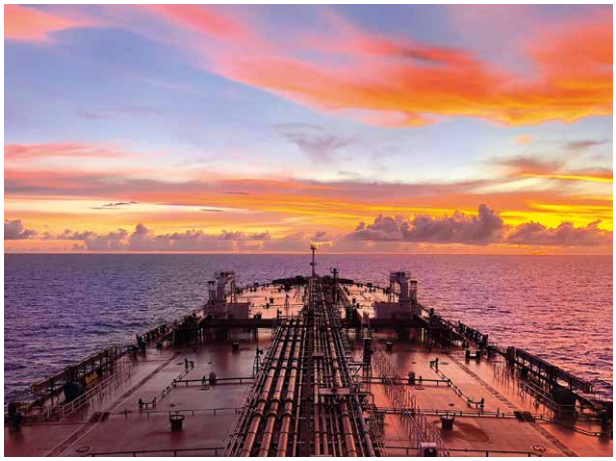

Could this be the year we have all been waiting for?

VLCCs and MRs have proved to be popular among shipowners looking to make plays in the tanker market, as can be seen from the pages of this issue.

Despite the geopolitical and financial uncertainties, not least the US sanctions, trade wars and in the UK, the dreaded 'B' word, which are having an adverse effect on markets, including shipping, many shipowners have invested in the tanker market recently, taking advantage of lower asset values.

For example, in its latest weekly report, Allied Shipbroking said that '2019 will be a significant year for the fleet development in the tanker segments, as sentiment in the market has improved and expectations are now more bullish than a year ago, despite the recent freight market correction.'

This has resulted in 141 new contracts reported last year and a total orderbook of 518 tankers - both crude and product carriers.

According to Allied's Research Analyst, Yiannis Vamvakas, writing in the report, "in the crude oil market, it looks as though owners have not been discouraged by the increased uncertainty witnessed recently by the various geopolitical tensions.

"Market participants expect that demand for crude oil will increase soon, with the International Energy Agency forecasting a 1.4 mill barrels per day growth for 2019, 0.1 mill barrels per day more than in 2018. Meanwhile, news regarding US oil shipments heading to China are helping further boost confidence that a deal is close to being reached by the two.

"Up to now (mid-February), 17 new contracts for VLCCs have been placed within 2019 and added to the existing orderbook, which currently stands at 114 vessels. In comparison, during the same period last year, new orders for VLCCs had not even reached double figures.

"The majority of these new orders have been secured by South Korean shipbuilders (nine out of the 17 new orders). In addition to the VLCC orders, we have seen orders for three Suezmax vessels surface thus far in 2019, while in sharp contrast, there have been no confirmed new orders for Aframaxes in 2019, with the last reported order being back in October, 2018.

"Shipbuilders, having witnessed the rising appetite for new orders in the crude oil space, have already pushed for higher prices, with the average newbuilding price for a VLCC being quoted now at around $93 mill, $4.5 mill higher compared to the average price noted back in 2018," he said.

IMO 2020

Vamvakas then looked at the product tanker market, saying "…on the product tanker side, orders for 13 new MRs have been signed this year, with 10 of them being ordered in South Korea and three in Russia. (There have been a few more rumoured in recent weeks- Ed).

"The oil products trade growth that is expected to be seen during the latter half of this year (due to the IMO 2020 regulation) has played an important role in the boost in new orders. New products will need to be produced and distributed across the different bunker markets worldwide, with a fair increase in tonnage likely to be needed in order to cover this increased demand.

"It is worth mentioning that three of these MRs were ordered by Russian interests and will use LNG as their main fuel. Beyond this, expectations seem to be that the orderbook for product tankers will continue to grow within the year, while at the same time 127 vessels are currently scheduled to be delivered this year.

"Both LR1 and MR newbuilding prices have increased considerably against what we were seeing back in 2018, climbing by $2.5 mill and $1 mill, compared to their respective last year average levels.

"The global developments, including Iran sanctions and the US/China trade war, will define the level of uncertainty noted in the market during the year. Meanwhile, things will start to clear with regards to how prepared oil refineries really are for the upcoming IMO 2020 regulation and how many vessels will eventually be equipped with scrubbers by the time the regulation comes into full enforcement.

"To what extent things will clear up in this regard and opportunities begin to be more well defined will determine the level of renewed interest that will emerge amongst owners during the rest of the year," the analyst concluded.

There is no doubt that 2019 could be a defining year for the tanker markets, both for crude and products.

In the crude sector, we could see changing trade patterns, due to the rise of the US and the demise of Iran as exporters. Then there is the Venezuelan situation, which at the time of writing was volatile with the threat of a civil war looming.

As mentioned, product tankers could be boosted by changing trading patterns, due to the need to ship more low sulfur fuel and other fuel types worldwide to cope with the new demand after 1st January, 2020.

I wonder if the shipyards will take my credit/debit cards as a down payment??

Will there be tankers in 2050?

TO

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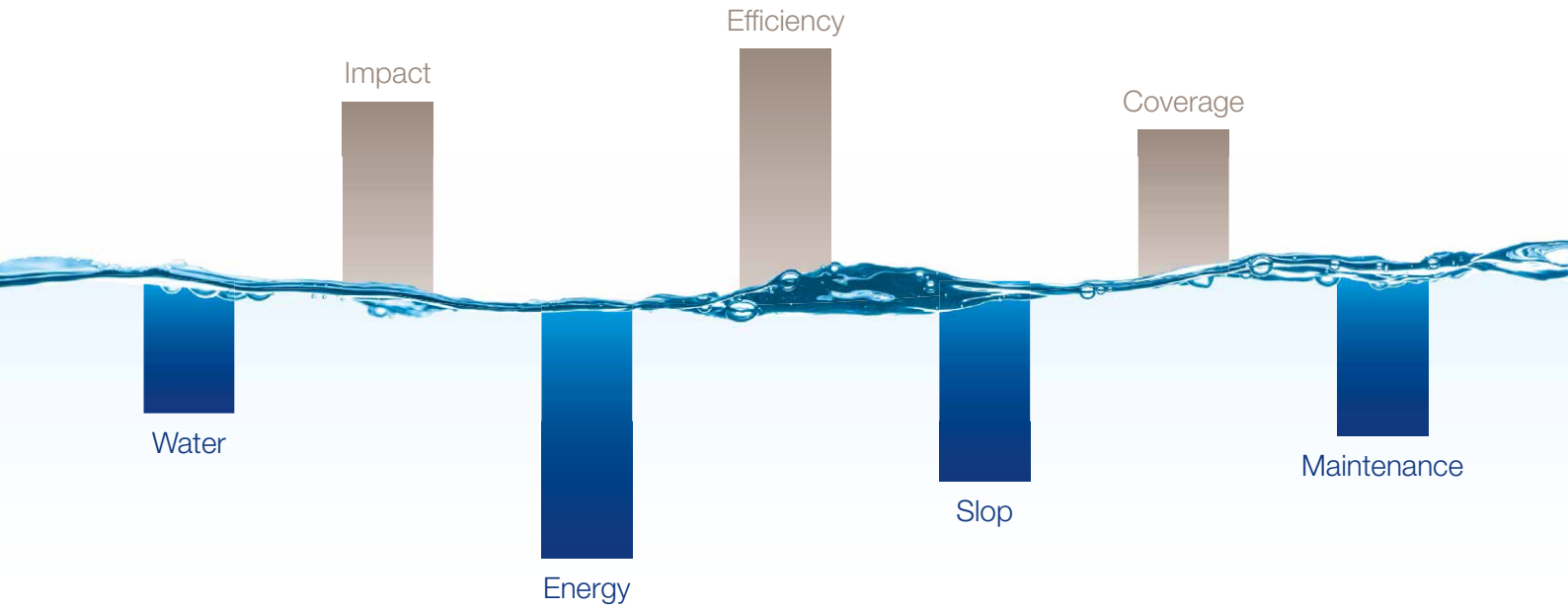

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McQuilling looks into the crystal ball

According to McQuilling Services' recently published '2019-2023 Tanker Market Outlook', last year, global tonne/mile demand to transport crude and residual fuels increased by 1.9%.

This was supported by a 1.4% increase in VLCCs, which accounted for 63% of the total demand for dirty tankers. Suezmax demand accounted for 25% of all DPP demand in 2018, 1% higher than recorded in the previous year, due to higher crude exports from the Southern European and North African loading regions.

Crude pricing differentials initially favoured long-haul flows from West to East; however, a surge in Middle East supply to re-establish baselines transferred crude volumes back to the MEG, drawing Asian ballasters away from the West and exploding transatlantic demand for US crude oil.

Middle East crude supply averaged about 160,000 barrels per day higher year-on-year, supporting volumes to the East, while demand for Arabian Gulf/West remained under downward pressure, a trend which is forecast to continue.

Shipment demand for refined products increased by 0.4% year-on-year in 2018 amid a 3% rise in LR2 demand, while the other product vessel sectors experienced lower demand, due to declining volumes transported in the LR1 sector and lower mileage travelled in the MR2 segment.

As mentioned, LR2 tonne/mile demand increased in 2018, broadly in-line with McQuilling's January, 2018 prediction of accelerating growth, as a revival of the Middle East/Northern Europe gasoil and jet fuel trade supported demand. The tonne/mile demand estimates showed growth of 25% year-on-year for this trade, accounting for 13.4% market share.

During 2018, McQuilling counted 106 dirty tankers and 35 product plus IMO III tankers delivered to the trading fleet. VLCC deliveries decreased relative to 2017 with 39 vessels observed last year similar to Suezmaxes, which saw 32 additions.

On the clean side, 16 LR2s, 12 LR1s and seven MR2s were recorded joining the fleet.

The number of vessels that exited the fleet last year matched within 1% of the January, 2018 projections, as 134 ships were sold for demolition or conversion, compared to the original forecast of 133.

VLCC removals totalled 35 in 2018, while Suezmaxes and Aframaxes came to 22 and 37 vessels, respectively. On the clean side, 32 vessels left the trading fleet in 2018.

Newbuildings fall

Newbuilding ordering activity decreased 20.5% year-on-year in 2018 within the DPP sector amid tempered interest in the VLCC and Aframax segments, particularly in the second half of the year.

In 2017, 62 VLCCs were ordered, which fell to 43 in 2018. Suezmax orders remained flat at 25 vessels, while Aframax orders decreased to 32 vessels.

Clean tanker ordering activity through 2018 represented a 14.3% increase in comparison to the previous year with 18 LR2s and eight LR1s contracted. In the MR2 segment, ordering gained 17% year-on-year with 76 vessels recorded in 2018, while the MR1s observed less activity at 10 vessels.

Global economic growth decelerated in 2018, falling to an estimated 3.7% versus 3.8% in 2017. According to the International Monetary Fund (IMF), GDP growth is expected to temper to 3.5% in 2019, a downward revision, due to trade tensions between key nations and European political uncertainty.

World oil demand growth is likely to slow over the forecast period, down to 860,000 barrels per day this year before falling further to just 394,000 barrels per day by 2023.

Crude supply growth is also projected to slow down, rising by 830,000 barrels per day in 2019, due to downward pressure from OPEC production cuts, offset by gains in North American and European output.

Meanwhile, crude and residual fuel tonne/mile demand is forecast to increase by about 0.9% on an annual basis throughout the period under review with a decelerating trend observed in the latter years.

McQuilling projected a 2019 demand growth of 1%, as participants in the OPEC and non-OPEC production cut agreement limit crude output from the Middle East, somewhat counteracted by higher exports from the Atlantic Basin.

An annualised growth of 2% and 2.3% for the LR2 and LR1 sectors is forecast, respectively through 2023 and just below 1.6% for MR2s.

Total DPP 2019 deliveries are estimated to be 134, before falling to 102 in 2020, which will begin to support a freight rate recovery, due to increasing deletions over the next two years.

The consultancy's projections indicate that 58 product tankers will join the trading fleet in 2019, partially offset by 39 deletions, while beyond this point there will be a greater fleet contraction.

In the chemical tanker market, the delivery schedule for IMO I + II tankers increased to 74 vessels in 2018 before being predicted to drop to 58 vessels this year.

Rates to appreciate

On the basis of supply side pressure, as well as demand indicators pointing to decelerating growth, 2019 freight rates are expected to appreciate marginally; however, support for TCEs will stem from lower bunker prices with VLCCs averaging $26,800 per day and Suezmaxes averaging $18,800 per day. However, a much tighter balance for VLCCs is seen for 2022 with earnings climbing to $33,700 per day.

The story is quite different for the clean segment, as supply fundamentals improve with growing demand earlier in the cycle. Spot market earnings in the LR2 and LR1 sectors are forecast to average $17,100 per day and $16,700 in 2019, respectively. MR earnings on a round trip basis are, in general, expected to rise this year with TC2 TCEs averaging $6,600 per day; however, higher earnings of $14,500 per day can be attained on the basis of the Atlantic Basin triangulation.

Potential for supply side pressure on clean freight rates becomes evident in in the back-end of the forecast period based on analysis of McQuilling's new long-term delivery forecast methodology.

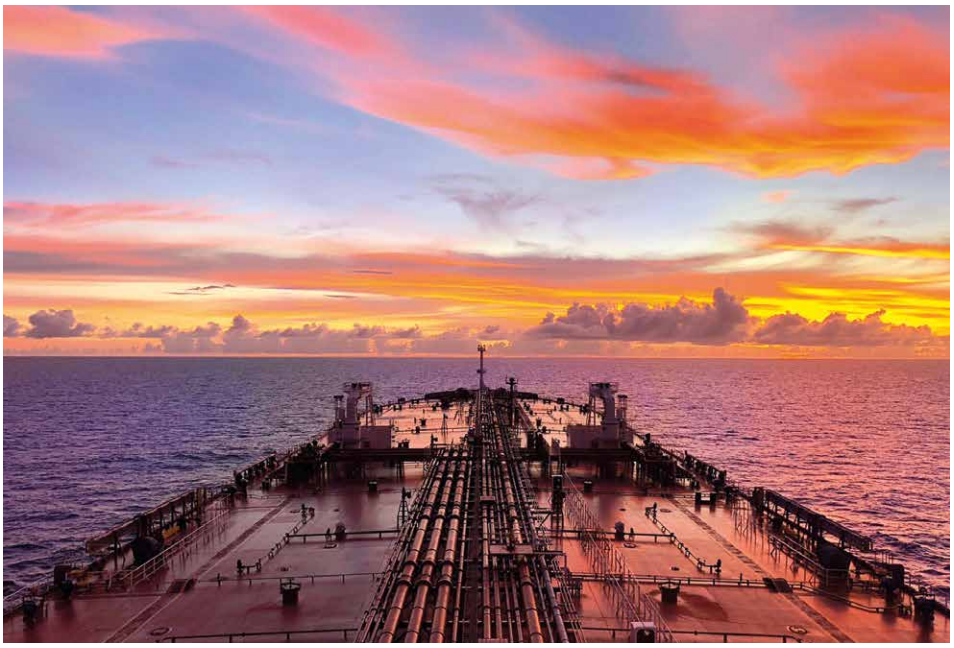
In the analysis, the relationship between timecharter rates and spot market earnings was strong and formed the foundation for the timecharter forecasts. For VLCCs, one-year and three-year timecharter rates are projected to average $31,500 per day and $32,000 per day in 2019, respectively.

