MARITIME LOGISTICS PROFESSIONAL

November/December | *Volume 8, Issue 6*

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Oscar Kallerdahl, VP LNG Systems
Rolls-Royce Marine

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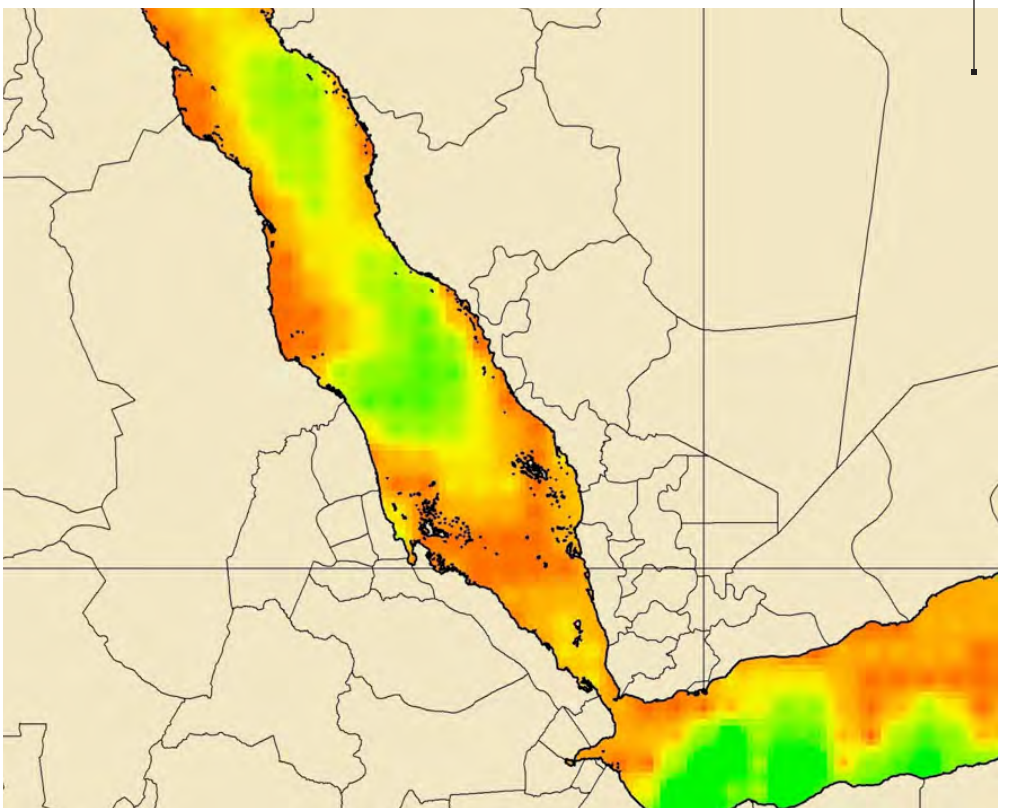
"That (LNG bunker-supply) hurdle was passed a long time ago in Norway. It's now only a design or technical issue. It's no longer an argument to say that we don't know if LNG will be available."

– Oscar Kallerdahl,
Rolls-Royce Marine VP, LNG systems



Credit: StratumFive

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ON THE COVER

Oscar Kallerdahl is Rolls-Royce Marine's vice-president of LNG systems. Kallerdahl says that it's no longer an argument to say that we don't know if LNG will be available. Together, Kallerdahl and his Rolls-Royce team are proving that theorem every day. The story begins on page 32.