The 2019 price forecast for the five-year old crude tanker sectors sees VLCC values averaging $66.1 mill, a 5.4% increase from the 2018 average price of $62.7 mill. Modern Suezmax tankers are forecast to demand $45 mill in 2019 with further appreciation to $56.1 mill in 2023.

Clean tankers in this five year age group are expected to see higher prices relative to their 2018 averages. For the LR2 segment, a 2019 forecast average price of $37.8 mill is seen, a 5.2% increase from the average price recorded in 2018, while the LR1 sector is expected to see larger gains of 14% year-on-year to average $32.7 mill. MR2s are likely to appreciate 15% to 30.7 mill in 2019.

In this 200-page annual report, McQuilling looked at the five-year spot and TCE outlook for eight vessel classes across 24 benchmark tanker trades, plus four triangulated trades.

The consultancy incorporated a variety of new features to provide a more robust view of global trade flows and major tanker trades, it stressed. These include:



Will it be full steam ahead or half ahead going forward? *Photo credit- Teekay Tankers*

- Enhanced utilisation of remotely-sensed vessel position data to capture fleet growth in terms of newbuilding deliveries and vessel deletions.
- Refined methodology in forecasting global bunker prices using forward product cracks relative to a projected Dated Brent crude outlook.
- Investment analysis providing insight into the projected unlevered returns for each tanker sector with discussion on the financial benefit of scrubber economics, as well as an 'efficient frontier' analysis, displaying various hypothetical portfolio enhancements an owner can employ when managing assets.
- Addition of the Aframax 70,000 tonne USG/UKC trade to the freight rate forecast table expanding the coverage to 14 dirty and 10 clean tanker trades. TO

Around 90% of tonnage scrapped on beaches

According to the latest data released by the NGO Shipbreaking Platform, 744 large deepsea commercial vessels were sold for recycling in 2018.

Of these vessels, 518 were broken up on the tidal mudflats of Bangladesh, India and Pakistan, amounting to a record-breaking 90.4% of the gross tonnage dismantled globally last year.

At least 34 workers lost their lives at the recycling yards. The NGO recorded at least 14 workers killed in Alang, making 2018 one of one of the worst years for Indian yards in terms of accidents reported in the last decade.

Another 20 died and 12 workers were severely injured in Bangladeshi yards. In Pakistan, local sources confirmed one death and 27 injuries. Seven injuries were linked to yet another fire that broke out on board a beached tanker.

UAE, Greece and the US topped the list of alleged 'country dumpers' in 2018. UAE owners were responsible for the highest number of ships sold to South Asian shipbreaking yards, amounting to 61 ship. Greek owners beached 57 vessels out of a total of 66 sold for demolition, while US-based owners closely followed with 53 vessels broken up.

NAT highlighted

According to the NGO, Nordic American Tankers (NAT) - incorporated in Bermuda and stock-listed in New York - was runner-up to Sinokor for the 'worst dumper' prize.

Last year, NAT was reported to have earned $80 mill for the sale of eight vessels for breaking. Three were sold to Alang and five were sold to breakers in Chittagong. According to local sources in Bangladesh, the cutting operations of these ships started without required government authorisations, the NGO claimed.

Seven vessels were sold to beaching yards by German owner Dr Peters. According to local sources, a fitter lost his life while scrapping the 'DS Warrior' in December, 2018.

US ramps up energy exports

The latest US Energy Information Administration (EIA) Annual Energy Outlook 2019 report forecasts that, for the first time since the 1950s, the US will export more energy than it imports by 2020.

This is due to increases in crude oil, natural gas, and natural gas plant liquids production outpacing growth in US energy consumption.

Different assumptions about crude oil prices and resource extraction affect how long EIA forecasts that the US will export more energy than it imports. The US has been a net exporter of coal and coke for decades, began to export more natural gas than it imported in 2017, and is projected to export more petroleum and other liquids than it imports within this decade.

The US has imported more energy than it exports on an annual basis since 1953, when trade volumes were much smaller. Since then, when imports of energy totalled 2.3 quadrillion British thermal units (Btu), gross energy imports generally grew, reaching a peak of 35 quadrillion Btu in 2005. Gross energy exports were as low as 4 quadrillion Btu as recently as 2002 but have since risen to more than 20 quadrillion Btu in 2018, largely because of changes in liquid fuels and natural gas trades.

EIA's projected changes in net energy trade are driven mostly by evolving trade flows of liquid fuels and natural gas. In the reference case of EIA's recently released reports, the US will export more petroleum and other liquids than it imports after 2020 on the back of US crude oil production increases and petroleum products domestic consumption decreases.

Near the end of the forecast period, the US will return to importing more petroleum and other liquids than it exports on an energy basis, as a result of increasing domestic gasoline consumption and falling domestic crude oil production in those years.

In the AEO's low oil price scenario, lower crude oil prices lead to lower crude oil and natural gas production, and the US will return to importing more energy than it exports by 2035.

Similarly, in the low oil and gas resource and technology case, crude oil and natural gas production is lower than in the reference case, and the US will become a net energy importer again in 2039.

Of course at present, tanker trades have to contend with the US sanctions on Iran and against Venezuela's PDVSA.

There is no doubt that the US Gulf terminal operators are ramping up their facilities to handle larger ships to export crude oil.

VLCC loading

Illustrating this push are several projects to load VLCCs - one that has been commissioned and another at the design stage.

Towards the end of January this year, liquids terminal and logistics operator, Moda Midstream, commissioned upgrades to Berth 2A at the Moda Ingleside Energy Centre (MIEC) at Ingleside, Texas.

This will enable the loading of VLCCs at rates of up to 80,000 barrels per hour, the company said.

At the time, Moda said it was loading its fourth VLCC at MIEC since late December. Moda also announced it had started to further expand its berths, which were originally designed by the US Navy to support a battleship and aircraft carrier group.

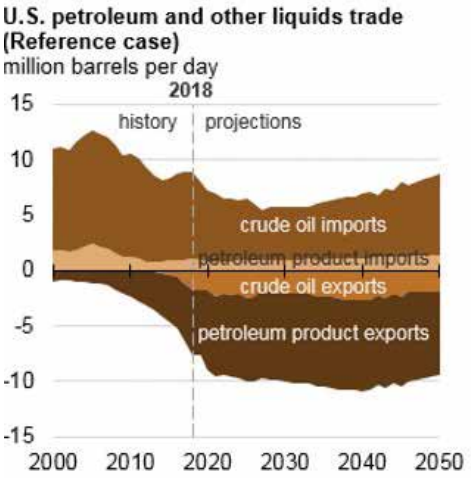
Upon completion, MIEC will have combined vessel loading rates of 160,000 barrels per hour and improved berthing efficiencies. MIEC has also worked extensively with the US Coast Guard and the Aransas-Corpus Christi pilots to ensure efficient transit times and safe berthing of vessels.

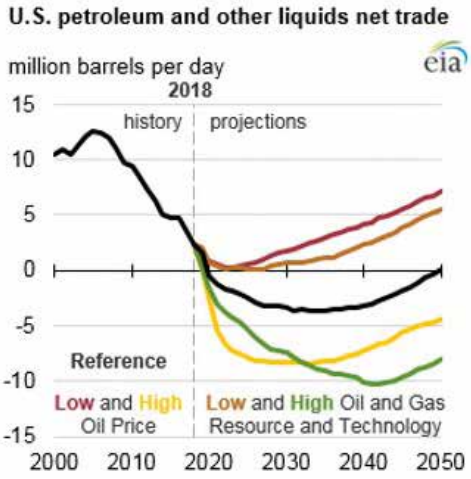
In addition, the Corpus Christi Ship Channel improvement project, when completed, will increase the depth from 47 ft below mean lower low water to 54 ft below, which will allow for the loading of larger cargoes on VLCCs at the facility, but still below their full capacity.

Moda has also started construction of an additional 10 mill barrels of crude oil storage as part of the expansion project. Most of the new storage tanks will come on stream this year and the whole project will be completed by the second quarter of 2020.

A new manifold and interterminal piping is being built to allow MIEC to receive direct 'basin to berth' deliveries from the Cactus II pipeline, Gray Oak pipeline and Epic Crude Oil pipeline. As a result, MIEC will be able to receive simultaneous deliveries from these three new long-haul crude pipelines at their full mainline rates.

The other project involves Texas COLT, which has submitted an application to the US Maritime Administration (MARAD) to construct and operate a deepwater crude oil





Source: US Energy Information Administration, Annual Energy Outlook 2019
Note: Net trade series in physical units may be different than those shown in energy units (British thermal units) because of differences in energy content of the components

export port located off the coast of Freeport, Texas.

The application was submitted by a proposed joint venture involving Enbridge, Kinder Morgan, and Oiltanking on 31st January, 2019.

Kinder Morgan explained that this project included an offshore platform and two offshore loading single point mooring buoys (SBM). They will be capable of fully loading a VLCC in about 24 hours.

The offshore facilities will be connected by a 42 inch pipeline to an onshore tank farm, which will have up to 15 mill barrels of storage capacity. The facility is planned to be operational by 2022.

Last year, Enterprise Products Partners (EPD), unveiled plans to develop an offshore crude oil export terminal off the Texas Gulf Coast. This facility would also be capable of fully loading a VLCC.

Elsewhere, ExxonMobil begun construction of a third crude unit at its refinery in Beaumont, Texas on 29th January after reaching a final investment decision (FID) on its expansion.

This expansion project, expected to start up in 2022, will increase the refining capacity at the site by 65% or 250,000 barrels per day, the company said.

ExxonMobil previously announced that it was planning for an additional unit, which will allow it to process light crude. Most of the US Gulf coast refineries process heavy crude. TO

John C Hadjipateras to wear the famous hat

The Connecticut Maritime Association (CMA) has named John C Hadjipateras, Chairman, CEO & President of Dorian LPG, as its Commodore for the year 2019.

He will be presented with the 2019 Commodore Award on 4th April, 2019 at the Gala Dinner concluding the annual CMA conference and trade show at the Hilton Hotel in Stamford, CT.

"John's lifelong passion for the industry, his deep and passionate engagement in every aspect that it takes to run a ship and shipping company safely and profitably are inspiring," said Joe Gross, CMA President. "So too have been the commercial insights that he and his team have demonstrated in finding the right commercial sectors for the time.

"While John and his family's commitment to our industry is inspiring, equally important to the CMA community is the fact that John and his company have participated in, contributed to, and just generally been terrific supporters of the association's existence and its educational objectives.

"In many respects he is the perfect Commodore — successful, supportive, passionate about the industry, and an acknowledged global leader — in our own backyard," he concluded.

From 1972 to 1992, Hadjipateras was the Managing Director of London-based Peninsular Maritime and subsequently served as President of Eagle Ocean.

He has served as a member of the board of the Greek Shipping Co-operation Committee of the Council of Intertanko and has been a member of the Baltic Exchange since 1972 and of ABS since 2011.

Managing ships in a digital future

At a recent round table, attended by *Tanker Operator*, it was said that there will be fundamental changes in the way vessels are managed and in the skill sets of seafarers going forward, due to the advance of digitalisation.

We asked leading shipmanagement companies for their opinions on how this ever changing world will map out.

First, we approached **Capt Kuba Szymanski**, InterManager secretary general, who said that he was not absolutely sure there will be fundamental changes in the way ships are managed in the future.

"Shipping is extremely slow to embrace untested and unproven technology. Please don't make me believe that we have digitalisation tamed already. I am just standing in front of the hotel here in Palm Springs and ….cannot call taxi because ….there is no mobile phone signal. Can you believe that?

"Also please show me a good computer model, which will be able to help a weather forecaster to predict the weather four days in advance! There is a lot of hype, which might be okay for the leisure market when people can afford failure but not in such a robust and reliable industry as shipping," he said.

He continued by pointing out that statistics are telling us the real story – less than 2% of ships are running performance-based maintenance. The reason - manufacturers themselves don't believe they have achieved standards that they can rely on.

"We are closely monitoring development and InterManager members are trying to engage technology developers, but we are struggling, as they rarely want to listen.

"Look at AIS – an otherwise great invention but is it cyber secure? How about ECDIS – is this equipment cyber proof? So let's come down to earth, or maybe better sea level, and start working together where people called seafarers could actually help technologists in changing this shipping world," he advised.

Some believe that so called 'smart management', teamwork with a more balanced highly skilled workforce is the way ahead with an organisational rethink resulting from digitalisation. Could this change the more traditional third party shipmanagement operation?

Capt Szymanski answered; "I believe that third party shipmanagement on its own revolutionised the industry. It allowed owners to march ahead at an unprecedented pace. Teamwork is essential indeed, but we believe that a paradigm shift is on the horizon and it is forced upon us, not by technology, but by politicians who vote for new regulations. I am not talking about MLC, BWMC or sulfur cap but about tax regulations, which make shore based jobs pretty unattractive for seafarers.

"We need to work together to change this trend or to allow ships to be managed from sea not from shore. I bet my money that the most advanced shipmanagement companies will shortly move superintendent jobs back to the Chief Engineers on board and will reduce the shore office to the role of co-ordinator/ facilitator.

"This is, in my opinion, the future of ship management," he stressed.

Data analysis

Turning to how the considerable increase in data streams from a ship will be analysed and what companies hope to get out of it, he said: "By using smart computers and algorithms created with close collaboration from the end users. Not prepared FOR them but BY or WITH them."

As for the advance of performance based measurement monitoring, Capt Szymanski said that he had heard this story for the past 20 years and it yet has to come.

"Look at the Virtual Arrival concept or Shipping KPIs – excellent concepts - which are not being widely used because people don't want to change their habits. The technology is already there at this level but we cannot persuade cargo owners and other customers to use it. Reason? Nowadays the word trust is not very fashionable," he said.