Image: Rolls-Royce

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PORT CANAVERAL

Editor's Note

Two Kinds of Green

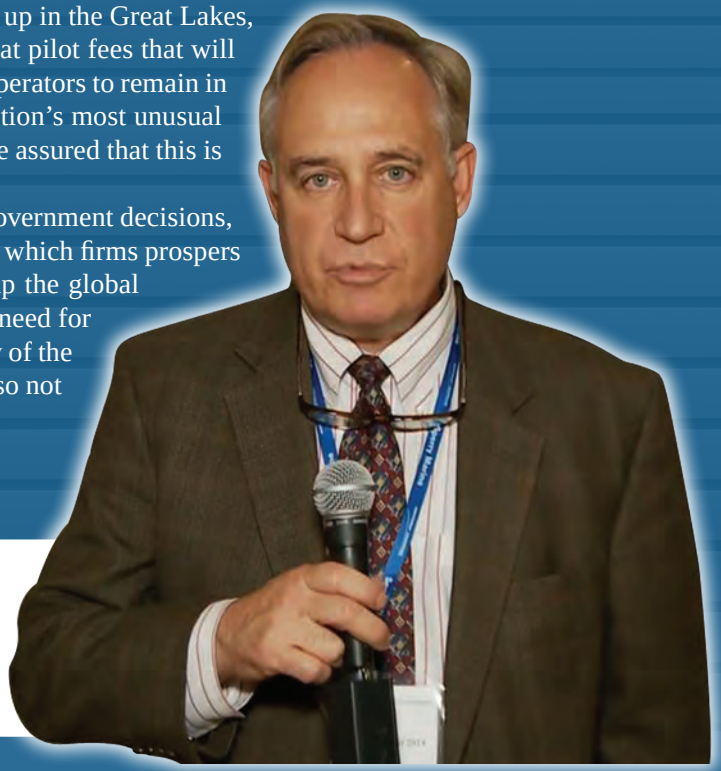
Our regular look at the regulatory and environmental side of the intermodal puzzle, also our final edition of this calendar year, provides a stark picture of where and how the regulatory hammer is impacting global shipping. The environmental lobby would have you believe that the waterfront hasn't done nearly enough to clean up the world's oceans and air. Certainly, we have a long way to go. But, that's not because the intermodal supply chain hasn't pitched in with vigor. They have and will continue to do so. But, don't take my word for it.

In places like the ports of Los Angeles and Long Beach, CA, the march towards a locally mandated 'zero emissions' signature is well on its way and in every way possible. Will they get there? That's hard to know, especially with most of the low hanging fruit already picked. Reaching outside the gates of the ports themselves, regulators are even measuring 'incidental emissions.' Beyond the effort to get greener, there's also the cost to do it and the question of who will pay when that day arrives. Within this edition, we address all of that and more.

The looming IMO 2020 deadlines are just one part of the bigger picture. Out ahead of that, the march towards a cleaner supply chain is well underway. There is more than one way to get there. When it comes to LNG, for example, the discussion has moved on from the worries associated with bunkering logistics. LNG as a fuel is here, and there is no turning back. William Stoichevski's look at bunkering infrastructure in Europe begins on page 32. Similarly, Rick Eyerdam's primer on U.S. East Coast LNG developments, starting on page 24, provides a uniquely American perspective on the very same topic.

Not all regulations are aimed at addressing the environment. That's a good thing, especially in North America. For example, the rapidly escalating costs associated with harbor pilots has begun to take almost as big a bite out of shipper's bottom lines as the more familiar cost of getting green. Nowhere is that more evident than up in the Great Lakes, where regulators on both sides of the border struggle to arrive at pilot fees that will ensure a commercial supply chain that is safe, but also allows operators to remain in the black. To that end, ***MLPro***'s Tom Ewing tells us in this edition's most unusual story, "If someone tells you it's not about the money, you can be assured that this is exactly what it's all about."

Looking ahead to 2019, all indicators point to a year where government decisions, trade policy and regulatory pressures will have more to do with which firms prospers and which does not, than the commercial entities that make up the global supply chain. That's unfortunate. The rules should balance the need for a viable commercial supply chain while also ensuring the safety of the general public and the wellbeing of the environment. That's also not always the case.



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MarTID 2019:

The second annual global Maritime Training Insights Database (MarTID) survey examines the impact of the autonomy trend in maritime operations on the training of future 'seafarers,' and as of November 26, 2018, the survey is officially 'open' for a period of approximately six weeks.

CREDIT: AdobeStock © Carabay

The Global Survey of Maritime Training Practices is Open

The MarTID 2019 Survey

To facilitate a broader response, this year the MarTID steering group opted to both shorten the survey and to offer three, targeted versions: one for vessel operators, one for training institutions and one for seafarers.

- ***For Operators:***
  https://www.surveymonkey.com/r/2019MarTIDOperator
- ***For Training Institutions:***
  https://www.surveymonkey.com/r/2019MarTIDMETI
- ***For Seafarers:***
  https://www.surveymonkey.com/r/2019MarTIDSeafarer

What is MarTID?

MarTID is a non-commercial, joint initiative of the World Maritime University, Marine Learning Systems and New Wave Media. Its core principles include ethical integrity, objectivity and confidentiality. It was launched in 2018 with the completion of the inaugural survey and publication of the 2018 Training Practices Report (which can be found at www.MarTID.org).

Why is MarTID Important?

This MarTID initiative is the first of its kind in the world. There is broad agreement that roughly 80% of maritime accidents involve human factors causes. As such, vessel operators and maritime training centers are pouring significant resources into creating best practice and innovative training programs. The MarTID database will grow in breadth and depth annually with your participation, shining a light on the training approaches and successes of global vessel operators and training centers. Insightful, hard-to-get information inside the report includes:

- ***Global trends in training budgets.***
- ***Average training amount spent per seafarer.***
- ***Trends in training technologies and training models.***

What's new for MarTID in 2019?

The 2019 survey is designed to further the mission of MarTID 2018: to provide a global picture of maritime training that is not currently available. Last year's survey was designed to collect a broad set of foundational training data. This year's survey will be shorter and consist of two foci.

The first section of the survey will focus on collecting benchmark data tracked annually, revealing trends in core training issues. These include training budgets, training models, training staffing, the use of technology, major training initiatives, and seafarer demographics.

The second section will focus on this year's special topic: the impact of autonomous vessel operations on maritime training. This trend has already begun to impact operations and the need for training. The 2019 MarTID survey will explore the perspectives of vessel operators/managers, maritime administrators, maritime training experts and seafarers.

What's in it for me?

As was the case in 2018, the 2019 survey will be followed by a series of publicly-available reports, broadly published. These reports will provide both high-level and deep-dive information covering both broad trends as well as deep coverage of the 2019 special topic. Although MarTID was founded and run by the three partner organizations, it requires community involvement to succeed. Your participation, approximately 20 minutes of your time, helps to broaden the depth of information. To that end:

- ***Vessel owner/operators will have a means to benchmark their own training initiatives.***
- ***Maritime training institutions will be able to better gauge future needs.***
- ***Seafarers will potentially have a clearer picture of evolving skills requirements.***

Take the Survey

- ***For Operators:***
  https://www.surveymonkey.com/r/2019MarTIDOperator
- ***For Training Institutions:***
  https://www.surveymonkey.com/r/2019MarTIDMETI
- ***For Seafarers:***
  https://www.surveymonkey.com/r/2019MarTIDSeafarer

Questions?