He agreed that predictive maintenance on the back of digitalisation will save opex, saying, "No doubt but you need two to tango. Manufacturers of the equipment need to start playing ball too."

InterManager's Capt Kuba Szymanski

As for seafarer skill sets possibly changing to a more digital, artificial intelligence (AI) led environment, he asked the industry not to use the AI argument where common sense is not being used first.

"Why do we still ask the most expensive people on board – ship's Masters – to run excel sheets every month while preparing the payroll and victualling accounts? Why are we still asking ships to produce 50 forms for every port call?

"The technology is here already but ports and authorities don't want to change, they don't trust anyone with technology which has not been done by themselves. Do you want a reality check – please refer to the European Single Window fiasco – it will be 10 years soon since the concept was created and four years this coming July since it became compulsory for all EU countries.

"Show me one port in Europe where a ship could send standardised, digital arrival documents to ONE e-mail address – or, maybe better, where it could be uploaded and then used by ALL users in one port!" he

explained.

”As long as the police, customs, immigration, port authorities etc do not work together, we will be requested to provide port specific and, actually, very often department specific papers,” he added.

At the round table, it was mentioned that attitudes to work and life are and will change rapidly going forward and *Tanker Operator* wondered how companies would cope with this.

He gave rather a robust answer saying, “Is this a question or a statement. Do you expect a different view? Or maybe this is already this new attitude towards other humans? You are telling us what you believe and expect us to follow.

“Let me pose a question? Why change something which is better than proposed change? For the sake of change? Why do we all believe that NEW is better?

”I am all for development and change but only when change is for the better and not just for change. I am not happy with issuing a new software update only to find out that it does not work and it needs upgrading, that it has not taken into account all stakeholders. I am extremely unhappy about changes which create more work and frustrate people – users who are allegedly waiting for improvement,” he explained.

Training

It was also stressed that training needs to follow this trend to produce the next generation of engineers and naval architects and of course seafarers. Will training fundamentally change in the future? We asked.

Capt Szymanski said that we can see this change happening already. However he thought it was changing for all the wrong reasons.

“We need to pause and re-think,” he said. “What do we want to achieve? Currently training is extremely reactive, we are trying to catch up and that means we will always be ‘behind’ the development. That probably means we need to start paying attention to different skills. That is extremely difficult in our seafaring profession as we combine a lot of skills, hands-on included.”

Tanker Operator then posed the question - Do you think we should include a career path in shipping digitalisation and autonomy to attract people into the industry going forward? Are we looking far enough ahead?

He answered; “We don’t seem to have a problem attracting young people. Please don’t believe this fake news. We have plenty of seafarers waiting for their vessels. Their problem is that they need to be fairly paid, like anybody else. It is not digitalisation or autonomy which will continue to excite people to go to sea but resilience, reliability, trust and pride in doing something difficult and challenging.”

There has been criticisms of STCW of late, especially as it doesn’t cover digitalisation. We asked whether it was time for a change.

Capt Szymanski basically agreed saying, “ …but not only for digitalisation but for many other reasons too. There was plethora of new regulations recently introduced and STCW is yet to catch up with them.”

As for the IMO addressing these points, he said; “Ultimately yes but maybe, just maybe, we should start thinking holistically with a bigger picture in mind. Presently we keep patching the world.”

Commenting on training being at the heart of this and thus creating great opportunities for academies worldwide, both independent and in-house, ie attached to shipmanagement companies, he said; “Good training establishments work very closely with their customers.

“They have realised that in order to stay competitive they need to act quickly. It also applies to shipmanagement and crew management companies.

“Our members heavily rely on maritime professionals and these have to be trained to the highest standards to ensure that our businesses thrive. I do see better collaboration on the horizon indeed,” he concluded.

TO

Third party practitioners have their say

***Tanker Operator* also spoke with leading third party shipmanagement companies about the future of their offerings.**

Talking about the march of digitalisation, **Sean Hutchings, Thome's CTO for Fleet Support and Innovation**, said that Thome was one of the first third party shipmanagement companies to embark on the operational hub concept, which was opened in August, 2017.

"We see our Ops Hub as being like a laboratory, where we can experiment and try out new technologies and processes in a controlled environment," he explained.

At the heart of the concept is the provision of monitoring capabilities to enable Thome to conduct more effective fleet management, saving time and improving the operational efficiency.

"We have integrated a full ECDIS installation in the Hub. This will be used to enhance the safety of navigation across the fleet," he said.

In order to ensure compliance with the array of different special zones, we have automatic alerts sent out to our vessels from the operations hub when the vessel is seen approaching pre-designated zones, such as SECAs, MARPOL special areas and high-risk areas.

Thome's technical team monitors the fleet's performance, including the main engine, hull & propeller performance and auxiliary engine load management and has automatic alerts that are sent to the vessel when normal parameters are exceeded.

So called smart management will change the way decisions are made. With so much more data available, this will enable decisions to be made based on data analytics. Benchmarking and optimisation of performance will become more important. Shipmanagement basics will remain the same, but it will become much more transparent, he said.

As for data analysis, Hutchings said that digitalisation is all about data, so data quality is very important. A lack of data ownership can be a barrier to increasing data quality, while poor data quality leads to poor data analytics, and nobody will trust the numbers. Therefore, assigning data ownership is key.

Addressing performance-based measurement monitoring, he said; "Thome already has KPIs in place, so these are monitored on a regular basis and adjustments are made to improve performance and efficiency as required.

"All of Thome's employees are encouraged to speak up and offer improvements in operational/safety procedures," he stressed.

"The future will be in condition based maintenance and eventually predictive maintenance. The varying age of the fleet and associated machinery is a challenge. We need to advance the way we do maintenance. The most common way is still to use time based maintenance.

"This will be phased out as we acquire more data from the vessels either through the numerous sensors on board or through condition based maintenance tools, such as vibrational analysis, thermal imaging, ultra-sound, oil analysis and engine performance analysers.

"Trend analysis will pinpoint when maintenance is required, hence minimising spare parts cost, system downtime and time spent on maintenance," he explained.

Changing skills

Skill sets will also need to change going forward. There will be a shortage of expert data scientists, and to fill this gap, so called citizen data scientists who are from other professional backgrounds, such as marine engineering, will be used. Augmented analytics is increasing and by 2020, the number of citizen data scientists will increase five times faster than the number of expert data scientists.

The new generation definitely have a different outlook on life, as compared to previous generations. They demand more work life balance and they will be key in driving the old saying 'work smarter, not harder', he said.

Training is still fundamental and probably will be even more important in the future, some experts have said. Hutchings thought that training of the next generation of engineers and naval architects has always been changing, as different technologies are introduced and this will continue to be the case.

New technology will be used for training, like VR and AI, to engage this digital savvy generation. However, the fundamentals remain the same and young cadets will still need to learn the basic skills of seamanship in case interruptions in digital connectivity occur.

The industry needs to attract the next generation of engineers and using digitalisation and autonomous shipping is a good platform to encourage new blood to the industry who are forward thinking and have the potential to take shipping to the next level.

The scope of the training provided will have to change to take into account the introduction of new technologies. The trend in training seems to be task based through practical exercises, so cadets can learn through performing a task rather than sitting passively in a classroom.

As for the criticisms aimed at STCW, he said that it did not need to cover digitalisation as such, it does however need to be constantly updated to include new technologies in use in the engine control room and on the bridge.

In addressing these issues, he said; "Additional regulation is something we do not need. What we need is better collaboration between interested parties. It is better that industry bodies, such as OCIMF, INTERTANKO, INTERCARGO and ICS, agree on common guidelines and principles."

Columbia Shipmanagement's (CSM) President, Mark O'Neil thought that digitalisation will not of itself change the fundamentals of shipmanagement.

"Digitalisation is but a means to an end, the end being performance optimisation. It is the drive for performance optimisation

which is bringing about a fundamental change in shipmanagement," he said.

To remain competitive, vessels' operational costs will have to be reduced substantially and their overall performances enhanced. Digitalisation is but one tool in the optimisation toolbox which enables operators and managers to achieve these objectives, he added.

"At Columbia Shipmanagement, we have not only provided our clients and crews with the Client Portal and Crew Portal allowing for complete transparency of operation, but we have developed and implemented the market-leading Performance Optimisation Control Room focussing on optimisation of all areas of operation; safety, fuel and consumption, weather routing, crew training and rotation, preventative maintenance, port delays, and charterers' commercial parameters.

"Furthermore, our partnership with Adobe has seen the launch of the Adobe eLearning platform, which optimises crew training allowing crews to access tailor-made training modules via tablets and handheld devices.

"Operators and managers are increasingly being asked to do more for less, and more for less and better! Digitalisation is one of the tools enabling operators and managers to achieve this required optimisation," he said.

He continued by stressing; "At Columbia Shipmanagement, we want to offer all of our clients – from the one ship to the 100 ship operator – with a quality, tailor made service. Each of our clients has to be made to feel as though he/she is our only client.

"To achieve this, as well as recognising the importance of digitalisation and other technological advances, we are also hugely recognisant of the importance of the Human Element.

"Well-trained, appropriately rewarded and well motivated employees ashore and on board, with a strong sense of company culture and identification, and who care passionately about the clients, one another and the company, are equally important in delivering the required service.

"The importance of the Human Element, and of personal service, will never change. We have seen to many other companies make the mistake of focussing exclusively on commoditised, digitalised, impersonal and scaled- up business models, which invariably fail. We must remain client/market facing at all times and remember we are a personal service industry," he said.

As for data and how to use it, he said that data received by CSM's control room will be confidential to the individual clients and can be used to run performance optimisation algorithms at their request. The opportunities to use big data to optimise performance are endless.

CSM's President Mark O'Neil

Preventative maintenance

CSM's Performance Optimisation Control Room will offer clients the opportunity to install various additional sensors and cameras on board a vessel, as well as additional data capture points. This will enable preventative maintenance techniques minimising downtime due to equipment failure and maximising performance optimisation.

Clearly the ability to maximise the safe working lifetime of individual items of equipment and replace such equipment before failure will maximise uptime, overall performance and reduce OPEX. Use of sensor technology in a digital environment will enable such preventative maintenance.

Turning to the question of skill set changes, O'Neil said that employees on board and ashore are having to adapt to technological advances and increased digitalisation. But he repeated that these advances are merely tools allowing for optimisation of the business function, which will remain essentially the same and will still require the essential Human Element for the foreseeable future.

Shipping has always been a 24/7/365 business placing high demands on those employees on board and ashore. As an industry it is perhaps guilty of failing to implement the increasingly sophisticated Human Resource Management developments seen in other industry sectors, which now recognise fully the importance of the Human Element as a valuable – perhaps the most valuable – element in a business P&L.

"We are catching up rapidly and are assisted by the technological advances and digitalisation as previously discussed. These will allow for better time and resource optimisation and allocation, which will lead to ensuring a better work life balance for all involved," he said.

Addressing training, he said CSM prioritises training above all else. "A highly trained, well fed, well paid crew is a motivated crew and (in all probability) will ensure a well maintained and operated vessel. As the industry is exposed to technological and digital advances, we have to ensure that crews and employees ashore are trained to deal with these advances.

"But technology can itself assist in this process. Columbia is the first shipmanager to provide its crews with an Adobe eLearning platform, allowing tailor made training modules to be delivered to crew and staff via tablets and I Phones without connectivity issues. Training can therefore be much more modular and targeted, and take place during leave and down time if wanted," he explained.

"The days of academies, independent and in-house, with all the associated overhead costs and travel expenses for attendees, are perhaps limited. ELearning platforms and the world of virtual reality will allow for remote and much more flexible, personalised and effective training and simulation. The whole training industry and delivery of training is itself being hugely disrupted and optimised," he added.

Wallem Group's CEO Frank Coles said that traditional ship management is heavily reliant on a single point of failure - the superintendents.

To varying degrees the responsibility of the ship operation is laid at their door, without satisfactory training and without satisfactory tools.

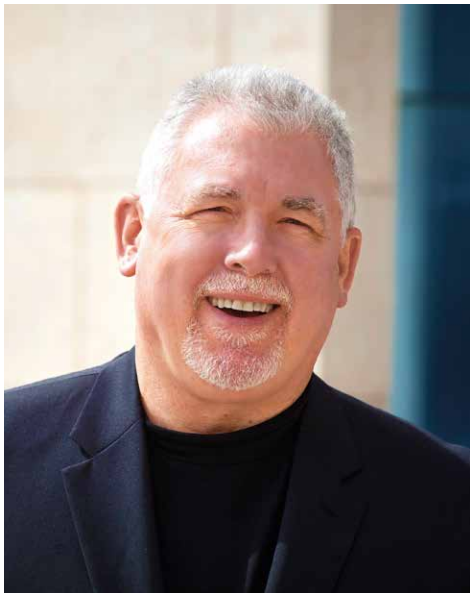
With the proper use of modern management techniques in a functional organisation and using digital tools, it is possible to totally change the methodology of management of the ship, the client and the effective management of the fleet.

Using data and proper analytic tools, we are going to be able to provide the operators, the owners and the management with an ability to properly assess the performance of the fleet and operations, Coles said.

Today operations are largely undertaken by ex-seafarers, using gut instinct and experience, which while valuable does not provide a comprehensive, efficient solution. By embracing new techniques, efficiency and data analytics, it is possible to provide a better quality, safer and effective client experience.

Wallem is creating a digital path that includes people, process and platforms, to transform the level of operations, the user experience and the quality of service.

He explained; "It is increasingly more important to have technology and analytics competence in the organisation, and this is very important in shipmanagement as in most other maritime sectors."



Wallem Group's CEO Frank Coles

A quality of life and work satisfaction is critical for welfare both ashore and at sea. The modern worker wants to see technology and support to aid them and create a balance between their work and life. They also want to see an employee that is environmentally aware.

"We remain committed to providing our staff and crew with technology and support to have balance in their lives as well as be at the forefront of modern systems," Coles said.

Turning to training, he said that this will become more focused on adoption of skills using simulation, which could in turn see some reduction in time served for qualifications to a certain rank. Either way, the use of technology will enable more remote courses and training to occur.

Training attaches to the technology and the associated risks and rewards. Using technology and adopting new business processes can only enhance the quality of the operations and staff.

Companies that use modern systems for training and in operations will have a significant advantage going forwards.

Automation has been a part of engineering for some time. Digitalisation is essentially the increased use of newer technology. "In my view we need to be cognisant of the advances in technology, but we have some way to go in general towards a standardised ship with settled technology business processes and practises," he said.

Commenting on the IMO, he said that the organisation should be challenged to become more modern in general and agile in its approach to these issues.

A **Northern Marine Group** spokesperson said answering the question regarding digitalisation: "Throughout our 35-year history, we have been on a continual journey of process optimisation. Indeed, digitalisation has offered us the opportunity to take great leaps of advancement, to the benefit of our clients, employees and our operations.

"Our digital shipmanagement systems are built in-house by our own team of highly qualified software developers and engineers. The days when shipmanagement companies were rated solely on the quality of their technical or crew management operatives are long gone; we now must also demonstrate our competence in developing and utilising leading digital technology," the spokesperson concluded.

TO

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Have we reached the end of the long dark tunnel?

The year 2017 and most of 2018 were pretty grim for product tanker owners.

However, during the fourth quarter of last year, the market started to take a turn for the better.

The outlook will be positively affected during the immediate aftermath of the introduction of the 1st January IMO 2020 low sulfur cap, a new report said.

According to an in-depth look at the product tanker sector by Genoa-based shipbroker and consultancy Banchero Costa, following the cut-off date for switching to low sulfur fuels, there will be a dearth of 0.5% LSFO both by volume and geographically, thus MGO will be needed in many ports worldwide to cover the deficiency.

This will boost product tanker demand, due to the considerable amount of MGO that will needed to be shipped worldwide, thus boosting the tonne/mile equation.

On the whole, refineries are getting ready for the new fuel regime in terms of the production of compliant fuels and rescheduling the use of HSFO. The EIA has forecast demand to grow by 1.1 mill barrels per day and new refining capacity to increase by 2.6 mill barrels per day.

As for current products exports, the Asia/Pacific region currently accounts for 27% with the leading players being Singapore, China, India. The US is the largest exporter with its main market being South America and Europe, while the MEG's share is growing, especially with the refinery expansion projects ongoing in the area.

Banchero Costa also took a comprehensive look at the fleet composition and found that at the end of 2018, there were 2,984 products tankers of 30,000 dwt and over. These were made up of 1,548 MR2s, 715 MR1s, 376 LR1s and 345 LR2s.

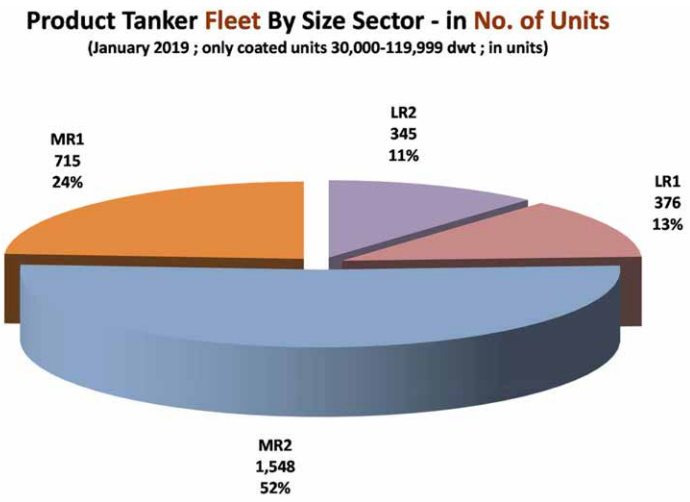
The delivery profile for last year was 19 LR2s, 15 LR1s, 52 MR2s and 14 MR1s delivered, according to the report. At the same time, there were a further 266 vessels on order with deliveries through 2022. Of these, MR2s make up 47% and LR2s 36% of the total.

Recycling also increased last year amounting to 53 vessels, compared to 37 in 2017. These included seven LR2s, nine LR1s, 20 MR2s and 17 MR1s. This trend is expected to continue, due to the cost of meeting the Ballast Water Convention and IMO 2020 restrictions.

Another positive sign was the effect of slower newbuilding deliveries/slippages and higher recycling numbers, which led to fleet growth slowing - coming down from 6.5% in 2016, to 4.6% in 2017 and only 2% last year. The fastest growing segment overall was the LR2s at 4%.

For this year, taking into account a 30% slippage, deliveries are estimated at 126 ships with the split between MR2s and LR2s being 47% and 33%, respectively.

Of the 67 contracted last year, South Korean builders won 37, China 17, Vietnam seven, while Japan accounted for only two 49,800 dwt units ordered at JMU.



Source: Banchero Costa

Fleet analysis

Analysing the fleet, Banchero Costa said that Greek interests controlled at least 16% of the trading fleet in terms of vessel numbers, followed by China and Japan with 7% each, the US with 5% and Norway with 4%.

At the end of last year, the largest standalone fleet was controlled by TORM with 73 vessels. However, adding Scorpio Tankers' vessels with those under Scorpio commercial management, a figure of 76 is reached.

Looking at the all important charter rates, the report illustrated the recovery seen last year by saying that LR2s' TCEs (MEG/Japan) were at an average of $30,500 per day by December, although only averaging $15,200 per day throughout that month.

LR1s were recording an average of $23,600 per day by the end of December for MEG/Japan, while MRs on Cont/USAC trips averaged $20,400 per day by the end of the year, compared to an average of just $10,500 per day for the whole year.

MR triangulation charters (Rott/NY/Amst) averaged $33,100 per day in December, compared to only $10,250 per day for the whole of last year.

McQuilling Services also took a look at product tankers in its annual five year forecast.

This report said that transportation demand for refined products increased by 0.4% year-on-year in 2018 amid a 3% rise in LR2 demand, while the remaining vessel sectors experienced lower demand, due to declining volumes transported in the LR1 sector and lower mileage travelled in the MR2 sector.

LR2 tonne/mile demand increased as a result of accelerated growth, due to the revival of the Middle East/Northern Europe gasoil and jet fuel trade. The tonne/mile demand estimates showed growth of 25% year-on-year for this trade, accounting for 13.4% market share.

McQuilling forecast an annualised growth of 2% and 2.3% for the LR2 and LR1 sectors, respectively through 2023 and just below 1.6% for MR2s.

The consultancy's projections indicate that 58 product tankers will join the trading fleet in 2019, partially offset by 39 deletions, while beyond this point there will be a greater fleet contraction.

On the chemical side, the delivery schedule for IMO I + II tankers increases to 74 vessels in 2018 before dropping to 58 vessels the following year.

Spot market earnings in the LR2 and LR1 sectors are forecast to average $17,100 per day and $16,700 in 2019, respectively. MR earnings on a round trip basis are, in general, expected to

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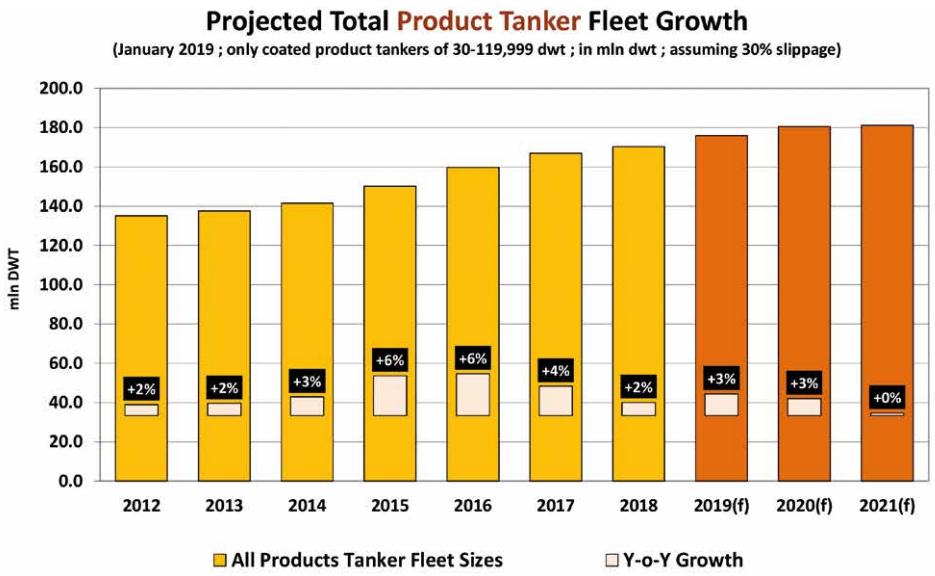

Source: Banchero Costa

rise this year with TC2 TCEs averaging $6,600 per day; however, higher earnings of $14,500 per day can be attained on the basis of the Atlantic Basin triangulation.

Clean tankers in McQuilling's five year age group are expected to see higher secondhand prices relative to their 2018 averages.

For example, in the LR2 segment, a 2019 forecast average price of $37.8 mill is seen, a 5.2% increase from the average price recorded in 2018, while the LR1 sector is expected to see larger gains of 14% year-on-year to average $32.7 mill. MR2s are likely to appreciate 15% to 30.7 mill in 2019.

Refineries

Returning to refinery ramp ups, one of the drivers of the market, Gibson Shipbrokers, quoting the IEA, said that 2019 is expected to see the largest wave of refinery capacity additions since the 1970's.

The Agency forecast that 2.6 mill barrels per day of new capacity will initiate operations this year.

In terms of pure volumes, this is of course a bullish sign for the product tanker market, but what really matters is how global product flows shape up, Gibson said.

Asia accounts for the bulk of the new additions. The new 400,000 barrels per day Hengli and Zhejiang Petrochemical plants should support higher export flows from China this year.

Further South, Malaysia's 300,000 barrels per day RAPID project, and Hengyi's 160,000 barrel Brunei plant, as well as the recently commissioned 200,000 barrels per day Nghi Son Refinery in Vietnam, will add to regional supply.

Some of this supply will be gasoline focused, which could further pressure on an already oversupplied global gasoline market and force more product out of the region. Where this will go, however is uncertain, as the main global demand centres are already well supplied.

Middle East products supply is also set to rise following capacity expansions. Higher products supply will primarily be driven by the start up of Aramco's 400,000 barrels per day Jazan refinery, increased capacity from KPC's Clean Fuels Project and the start-up of Iran's third 120,000 barrels per day Persian Gulf Star condensate splitter, although sanctions may complicate matters.

Flows into the Middle East may also be impacted. Argus estimated that the region is currently 100-200,000 barrels per day short of gasoline, but with the start-up of new plants this year, that deficit could drop to 50,000 barrels per day. This has the potential to impact on gasoline flows from the West.

Similarly, the overall distillate surplus in the region is expected to grow, supporting incremental export volumes.

Ultimately, more product will flow out of both the Far East and Middle East during 2019, as both regions see greater product length, with South/Latin America, Africa and Europe being the primary demand outlets for exporters.

However, the picture is more complicated as we move closer to 2020. As outlined by Banchero Costa, middle distillates are expected to at least initially serve as the primary route to compliance with the 0.5% sulfur cap.

In theory higher demand and wider product imbalances should support arbitrage, particularly from East to West. However, Asia's gasoil length is expected to be reduced through higher regional demand for low sulfur fuels, which may limit the growth in exports out of the region.

This is however, expected to be counterbalanced by higher intra-regional flows, offsetting any negative impact caused by potentially lower extra-regional outflows.

With much of the new refining capacity not expected to have an impact until the second half of the year, shipowners may have to endure a weak six months before seeing any sizeable demand boost. Seasonal factors will also play a role.

Spring turnarounds are likely to limit product export volumes over the coming months, whilst higher newbuilding volumes will continue to threaten the product tanker market.

However, as we move into the second half of the year, a combination of seasonally higher flows, preparations for 2020 and the impact of new refineries coming online should be felt, allowing 2019 to end the way it started – on a high, Gibson said.

Consolidation

There has been a reasonable amount of consolidation among the major players recently, which is likely to continue going forward, both at company and commercial level.

For example, one of the world's largest owners and operators of product tankers was created on 16th January this year.

This was the date when BW Tankers and Hafnia Tankers completed their merger.

BW Tankers is the surviving entity of the merger and has assumed all of Hafnia's assets and liabilities, contracts, rights and obligations. However, the new company is now known as Hafnia Limited.

At the time of the merger, the new company owned and operated 102 product tankers and had another four newbuildings still to come. Three product tanker pools, managed by Hafnia Management and Straits Tankers, commercially control LR2s, LR1s, MRs and SRs.

The global company has offices in Singapore, Copenhagen and Houston and a presence in Mumbai.

In another move, Mitsui OSK Lines (MOL) and Asahi Tanker have established a pool - Asahi MOL Tankers.

Catering for MRs, this pool will control a fleet of about 25 vessels and allocate them mainly to Asia and Oceania from three centres - Tokyo, Singapore, and London.

Finally, at the end of last year it was announced that Capital Product Partners and Diamond S Shipping were to merge in a $1.65 bill deal. The deal was also due to be completed in January.

This transaction involves Capital Product Partners hiving off its tanker fleet (four crude carriers, 21 product tankers) and combining it with the existing Diamond S business (12 crude tankers and 31 product vessels), giving a total fleet of 68 vessels.

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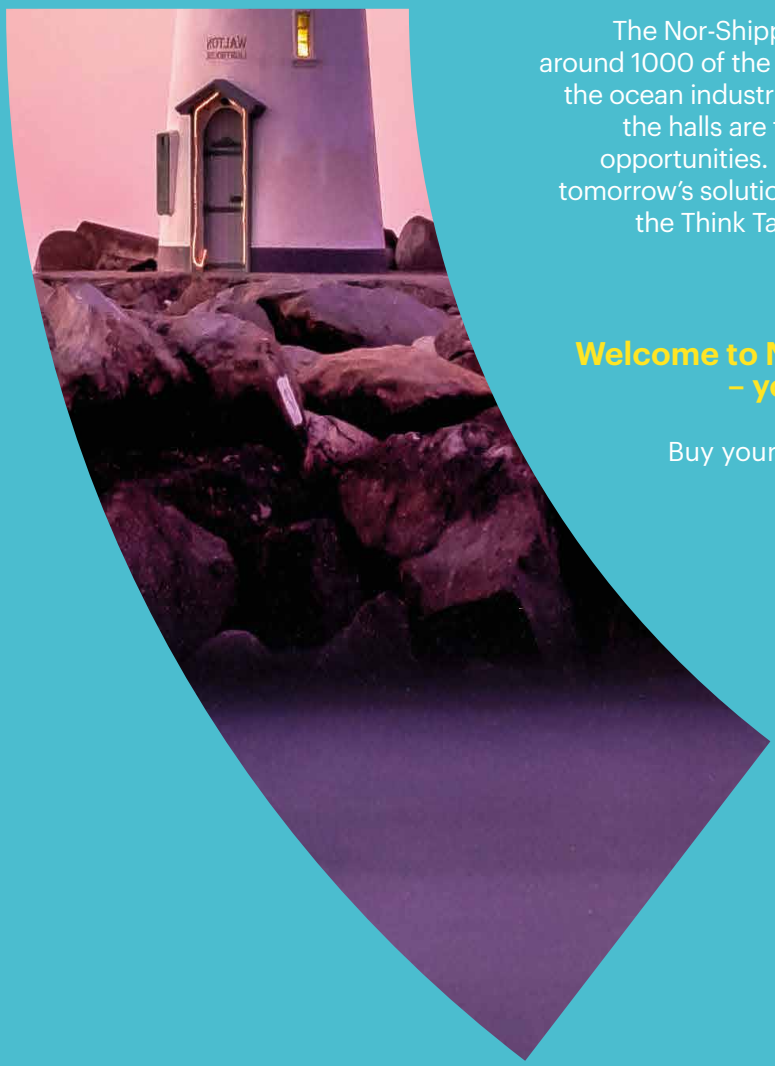

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Fitting a BWTS on a tanker

Ballast water treatment system (BWTS) manufacturers are under close scrutiny, from shipowners, to regulators and, of course, competitors. *

Different vessels have different needs for managing ballast; there is no one solution that fits all ship types, sizes or trading patterns and, for those in the market for a solution, there are many available options.