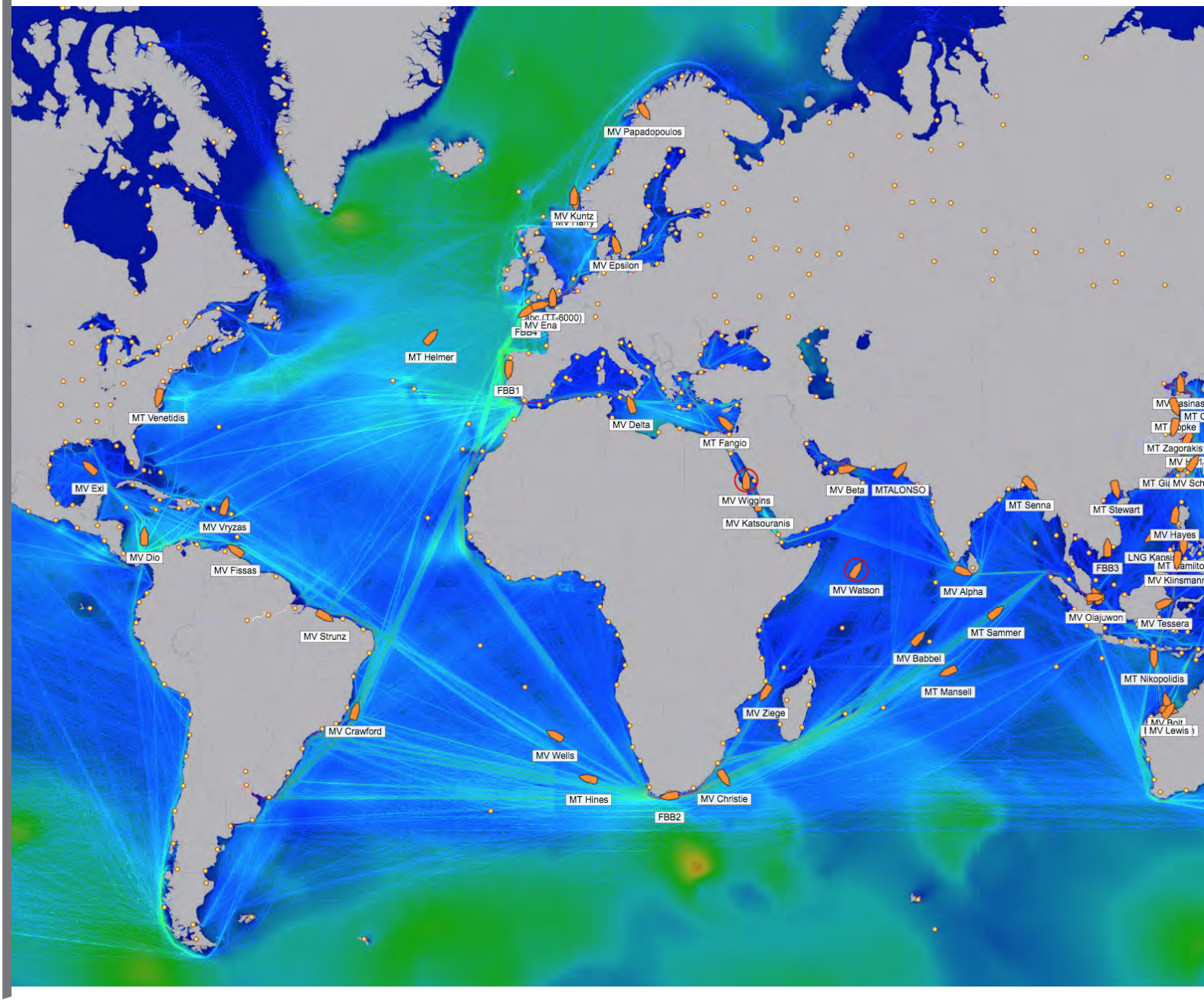
The MarTID partners are dispersed in several world time zones, and your question via email will likely be answered in 24 hours or (much) less.