A BWTS that fits one ship may be an altogether inadequate solution for another and shipowners are now trying to navigate this decision. A product tanker, an Aframax and a VLCC share the same cargo types but this is where the similarity ends when it comes to ballast water treatment.

Ballast treatment systems have come a long way since the early days. Makers listened to ship operators and have developed systems that address the needs of the owner while delivering compliance.

Slip stream electrochlorination (EC) installations are more flexible and less intrusive than ever, while also providing cost effective solutions. In contrast, a filter-UV system on a tanker will, in many cases, require multiple filters and multiple reactors installed on the main ballast lines and another complete filter-UV installation to provide an AFT treatment.

With a BALPURE® slipstream EC system the same EC pack can serve the requirements of both the main ballast line and AFT treatment with the provision of a dedicated filter. This means fewer components, duplication reduction, decreased maintenance needs, and less CAPEX and OPEX costs.

A patented BALPURE seen installed on a vessel

Furthermore, with a lower number of critical components, the reliability is inherently improved, along with system availability.

The fact remains that UV systems still need to be located on the main ballast line of a ship and with the inclusion of a filter, this adds significant complexity to the pipework and installation. With a slip-stream EC system, the filter, an injection penetration and some instruments are the only components within the hazardous zone. The majority of the slip-stream EC system can be installed outside of this zone allowing for easy access.

Maintenance

Once this configuration has been established, there are also maintenance factors to negotiate. Crews frequently experience an influx of additional tasks that require both time and training, which causes understandable trepidation for shipowners and operators. It goes without saying, that there can be no shortcuts when it comes to safeguarding.

With this in mind, it is important to ask the following questions: can the safety of your crew be guaranteed if they have to enter a hazardous zone to perform essential maintenance? Have the additional time implications been factored in to such a scenario?

For example, if a lamp fails on a UV system and requires replacing, the space needs to be adequately purged to ensure gas free conditions before it is safe to enter and carry out essential maintenance. Compliance and welfare hinge on these considerations and must not be taken lightly.

A slipstream electrochlorination system with a flexible footprint, such as De Nora's BWTS, can help overcome many of these challenges. It allows the BWTS to be installed away from the ballast line, with all major equipment located in the engine room – the only equipment required in the hazardous zone are low energy parts which, in the case of the BALPURE® system, is the filter and some sensors.

When it comes to maintenance, a system that relies on self-cleaning technology takes away a lot of the headache. With the BALPURE® system's patented self-cleaning electrode coating, there is no need for regular crew intervention or maintenance activities within the hazardous zone to deal with cell fouling.

On a typical EC system, crews would need to be trained to clean electrodes every eight to 10 months, most commonly with hydrochloric acid, and provided with the relevant safety equipment. An additional maintenance consideration frequently hidden is the environmentally acceptable disposal of the wastes from the cleaning process.

US flagged vessels

With news of applications and certifications for ballast manufacturers' USCG Type-Approval permeating the maritime landscape every week, it does bring to light another interesting consideration – how many of these manufacturers actually have the credentials to install their systems on US-flagged vessels?

Approval for ballast-compliant trade in US waters is one thing – however without the relevant additional certification, specifically 46 CFR Subpart 111.105, manufacturers are not able to install their BWTS in hazardous areas on US flagged ships.

De Nora's commitment to both compliance and safety extend to this additional certification.

Investment in a system that works with your vessel and your goals is paramount in the journey towards safe, long-term compliance. It is one thing for a manufacturer to announce that they can work out an installation programme for you, but another for them to work together with you on the long-term factors such as training, support and service.

It really is no wonder that with so many issues to consider, a clear-cut solution is hard to come-by.

TO

** This article was written by Dr Stelios Kyriacou, General Manager of BALPURE® BWMS, De Nora.*

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Efficiency often starts with a ship's main propulsion unit.

All of the major engine manufacturers have made great strides in the past 10 years or so to increase the efficiency of their main and auxiliary engines to reduce fuel costs, thus cutting emissions and on repair and maintenance needs.

Tanker Operator spoke with Rudolf Wettstein, WinGd's General Manager, Marketing & Application about the company's main propulsion systems, which are being marketed to the large tanker sector.

He said that the main selling points were that the WinGD engines (diesel and low-pressure dual-fuel) provide attractive and competitive technical parameters applied for tankers.

Fuel consumption and steam production options meet customer's expectations. Low-pressure dual-fuel XDF engines are the proven choice of main movers for LNG fuelled vessels, due to their simplicity, safety, low electric power demand and TIER III compliance in gas mode.

Based on the order intake from last year, large tanker owners opted for the following types of WinGD engines: X35, X52, X62, X72 and X82.

WinGD engines are well prepared for the forthcoming low sulfur cap and emission regulations, he claimed, as the diesel engines can operate with low or high sulfur fuels.

For an application burning low sulfur fuel, the correct cylinder oil type must be selected. For high sulfur fuels, WinGD engines can be operated with scrubbers. With reference to NOx emission control areas, for low pressure or high pressure, a selective catalytic reduction system should be fitted.

X-DF engines, due to their TIER III compliance in gas mode and low pilot fuel consumption, are an attractive, parallel solution for the diesel options mentioned above, Wettstein claimed.

The DF engines ordered (or in operation) were for 15,000 dwt chemical tankers, 14,000 dwt asphalt carriers, 115,000 dwt Aframaxes and 125,000 dwt Shuttle tankers.

As for alternative fuels, LNG and LBG (liquid bio-gas) are already being used to fuel WinGD engines. For example, in Spring last year, WinGD and Wärtsilä Gas Systems successfully tested a NG-VOC (natural gas - volatile organic compounds) fuel mix for the WinGD X-DF engine selected to power two 125 000 dwt AET Shuttle tankers.

Much of WinGD's R&D efforts are dedicated to exploring the viability of other fuels. WinGD realises that a significant key to de-carbonisation lies in which fuel is used and is committed to designing the technology to be compatible.

Maintenance

As for after sales/service, maintenance services are typically agreed between shipowner and engine service provider and not through the shipbuilder. WinGD engines are serviced by either CSSC Marine Services (CMS) or Wärtsilä Services, offering owners the choice from a global service network.

In addition, WinGD's WiDE system offers a further advance towards smart shipping and optimising the vessel's performance. The intelligent data analytics allows owners and operators to move towards a more efficient condition-based maintenance system, ideally reducing service costs and increasing TBO.

WinGD takes full responsibility for providing technical support during production and delivery to the engine manufacturer until the end of the warranty period, as well as to shipowners and operators as second level support throughout the engine's lifetime.

WinGD also holds full responsibility for warranty issues on design. Both CMS and Wärtsilä Services offer service/support during the warranty period for the standard maintenance work (field service and spare parts) and regular operation support.

The company will provide a worldwide contact presence throughout the engine's lifetime for all operational and maintenance support after the end of warranty period, he said.

All WinGD engines are manufactured by licensed engine manufacturers in China, South Korea, Japan and Croatia.

A delegation, comprising various representatives and business associates from MIIT, China, shown in front of the WinGD Diesel Technology Centre, in Winterthur, Switzerland earlier this year

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SIRE inspection requirements and STS operations

DYNAMARINe has prepared a guide for senior officers on board vessels analysing the VIQ-7 questionnaire, in order to prepare for a SIRE inspection and vetting assessment.

This guide specifically looks at ship-to-ship (STS) elements of VIQ-7 with references to industry best practice.

The guide's content includes the relevant VIQ question along with critical comments and remarks, on the basis of the knowledge that the DYNAMARINe team has accumulated by assessing STS element reports, prepared for each STS operation of the company's client's vessels.

In preparing the guide, the company acknowledged the support received by shore operators and Masters.

Section A contains the introduction, while Section B addresses related VIQ topics, comments and best practices.

Tanker Operator has reproduced extracts from the guide by kind permission of the publishers.

It has been published in a question and answer format with points of concern raised and then answered.

The first question in Section B is - Are the officers and crew familiar with the requirements and risks during STS operations?

Points of concern here are -

1) Does the ship have an approved STS plan in line with the latest OCIMF ICS/OCIMF/ SIGTTO/CDI 'Ship to Ship Transfer Guide, for Petroleum, Chemicals and Liquefied Gases' -first edition 2013?

2) Does the risk assessment available on board include STS hazards not less than those outlined in Appendix K of the latest OCIMF guidelines?

3) Is a risk assessment of the location undertaken? This is different from the STS risk assessment already on board.

4) Is the Master or Chief Officer (a management level senior officer) qualified to become a POAC?

5) Does the STS plan include provisions for the maintenance of fenders, hoses or other STS related equipment?

The guide answers these questions by providing a list of best practices and provisions of DYNAMARINe's STS registered vessels to each of the points above.

Points of concern during a SIRE inspection are covered by the same question and answer format. The questions are -

1) In previous STS operations, had the nominated POAC satisfied the requirements of IMO oil pollution manual section 1 - Prevention, Para 6.2.1.2 and the company's STS policies?

2) Are a POAC's qualifications assessed as a routine practice within the SMS system?

3) Are the POAC's qualification records kept?

4) Should senior officers know how the POAC's qualifications are assessed?

5) What is the Master's and C/O's understanding of the words 'experience', similar circumstances' and 'similar vessels' when referring to points 3 and 4 above.

6) If the cargo transferred by an STS operation relates to gas or chemical products, does the POAC have to comply with the above qualifications?

7) What is the difference in a POAC qualification when an STS operation is undertaken within port limits?

Addressing the provision of closed fairleads and mooring bitts, the questions posed are -

1) Are the use of open chocks accepted?

2) If an open fairlead has a stopping bar, is this accepted as best practice?

3) Is a proper mooring plan requested from the service provider prior to the commencement of STS operations?

4) Are the closed chocks inspected that will be used according to the mooring plan provided for scratches before the STS operation starts?

5) Is confirmation from the POAC requested regarding the chocks of the participating vessel being properly maintained.

6) Are the use of wire tails, instead of synthetics accepted?

On the basis of feedback from Masters, who are members of onlineSTS.net service, in December, 2017, DYNAMARINe published criteria for the information required to develop a mooring plan, which were adopted by certain STS service providers.

The criteria are listed in the guide.

Turning to checklists and records, the guide posed the questions -

1) Are STS records kept on board a vessel for three years?

2) Are all of the required documents requested from the service provider prior to to start of an STS operation?

3) Is the crew's STS experience recorded after an STS operation has been completed?

Another section contains a what if scenario of an STS transfer operation being carried out while a SIRE inspection is underway. Here the questions posed were -

1) Are the hoses inspected for scratches before the STS operation starts?

2) Are protective sleeves used in case more than one line passes through a single chock?

3) Are the mooring lines inspected before an STS operation?

4) Are the mooring lines' forces calculated?

5) Is the risk assessment in line with OCIMF Annex K?

6) Is the person confident in assessing safety, crew preparedness and the safety of the STS operation?

Finally, an ExxonMobil STS transfer supplement on environmental, safety and quality criteria has been included in the guide.

TO

STS requirements and risks - the basics

Basically, any oil tanker of over 150 gt involved in an STS operation must carry a plan on board - the STS Operations Plan - which must be approved by the flag administration.

The plan should be developed against the information contained in IMO's 'Manual on Oil Pollution, Section 1, Prevention and the ICS/ OCIMF/SIGTTO/CDI' Ship to Ship Transfer Guide, for Petroleum, Chemicals and Liquefied Gases' - First Edition 2013.

Vessel exceptions are transfer operations from FPSOs. FSOs and bunker tankers.

This working plan should be written in the working language practised on board the ship.

A risk assessment should be undertaken when considering the suitability of a location for a transfer, plus for the STS operation itself.

All STS transfer operations should be undertaken under the co-ordination and advisory control of one individual, who will be either one of the Masters involved, an STS superintendent of the POAC.

To prevent fatigue during a long transfer operation, the role maybe transferred to another suitably qualified person.

If a vessel is fitted with permanent fenders and hoses, there shall be a procedures in place to monitor and assess the condition the equipment in accordance with the manufacturers' guidelines.

Facts and fears in the open loop scrubber debate

Recent local bans on scrubber washwater discharges from open loop systems have increased a widespread misconception that there are no safeguards against their environmental impact.*

This has created uncertainty about the viability of this particular solution to reducing sulfur emissions from ships at a time when the market is already under a lot of stress about how to cope with the 0.5% sulfur limit taking effect at the start of 2020.

IBIA has made observations and given background to help clarify the situation, which is summarised as follows:

- The IMO's EGCS Guidelines have established washwater discharge and monitoring criteria to safeguard against environmental damage.
- Regulatory decisions should be based on sound science to assess environmental impacts.
- Environmental impacts of washwater discharges depend on local factors.
- Local authorities may take a precautionary stance but a global washwater discharge ban is currently not on the cards.
- Scrubbers play a role in global fuel availability to comply with the 2020 sulfur limit.

IMO scrubber regulations

Currently the use of systems using water to clean ship exhaust gases, both open and closed loop scrubbers, is allowed under MARPOL Annex VI. Bleed-off water from closed loop systems can also be discharged as washwater after on board treatment, or fed to a holding tank for later discharge if a zero discharge mode is required.

No proposals have been made to prohibit their use even if there are some parties calling for water discharge bans on the basis of concerns about the environmental impact.

IMO might eventually go that way, but it would need to be formally proposed by one or more member states and go through the process of regulatory amendments.

New research

Recognising that a ban on washwater discharges from scrubbers would be a serious blow to shipping companies that have invested millions in them, any proposal and subsequent decision would need to be supported by new research demonstrating that the washwater causes unacceptable environmental risk.

As mentioned, the IMO has established EGCS Guidelines, which include washwater discharge and monitoring criteria to safeguard against environmental damage. These were first issued in 2009, they were updated in 2015 and they are currently under review to be refined further.

The discharge criteria remain the same so the review is chiefly to clarify issues around monitoring of washwater, emission testing and approval of scrubbers. This should help ensure that the monitoring of EGCS washwater is effective to ensure the discharge criteria are met.

EGCS role

The IMO's decision to implement the 0.5% sulfur limit in 2020 hinged in part on the ability of a portion of the global fleet to be compliant by using EGCS in combination with burning HSFO.

This decision taken by the IMO in October, 2016 was based on an availability study, which used a model predicting that ships with scrubbers would be burning some 36 mill tonnes of HSFO, accounting for 11% of total global marine fuel demand in 2020.

That forecast may be too high, as orders were slow to take off until the second half of 2018, but a portion of the fleet will be ready in time and more will come on stream during 2020, reducing some of the demand on global refining capacity to produce sufficient compliant low sulfur fuels to meet global marine fuel demand.

With less than a year before the global bunker fuel sulfur limit falls from 3.5% to 0.5%, there is still a lot of uncertainty in the market as to whether there will be sufficient compliant fuels available in 2020.

Supply pressure

A number of refinery modelling experts say it will be tough even if refiners make a concerted effort to meet demand from the marine sector, and there is no doubt that implementing such a dramatic global fuel specification change over a short period of time will create pressure on supply.

This is not a good time to sow doubts about the feasibility of open loop scrubber installations, as that will increase the pressure on low sulfur fuel supply.

Even with major ports like Singapore and Fujairah banning scrubber washwater discharges, ships will still be able to use open loop scrubbers at sea, which accounts for most of their fuel consumption.

As such, owners that have opted for open loop scrubbers will still be able to use them as their primary MARPOL Annex VI compliance option, but will need to use compliant fuels or systems that can operate in completely closed loop mode in locations which prohibit washwater discharges.

**This article was written by Unni Einemo, Director, IBIA and first appeared on the association's website.*

The real price of cargo tank cleaning

Everywhere one looks today, there are clear indications of growing awareness for optimisation, sustainability and safety in the chemical tanker market. *

Ballast water management, exhaust gas emissions control, routine orders for 'economical' steaming, super smooth hull paints etc, etc, are all designed to lessen the impact of transporting chemicals from manufacturing sites to receiving facilities.

One process, the pre-loading inspection, that actually defines whether a vessel is ready and able to transport these products, is apparently immune to similar scrutiny, because the consequences of off-specification cargo are seemingly insurmountable. This provides commercial interests *carte blanche* to force vessels to clean further and further in the name of 'product quality'.

But what is off-specification cargo? Herein lies the biggest challenge, because the term 'off-specification' is not black or white, it is a very nice shade of grey which provides the perfect landscape for commercial subterfuge.

All cargoes are shipped to some kind of quality specification, which should provide sufficient security or insurance to protect the interests of the vessel nominated to carry the cargo. But the key word here is SHOULD because as noted, quality is not black or white, and just because a product meets the agreed quality specification, does not necessarily mean it meets every requirement of every cargo receiver. So technically, a received cargo could meet the quality requirements as specified in the charter party, but still be off-specification.

Most commonly, this refers to traces of the 'first' previous cargo in the received cargo, although there are a growing number of cases where the second, third (and even eighth) last cargo have been detected at levels that are seemingly unacceptable for the cargo buyer. But just like the term 'off-specification', which is negotiable and therefore impossible to exactly quantify, the term 'unacceptable' is equally unquantifiable; the question being, how much previous cargo in the received cargo is required to render the received cargo as useless or 'not fit for purpose'.

This is not really a cargo quality issue any more, it is more a case of analytical ability. The fact that cargo receivers have access to laboratories that can routinely analyse products for contaminants at concentrations as low as parts per billion, essentially means any detectable level of contamination in the received cargo, will theoretically put it off-specification, regardless of published and/or agreed upon, cargo quality specifications.

It needs to be recognised that if the received cargo does contain 'something' that it did not contain prior to loading onto the vessel, then of course technically that cargo is contaminated. But the point here is this, if 10 parts per billion of the third last cargo is really sufficient to render the received cargo as unusable, then in the future, commercial interests will really have no other choice than to use either dedicated tonnage or stainless steel for transporting more and more chemical cargoes, which comes at a price, that at the moment they seem unwilling to accept.

Consider also the disproportionation between analytical technology and the pre-loading inspection. As rapidly as analytical capabilities are advancing, the pre-loading inspection of vessels steadfastly remains the same as it was 50 years ago as two choices:

1) Visual inspection?
2) Wall wash inspection?

The wall wash inspection is of course the stricter of the two techniques, but honestly, how can randomly splashing methanol or acetone over less than 0.5% of the internal surface area of the cargo tank be accepted, as providing any guarantee that the received cargo will not contain 10 parts per billion of the third last cargo?

Moreover, there are more and more wall wash inspections now, with stricter and stricter specifications. But simply having an apparent need and the ability to test the wall wash samples to lower levels of contamination will never make the wall wash inspection any more worthwhile, because at the end of the day, the sample is still based on 'randomly splashing methanol or acetone over less than 0.5% of the internal surface area of the cargo tank'. This sample could be tested for the presence of any contaminant at any concentration, but fundamentally, it does not represent 99.5% of the cargo tank (or any of the cargo lines). So what is the point?

This may sound like a stupid question,

but it is crucial to understand, because it is creating a tidal wave within the industry that is pushing vessels to a breaking point. Every time a receiver' rejects' a cargo, there is a domino effect starting with commercial interests making pre-loading inspection specifications stricter, (because what else can they do?) and eventually stopping back at the vessel.

Consequence

The primary consequence of this effect is quite simply that vessels are being forced to clean further and further prior to loading whatever the next cargo might be, which clearly involves cleaning for longer periods of time, generally at elevated temperatures, thus consuming more and more fuel and liberating more and more SOx, NOx and COx into the atmosphere.

At the same time, far higher volumes of cleaning chemicals are being consumed, all of which are ultimately discharged into the sea. This is perfectly legal and within the constraints of MARPOL, but morally it cuts to the quick, because it needs to be recognised that in the vast majority of cases, after the first round of chemical washing, there is very often little or no benefit repeating a process that has already been completed. To para-phrase Einstein, repeating a process time and time again, expecting the result to change is the first sign of insanity ..

So what is the answer? In a perfect world the answer is greater transparency, recognising the fact that having the ability to test for lower and lower levels of contamination in any received cargo, does not always mean that the received cargo is off-specification or unfit for purpose.

As long as the received cargo meets pre-agreed quality specifications, then this particular obligation of the shipowner is satisfied. If the cargo receiver has a genuine concern about a previous cargo or a specific cargo group, this has to be documented and quantified in the recap, before any contracts are agreed. Hiding actual cargo quality concerns behind a wall wash inspection should not be a defence for off specification cargo for commercial interests, because the wall wash inspection is worthless, providing no reassurances and absolutely no guarantee that the shipped cargo will be on specification or not.

Real example -

A vessel recently carried a cargo of vinyl acetate monomer (VAM) from the Far East to Europe.

All nominated cargo tanks were wall washed with methanol and VAM prior to loading, tested for colour, hydrocarbons, inorganic chlorides, distillation properties and water, all of which were found to be acceptable.

Manifold, pump-stack, first-foot and final-loaded samples were taken and tested for appearance, colour, water content, distillation properties, acidity and inhibitor content and were all found to be acceptable.

The vessel arrived in Europe and the cargo was tested for the presence of aromatics, maximum 0.1 ppm (100 parts per billion) because this was the cargo receiver's requirement and the cargo was rejected for the presence of 120 ppb aromatics.

Last cargo on the vessel? Mixed xylenes .. a pure aromatic cargo. The vessel's owner had no idea of this specification, but worse, nobody thought to test any of the load port samples for the presence of aromatics. And let's be realistic here, 120 ppb is the same as 120 seconds in a period of 31.7 years - not a lot of aromatics.

The unanswerable question of course is this; could the vessel have cleaned any further? Unexpectedly, my opinion is NO because how is it possible for a vessel to measure or determine that such trace amounts of aromatics have been completely removed from all part of the cargo system? But I also did some digging and found that according to the World Health Organisation (WHO), the maximum limit of xylenes in drinking water is 0.5 parts per million

Not only is the purity of VAM seemingly higher than the quality of drinking water, but more seriously any vessel cleaning with freshwater potentially runs the risk of contaminating subsequent cargoes with aromatics, just by using 'pure' water.

If this trend continues, the alternative is going to be extremely expensive in the long term, because vessels will be forced to only carry the same cargoes or cargo groups, which massively reduces flexibility and increases freight rates.

Let us end with an outrageous example of pre-loading inspections gone mad, with a sting in the tail. The subject vessel was stainless steel and presented with a last cargo of methanol in all cargo tanks. After the carriage of methanol, it has to be accepted that the vessel's cargo tanks and lines will generally be extremely clean after minimum, or no cleaning, (just ventilation) and suitable for virtually any next cargo; particularly in stainless steel cargo tanks.

The next nominated cargo in this case was benzene and for some reason the charterers decided that a wall wash inspection was required prior to loading:

Inorganic Chloride	1 ppm maximum
Colour APHA (ASTM D1209)	5 maximum
Hydrocarbons (ASTM D1722)	Pass
Permanganate time (ASTM D1363)	60 minutes minimum

These specifications are particularly interesting (and ridiculous) when one considers that under ASTM D2359 and D4734, which list the industry recognised export specifications for benzene, there is no requirement for inorganic chloride, or permanganate time. Furthermore, the maximum colour of the loaded benzene cargo is 20 APHA and the only potential source of contaminants that might be identifiable in the ASTM D1722 hydrocarbon test are 'non-aromatic hydrocarbons' with a maximum specification of 0.1% or 1,000 ppm.

Perhaps the only significant potential contamination of the benzene cargo after methanol would be for the presence of oxygenates, but there is no such requirement in the ASTM specifications, presumably because benzene is a finished product and will not be undergoing further chemical processing.

Can there be any justification for such a wall wash specification? Apart from, there is no justification, and sadly no control and nothing stopping cargo interests from demanding whatever they want for a pre-loading inspection, 'in the name of product quality'.

As it turned out, the vessel washed the cargo tanks with freshwater, ventilated until all traces of the methanol were removed, before rinsing with de-ionised water to remove any last traces of inorganic chloride, only for two tanks to be rejected (apparently) for the presence of inorganic chlorides.

The vessel argued that the cargo tanks were clean and eventually a second inspection was carried out, without any additional tank cleaning undertaken. Sanity prevailed, the two cargo tanks were indeed found to be load ready and the vessel was accepted for loading, but only after a delay of 16 hours, which was completely

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unnecessary and effected both the owner and the charterer.

Without making the point that two wall wash inspections taken from the same cargo tank will, in the vast majority of cases, produce different results, (which one is correct?), surely common sense should have taken over here and the vessel should have been accepted for loading without a need for any wall wash inspection? But ok, loading commenced, and a manifold sample taken at the start of loading, confirmed that the product was seemingly acceptable (visibly) at the point of delivery:

At this point the cargo valve on board the vessel was opened in order to introduce the benzene into the nominated cargo tanks in readiness for first foot sampling and analysis.

Fortunately, this vessel was familiar with the L&I Maritime approach to cargo operations and accordingly, the duty officer was prepared to take regular manifold samples throughout the first foot loading operation. The reason for saying that this was 'fortunate' is self-explanatory after seeing the sample drawn 5 minutes after the cargo valve was opened.

No words are needed to describe this scenario, but sadly such incidents are not unusual and the worst of it is that the vessel is very often blamed for this kind of contamination because seemingly the cargo shipper can never make a mistake. Had the vessel not taken extra manifold samples they would undoubtedly have been dragged into the argument of trying to prove that the contamination did not come from the vessel's cargo lines, (even though the last cargo was methanol and there was washing water analysis to prove the cleanliness of the cargo lines).

Needless to say, the shippers could not really dispute the contamination was derived from the loading terminal, but of course the vessel had the responsibility of cleaning up the cargo tanks again, even though they had already jumped through ridiculous hoops, achieving a wall wash standard that had absolutely no bearing on the ability of the vessel to load.

Interestingly, there was no wall wash inspection when the cargo tanks were re-presented. Was this some kind of backhand apology?? But surely, any concerns that the charterers had switching from methanol to benzene would pale into insignificance compared to switching from 'brown sludge' to benzene? And what would have happened if the receivers of the benzene cargo had found traces of the same brown sludge in the cargo??

What is really going on here??

** This article was written by Guy Johnson, Director , L&I Maritime (UK) Ltd.*

Liquid cargo sampling

A pro-active approach to cargo sampling on tankers can potentially save millions of dollars in claims and prevent delays to the vessel.

In this Insight, insurance and P&I club Gard looks at some critical aspects of cargo sampling on tankers.

Disputes relating to 'off-spec' or contaminated liquid cargoes are a recurring problem and shipowners may have no independent evidence as to the cause of an alleged cargo contamination.

The source of the problem could be in the shore tank at the load port, in the shore pipeline during loading or on board the vessel itself. The cargo could even have been manufactured out of specification prior to delivery to the terminal for shipment.

However, if the cargo is found to be 'off-spec' when the vessel arrives at the discharge port and there is no evidence of contamination from the load port, the vessel could be faced with a claim, even if the vessel is not at fault.

Samples drawn at the load port and retained on board showing that the condition of the cargo has not changed between loading and discharge provide the best defence against cargo claims. It is therefore important that shipowners and operators implement proper procedures for taking, and retaining, own (duplicate) samples of all cargoes loaded on the vessel and train their crew in how to perform the sampling process.

For example, an experienced officer may be able to identify a poor-quality sample by visual inspection alone, and early intervention may prevent an expensive claim arising later.

Case Study

Although substantial resources are used on board vessels in the preparation and cleaning of tanks and lines prior to loading, we see that samples are frequently not taken by the vessel at the start of loading. Alternatively, where samples are taken, they are not taken following the proper procedure or are discarded for one reason or another before they can be analysed.

In a recent Gard case, a chemical carrier arrived at a terminal with its cargo tanks and lines cleaned and ready for loading. The vessel was inspected upon arrival and found to be suitable for the nominated cargo. No manifold samples were taken at the commencement of loading, but first foot samples were taken from the designated tanks that were being loaded.

Upon analysis of the first foot samples, the cargo was found to be 'off-spec' resulting in stoppages and delays on the vessel's account for further tank cleaning. The vessel was held responsible for contaminating the cargo and the cargo in the vessel's tank was pumped back ashore and the vessel was instructed to leave the terminal to clean her cargo tanks and lines.

She returned to the terminal following cleaning operations and loading was resumed. On this occasion, manifold samples were taken and analysed and everything found to be in order.

However, upon detailed analysis of the sample of the contaminated cargo, the cause of the contamination was suspected to be from the remains of the previous cargo in the shore tanks and lines. Given that there were no manifold samples on the first occasion, there was no way for the vessel to prove that the cargo received on the first occasion may have been contaminated prior loading.

Protecting interests

The manifold - The transfer of custody of the cargo from another vessel or the terminal to the vessel, and vice versa, normally takes place when the cargo passes the vessel's manifold. A manifold sample taken at the start of loading and discharge can, in principle, determine who is responsible for the contamination of a cargo. It should be noted that manifold samples should be taken outboard of the manifold valve. During this process, the loading rate should be very low, preferably by gravity.

In some Gard cases, even where a manifold sample had been taken at the start of loading, samples have been known to have been disposed of by the crew if they do not appear to be of the expected quality. A new sample is then drawn once the cargo quality appears as expected, and becomes the manifold sample 'on record', as having been taken by the ship at first loading.

Thus, the only evidence available in this instance indicates that sound cargo was loaded and the evidence showing that the cargo had been contaminated ashore is lost. While this practice appears to be counter-intuitive, it is nonetheless, prevalent.

First foot samples - These should be taken to confirm that the vessel's systems and pipes are clean. This is particularly important where sensitive and/or expensive cargoes are loaded to reduce the risks associated with contamination of the entire cargo parcel.

Tank samples - Taking a final tank sample after completion of loading and prior to commencement of discharge will enable the vessel to determine the cause of any potential contamination on board. It can also be useful for the officer in charge to request specimens of samples taken by the terminal's surveyor at the terminal's manifold as well as samples from the shore tank and shore line.

If the quality of the cargo samples from the ship and shore appear to be different, loading should be ceased for further investigation.

Recommendations

To ensure the best possible defence of a cargo claim against the vessel, it is recommended that shipowners create awareness among the crew of the problems related to improper sampling and have in place written procedures describing the sampling process in detail.

An improper sampling method can result in a poor-quality sample which is not necessarily representative of the cargo itself.

The procedures should include and emphasise the following points:

- Involvement of vessels' crew. The crew should participate in the taking of cargo samples, both during loading and discharge, and should be competent in checking and verifying the quality of the samples taken. The Chief Officer should preferably be involved in all cargo sampling whether it is taking samples for the vessel or for the charterers.
- Independent cargo samples to be taken by the vessels' crew. As a minimum, the crew should, for each grade of the cargo, take:
- Manifold samples, taken at a vessel's manifold at the start of loading, preferably with the manifold valve in a closed position. Spot checks should be

carried out at the manifold during loading whenever practicable, eg after shore stops and/or change of shore tanks.
- Pump stack samples, if taken by a surveyor the vessel should take own/ duplicate samples.
- First foot samples, taken from the cargo tanks once cargo level reached the first foot in the tank(s).
- Final tank samples, taken from the cargo tanks after completion of loading.
- Cargo tank samples prior to commencement of discharge.
- The importance of the manifold sample, often referred to as the 'million-dollar sample'. Where a proper sample of the first products loaded has been drawn and retained on board, any uncertainty about the quality of the cargo at the time of loading can usually be clarified at relatively low cost. Vessel procedures should therefore be specifically formulated to avoid any misunderstandings when it comes to ensuring that this manifold sample is never disposed of, regardless of its apparent quality.

Handling of samples
- Always flush the sampling point prior to drawing a sample.
- Always use clean and appropriate sampling equipment and properly label, seal and store the samples in designated areas
- The labelling should always state where, what type and when the sample was drawn, eg 'manifold at commencement of loading' or 'final tank sample drawn in the middle of cargo tank 4P'.
- Ensure there is sufficient sample amounts for retesting if necessary.
- For sample retention, we recommend members and clients have a clear policy taking into consideration the storage space, the vessel's schedule and the number of grades loaded for each voyage. Samples should be retained for at least three months after the completion of discharge. If the vessel has received complaints during a voyage the samples should be retained for longer if possible, or ask your insurer if the samples can be disposed of.
- Recordings should be made in the cargo log-book to ensure traceability of samples taken.
- Sample bottles should, as far as possible, be suitable for the cargo in question. For example, use amber coloured glass bottles for UV sensitive cargo to prevent deterioration due to the effects of UV lights.
- For cargo that is oxygen sensitive the bottles should be purged with nitrogen prior to sampling.
- Sample report: On completion of sampling, a sample report should be produced by the vessel listing the unique identifier number of each sample retained on board and of the samples given to the charterers' surveyor. The sample report should be jointly signed by the vessel's Master, or his representative, and the charterers' surveyor.

Shipowners and operators should instruct their officers on board that whenever they are in doubt as to the apparent quality of a liquid bulk cargo, they should seek expert advice and have any samples analysed at the loading port.

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TANKER*Operator's* Top 30 Owners and Operators

There has been a bit of a re-shuffle in *Tanker Operator*'s Top 30 listing.

However, what is constant is that the Chinese controlled companies remain dominant, due to their massive newbuilding spree, which seems to be continuing.

The most noticeable change is the rise of Euronav up to second place. This can be easily explained by the completion of the merger with Gener8, which occurred in June, 2018.

Bahri has moved up into third place on the back of several VLCC deliveries last year. The fate of NITC obviously hangs in the balance, but we have included the vessels still being shown on Equasis, several of which are at the veteran stage.

Another merger, which could affect next year's listing is that of Capital Product Partners and Diamond S Shipping, if it goes through as planned.

Credit-Navios Maritime Acquisition

One new entry was Delta Tankers, which owed its inclusion to the purchase of VLCCs last year.

Returning to the list is TORM following a few troubled years.

However, the company looks to have put the past behind it and is now taking delivery of several newbuildings.

Overall, there were 204 tankers of all types ordered last year, as against 334 in 2017, according to figures produced by Clarkson Research Services.

The order backlog at the end of 2018 was 67.1 mill dwt, compared with 74.9 mill in December, 2017.

Taking VLCCs as an example, 39 were ordered last year, compared with 56 in 2017.

Newbuilding prices firmed last year with VLCCs averaging $92.5 mill, compared with $81.5 mill for the previous year. Some of this increase could be explained by the fitting of scrubbers, as Clarkson estimated that more than 70% of the VLCCs on order were contracted scrubber fitted.

As for MRs, the average newbuilding price for this segment went up to $36.5 mill last year, compared with $33.8 mill for 2017.

As usual, the data has been gleaned from the companies themselves, the Equasis database plus other sources.

1 COSCO Shipping Energy Transportation (CSET)
(22.5 mill dwt, plus 3 mill dwt newbuildings)

COSCO Shipping Energy Transportation (CSET) is a joint stock listed company set up in June, 2016 to operate COSCO Shipping Corp's oil and LNG shipments.

CSET is a subsidiary of China COSCO Shipping Corp. Its predecessor was China Shipping Development Co and its principal subsidiaries include COSCO Shipping Tanker (Shanghai), COSCO Shipping Tanker (Dalian), COSCO Shipping LNG Investment (Shanghai), China Shipping Development (Hong Kong) Marine and COSCO Shipping Tanker (Singapore).

Towards the end of last year, the company owned and operated around 160 tankers, totalling in 22.537 mill dwt, having taken delivery of several newbuildings and chartering in tonnage long term from other Chinese operators.

In addition, there are around 16 tankers on order, totalling about 3 mill dwt.

For example, CSET signed two contracts with Dalian Shipbuilding Industry Co (DSIC) in November, 2017 to build four VLCCs, plus three Suexmaxes, and with Guangzhou Shipyard International (GSI) GSI in December, 2018 to build two Panamaxes, two 109,900 dwt crude oil tankers and three 114,000 dwt crude oil tankers, and purchased another two Panamaxes from China Shipbuilding Industry Corp (CSIC).

In December, CSET took delivery of the LR1 'Lian Gui Hu' owned by the Dalian subsidiary and built at DSIC.

She is the first 72,000 dwt LR1 to enter the domestic market to feature a wide beam (36 m), low draft and energy saving features, the company claimed.

'Lian Gui Hu' was also the last of five Panamax types delivered by DSIC to CSET.

Last December, CSET took delivery of the wide beam and shallow draft LR1 'Lian Gui Hu' from DSIC

2 Euronav
(18.1 mill dwt)

Antwerp-based Euronav has rocketed into second place and has now become the world's largest, independent quoted crude tanker company, as a result of the closure of the merger with Gener8 Maritime, which was completed in June of last year.

Euronav operates its fleet both on the spot and the period markets. Most of Euronav's VLCCs and one of the V-Plus (ULCCs) are commercially operated in the Tankers International Pool.

Some of the Suezmaxes are operated on long-term charters, while the remaining vessels are also operated on the spot market.

The company owns, manages or operates around 43 VLCCs, 25 Suezmaxes and two ULCCs (V-Plus) and in addition now has an LR1, courtesy of the Gener8 merger, which also operates on the spot market.

Euronav also jointly owns two ULCC size FSOs, although they haven't been included in the figures.

The company's fleet management is mainly conducted by three wholly owned subsidiaries -Euronav Ship Management SAS and Euronav SAS, both French companies based in Nantes, France and with a major branch office in Antwerp, plus Euronav Ship Management (Hellas) with a branch office in Athens.

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Two Euronav vessels seen at Moda Midstream's loading facility at Ingleside, Texas Photo credit- Moda Midstream.

3 Bahri (National Shipping Corp of Saudi Arabia) (15.5 mill dwt)

Bahri currently owns 92 vessels, including 46 VLCCs, 36 chemical/product tankers, six multi-purpose ro-ros and five drybulk carriers.

Several of the VLCCs were delivered last year, which helped to push the company further up *Tanker Operator*'s rankings.

The VLCCs come under the banner of Bahri Oil, which has several long-term contracts with charterers having volumes exceeding its owned fleet capacity.

In addition, it also has a long-term Charter Ownership Agreement (COA) with South Korean refiner S-Oil to transport three to four cargoes per month, equivalent to five to seven VLCCs.

Bahri Oil is also the exclusive provider of VLCC transportation for Saudi Aramco's CIF (cost, insurance and freight) sales.

In partnership with United Arab Chemical Carriers (UACC), Bahri Chemicals owns and operates the MR and LR1 fleet of coated chemical tankers.

All of the vessels are technically managed by Bahri Ship Management.

4 China Merchants Energy Shipping (CMES) (14.9 mill dwt, plus 1.6 mill dwt newbuildings)

CMES has also moved up in the rankings thanks to newbuilding VLCCs being delivered last year.

The vessels are owned by China VLCC (CVLCC), jointly established in September, 2014, which is the VLCC subsidiary of CMES.

On 18th December, 2018, CMES held the naming ceremony for its 49th VLCC 'New Honor' at NACKS.

Both the 49th and the 50th VLCC are due for delivery in the first few months of this year and thus are not included in the overall total above. There are thought to be another five more still to come.

The 48th VLCC, 'New Vitality' delivered from Dalian in November last year, is unique in that she was fitted with sails.

All of the VLCCs and the five Aframaxes in the fleet are technically managed by Associated Maritime Company (Hong Kong) (AMCL).

5 Mitsui OSK Lines (MOL) (13.9 mill dwt)

Figures produced by MOL to the end of September, 2018 showed that the Japanese giant operated 162 tankers, made up of 77 owned, 78 chartered in and seven listed as 'other'.

The Equasis database shows that the Tokyo office manages 29 VLCCs, four Aframaxes, one LR2, seven LR1s and 11 MRs, plus a couple of smaller chemical/products tankers.

MOL is also heavy involved in pools and joint ventures.

CMES' VLCC 'New Vitality' has been fitted with sails

NITC
(13.8 mill dwt)

6

Since NITC's entry last year, US sanctions against dealing with Iranian companies have been reintroduced.

Although parent National Iranian Oil Co has claimed that it has signed up a number of outlets for its crude oil exports, despite the sanctions, it is not clear whether NITC tankers are being used.

It is known that India and South Korea are importing Iranian crude, possibly with Iran underwriting the risk, although of course, the International Group member P&I clubs and the main hull and cargo insurance companies cannot handle the ships.

Equasis is still showing NITC as owning 38 VLCCs, four of which date back to the late 1990s. In addition, there are eight Suezmaxes listed, five Aframaxes and three Handysize tankers.

NYK Group
(13.6 mill)

7

The NYK Group consisted of 41 owned and 24 chartered tankers as of 31st March, 2018, the latest figures available.

In addition, there were 29 shuttle tankers listed, which are the Knutsen vessels operated in a joint venture. Other joint ventures include NYK Stolt.

Most of the owned vessels are managed out of Singapore by NYK Shipmanagement, including 19 VLCCs, one Aframax and nine MRs.

One of Teekay's latest Shuttle tankers

8 Teekay Group
(12 mill dwt, plus 0.7 mill dwt newbuildings)

For the sake of simplicity, we have grouped all of the Teekay tanker owning companies together.

The Group has taken delivery of several vessels during the year, in addition to disposing of older tonnage.

Still describing itself as the world's largest mid-sized tanker company involved with Suezmaxes and Aframaxes, it also has a sizeable Shuttle tanker fleet under the ownership of Teekay Offshore.

The shuttle tankers range from around 95,000 dwt to 155,000 dwt.

At the end of last year, the company had one VLCC, 30 Suezmaxes, 20 Aframaxes and 28 shuttle tankers, plus nine LR2s and one Handysize vessel.

In addition, the group has a further six newbuilding shuttle tankers to come.

Teekay also owns and operates FPSOs, FSOs, LNG and LPG carriers, and long-distance towage vessels, which have not been included in the figures.

Maran Tankers Management (MTM)
(11.8 mill dwt, plus 1.7 mill dwt newbuildings)

9 MTM is part of the Angelicoussis Group and has taken delivery of several VLCCs recently, bringing the total managed to 31.

In addition, the company manages 12 Suezmaxes and two Aframaxes.

In 2017, the company placed orders at Daewoo for another four VLCCs to be delivered this year and was thought to be behind a recent contract for two Suezmaxes at Daehan.

MTM's 2009-built Suezmax 'Maran Pythia'

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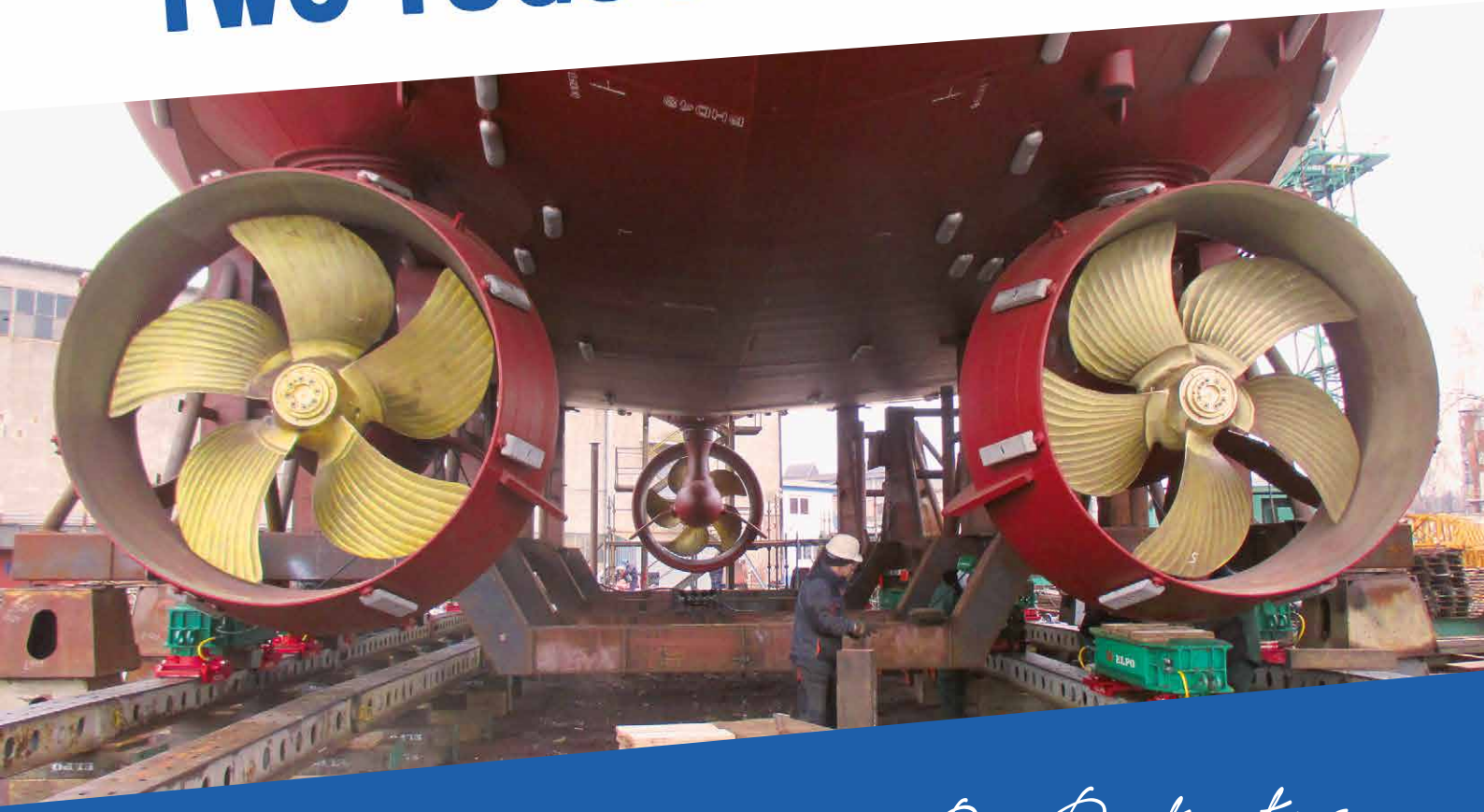

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Frontline
(11.8 mill, plus 300,000 dwt newbuilding)

10 Frontline has one more VLCC still to come from its newbuilding programme and has now taken delivery of all the other vessels recently contracted.

Including those chartered-in and under commercial management, Frontline's fleet consists of 21 VLCCs, 18 Suezmaxes and 22 LR2s.

The first of SCF's LNG powered Aframaxes

Sovcomflot (SCF)
(11.5 mill dwt, plus 0.8 mill dwt newbuildings)

11 On 28th December, 2018, Sovcomflot (SCF) placed an order at Zvezda shipbuilding complex for the construction of three new generation product carriers that will use cleaner-burning LNG fuel as their primary fuel.

The three MRs will have a deadweight of 51,000 tonnes each. They will transport petroleum products and gas condensate under a period charter to Novatek

Each tanker will be built to Ice Class 1B, to enable safe operations in challenging ice conditions, including the Baltic, the company said.

In September last year, SCF also ordered two 114,000 dwt LNG-fuelled Aframaxes at Zvezda.

In 2018, Sovcomflot took delivery of three LNG-fuelled Aframaxes, including the first 'Gagarin Prospect' from Hyundai Heavy Industries.

The first and the sixth in the series are chartered to Shell and during the year, the oil major supplied LNG as bunkers to the 'Gagarin Prospect', which had arrived at Rotterdam from Primorsk in a ship-to-ship (STS) operation using Shell's 6,500 cu m bunkering vessel 'Cardissa' .

SCF has been shedding some older tonnage and at the end of last year, had two VLCCs, 15 Suezmaxes, 36 Aframaxes, eight Aframax shuttle tankers, nine LR2s, nine LR1s, four Panamax shuttle tankers, 26 MRs, three MR shuttle tankers and four Handysize tankers.

Added to the three Zvedza newbuilding MRs are five more LNG powered Aframaxes and one more MR shuttle tanker still to come, SCF confirmed.

Dynacom Tankers Management
(11.1 mill dwt)

12 Another company which has come to the end of its newbuilding programme is George Prokopiou's Dynacom Tankers Management, which manages the wet vessels.

According to Equasis, the company manages 16 VLCCs, 30 Suezmaxes, one LR2, one Aframax and 16 Panamaxes.

13 AET
(10.6 mill, plus 1.01 mill dwt newbuildings)

AET is in the midst of a fleet rejuvenation programme having taken delivery of four Aframax and two Suezmax tankers and sold eight of its older Aframax tankers last year.

A further seven vessels are currently on order and due for delivery later this year and in 2020.

Last October, AET named two of the world's first LNG dual-fuelled Aframax tankers 'Eagle Brasilia' and 'Eagle Bintulu' at a ceremony held at Samsung Heavy Industries shipyard in Geoje, South Korea.

Both vessels have been taken on long-term charter by Shell International Trading and Shipping Company (STASCO), primarily for operations in the Atlantic Basin. They began their charters during the fourth quarter of last year.

AET has four Suezmax size DP shuttle tankers being built for long-term charter to Petrobras in Brazil and one Aframax size DP shuttle on order and attached to a long-term contract with Shell, also for Brazilian operations.

In addition, the company is currently building two LNG dual-fuel Aframax size shuttle tankers to operate in the North and Barents Seas for Equinor.

When delivered, these two ships are expected to be the most environmentally friendly shuttle tankers on the market, the company said. AET is already operating two DP shuttles in Brazil and two in the North Sea.

In total, the operating fleet comprises 14 VLCCs, six Suezmaxes, 33 Aframaxes, four DP shuttle tankers of Aframax size, five LR2s, one Panamax, three MR2s and 13 chemical carriers.

AET's 'Eagle Brasilia' is one of two LNG powered Aframaxes delivered last year for a charter to Shell

DHT Holdings
(8.4 mill dwt)

14 DHT is a VLCC holding company and since its takeover of BW's VLCC fleet, now has 27 VLCCs.

The merger was finalised during the middle of 2017.

DHT took delivery of the final VLCCs in its newbuilding programme last year and all but three of the vessels are managed by Singapore-based Goodwood Ship Management.

Minerva Marine
(7.6 mill dwt)

15 Minerva has risen slightly in the rankings having taken delivery of a few newbuildings last year.

The company's website is showing six VLCCs, seven Suezmaxes, 34 Aframaxes, 17 MRs and two Handysize tankers in its fleet list.

16 Thenamaris
(7.4 mill dwt, plus 0.3 mill dwt newbuildings)

Thenamaris also took delivery of a few newbuildings last year and has three more Aframaxes on order, due to enter service in 2020. The company manages five VLCCs, eight Suezmaxes, 33 Aframaxes, 10 MRs and seven Handysize tankers.

DHT's 2016-built VLCC 'DHT Leopard' (see page 39)

Ocean Tankers
(7.1 mill dwt)

17 Singapore-based Ocean Tankers manages 15 VLCCs, 12 Aframaxes, five Panamaxes, 20 MRs and two Handysize tankers.

In addition, the company operates what it calls general purpose chemical and products tankers and bunkering vessels, primarily in Southeast Asia around the Singapore area.

Ocean Tankers also manages two FSOs, which are not included in the figures.

Tsakos Energy Navigation (TEN)
(7 mill dwt)

18 TEN has slimmed down slightly and now has two VLCCs, 16 Suezmaxes, 19 Aframaxes/LR2s, 12 LR1/Panamaxes, six MRs and 12 Handysize tankers.

In addition, the company has LNGC, drybulk and containership interests.

All of the vessels are managed by Tsakos Columbia Shipmanagement.

TEN was believed to have ordered a couple of Suezmaxes earlier this year.

TEN's 2012 Suezmax 'Euro' seen at Gibraltar

19 Maersk Tankers
(6.7 mill dwt, plus 0.7 mill dwt newbuildings)

Maersk Tankers operates 164 product tanker vessels across five segments - Intermediate (Brostrom), Handy (Handytankers), MR, LR2 and Aframax.

Of these, 80 are owned by Maersk Product Tankers, 22 are chartered and 62 are under commercial management, the company said.

Maersk Tankers has an ongoing fleet renewal programme in the MR and LR2 segments.

In the MR segment, this comprised 19 vessels in total. By the end of 2018, the fleet had been expanded by taking delivery of 10 newbuildings from Sungdong Shipyard, as well as four newbuildings from Samsung Heavy Industries in Ningbo, China. The remaining MRs will join the fleet in 2019 and 2020.

In 2018, Maersk Product Tankers ordered six firm and four optional LR2s from Dalian with the first vessel expected to enter the fleet in 2020.

The latest pool to be launched was the Aframax Pool, which operates primarily West of Suez with uncoated Aframaxes and LR2s shipping dirty petroleum products (DPP). There are currently seven vessels in this pool.

As for the LR2 pool, this consists of 12 vessels, while the MR pool has 41 tankers, the Handytankers pool has 62, and Brostrom commercially operates 32 intermediate tankers around northern Europe and the Baltic.

Maersk Tankers' 2016-built MR 'Maersk Tangier'

20 SK Shipping
(6.6 mill dwt)

Last year, Seoul-based private equity firm Hahn & Co acquired a 90% stake in SK Shipping, South Korea's fourth-largest shipping company, for a reported $1.35 bill.

The shipowner, a subsidiary of energy conglomerate SK Group, is involved in the bulk carrier, petroleum product tanker, crude oil tanker and LNGC sectors.

In the tanker segment, SK Shipping manages 20 VLCCs, two Aframaxes and three MRs.

TMS Tankers
(6.6 mill dwt)

21 The tanker management arm of George Economou's empire, TMS Tankers recently took delivery of both newbuilding and secondhand tonnage.

As at the end of last year, the company managed three VLCCs, 14 Suezmaxes, 31 Aframaxes and two MRs.

International Seaways (INSW)
(6.3 mill dwt)

22 The former Overseas Shipholding Group international operation, INSW owns or manages 13 VLCCs, two Suezmaxes, five Aframaxes, one LR2, seven Panamaxes, four LR1s and 10 MRs.

The company is also involved in the US Gulf coast lightering operations.

Capital's 2019-built VLCC 'Amphion'

23 Navios Maritime Acquisition Corp
(6 mill dwt)

Last December, Navios Maritime Acquisition Corp completed the acquisition of Navios Maritime Midstream Partners.

Under the terms of the transaction, Navios Acquisition acquired all of the outstanding common units of Navios Midstream.

This gives the expanded company 15 VLCCs, eight LR1s, 18 MRs and two smaller chemical/product carriers.

At the beginning of this year, the company was rumoured to have ordered another three VLCCs.

Capital Ship Management
(5.9 mill dwt)

24 Capital Ship Management looks after 10 VLCCs, four Suezmaxes, eight Aframaxes, 26 MRs and Handysize tankers, plus one smaller tanker. This year, parent Capital Product Partners is to merge its product tanker interests with Diamond S Shipping to form a new company.

Olympic Shipping & Management/Springfield
5.5 mill dwt)

25 The former Onassis company is currently taking delivery of newbuildings.
At present, Equasis is showing 15 VLCCs, four Suezmaxes and two Aframaxes as owned or managed.

OSC's 2011-built VLCC 'Saiq' (see page 44)

Oman Shipping Co (OSC)
5.4 mill dwt)

26 OSC has 15 VLCCs, one Aframax and 12 MRs on its books.

It also has a fleet of LNGCs and VLOCs, as well as other vessel types.

The company has a close relationship with Shell in the tanker sector and all of the vessels are managed by Oman Ship Management.

Delta Tankers
4.8 mill dwt)

27 Delta Tankers has been catapulted into *Tanker Operator*'s Top 30 listing by way of purchasing several VLCCs recently.

Today, the company manages three VLCCs, 20 Suezmaxes and seven Aframaxes.

Formosa Plastics
(4.3 mill dwt)

28 The Taiwanese energy concern has nine VLCCs, two Aframaxes, five Panamaxes, 16 MRs and three Handysize tankers, according to various sources.

Sinokor Merchant Marine
4.3 mill dwt)

29 Sinokor manages or operates six VLCCs, eight Aframaxes, two LR1s and 27 MRs.

TORM
(4 mill dwt, plus 500, dwt newbuildings)

30 Copenhagen based pure product tanker player TORM has 12 LR2s, seven LR1s, 50 MRs and five Handysize tankers.

In addition, the company has another two LR1s and seven MRs still to be delivered this year and next.

TORM's 2016 newbuilding MRs seen fitting out

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