Email: info@MarTID.org
Visit: http://scholar.wmu.se/martid

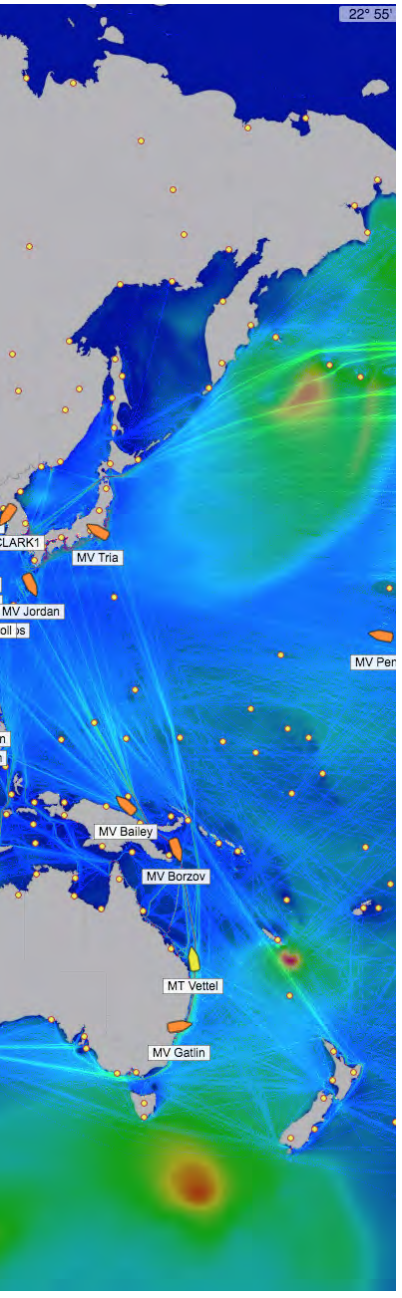
Who wins in shipping's

Weather has to be one of the most important building blocks of any digital operations solution. But, that's only one of dozens of individual variables. Building a data management solution that navigates the unexpected, and not just the low hanging fruit, is the way to go.

By Stuart Nicholls



Battle for Data?



One of the most fiercely fought battles in shipping today is the battle for data. On a weekly basis, we see companies of all stripes – ship managers, owners, class societies, equipment manufacturers and even coating suppliers – investing in their own digital solutions and fiercely competing for control over data: *the new oil*. Each of these is creating systems aimed at improving performance, claiming that they are ideally placed to harvest a variety of performance data and position themselves as the one-stop shop for all the data that a voyage generates. Of course, there's a good reason for all organizations to up their game digitally – every aspect of personal and business life has been affected by the march of technology, and every business needs to invest in the right talent to compete in this context.

And the business case is clear – according to analysts at Future Market Insights, the push for better data and optimization solutions is driving the marine electronics market to dizzying new heights. This market has already reached more than US$4.14 billion in 2018, but is predicted to jump to US$7.75 billion by 2028. Future Market Insights expects marine electronics market revenues to grow at a rate of 6.5% per annum over the next decade.

However, when we look at whether this trend benefits the market, it's unclear that this battle for control over data is really delivering results for the market.

Data: does the hype match the results?

While big owners or original equipment manufacturers (OEMs) may have the budgets to invest in their own digital systems, for the many smaller owners, operators and suppliers (who make up the majority of the market), digital transformation is beyond the reach of budgets stretched by a continually challenging market. C-suite respondents to a recent Futurenautics study revealed that 76% of their organizations are investing less than US$100,000 per annum in their digital initiatives, with 57% investing less than US$25,000 per annum. Only 11% of organizations are investing more than US$1 million annually. Similarly, in a recent study by Inmarsat on IoT adoption, when compared with other industries, shipping had a high proportion of early adopters – but a similar number of 'laggards.'

Shipping is living out sci-fi author William Gibson's claim that "the future is already here, it's just not very evenly distributed." Small players risk becoming left behind while big fish invest, consolidate, and lock their users into expensive, all-singing, all-dancing digital ecosystems – replicating Apple's 'walled-garden' business model. So what does the alternative look like?

Future Proofing

It's clear that we need an alternative to the closed systems that are beginning to proliferate, which can hide multiple inefficiencies and practices that ultimately harm their users. Owners and operators need to be able to choose what data sets they integrate into the platforms they use – and take control over what they pay for. Either paying suppliers multiple times for overlapping datasets or being locked into paying for information they don't need benefits no one. The platforms we build need to allow users to customize the data they use – and must also be open enough to incorporate new datasets from unexpected places.

This is vital, because whoever is creating the solution will tend to measure what's closest to their own business area and simply focus on that. For example, if your software system is built by your engine manufacturer, your best data will focus on how you can optimize your engine and ignore other vital factors and information.

Data solutions need to be built by looking at the voyage as a whole, and looking at the factors that most directly impact the

success of a journey across the sea. While undoubtedly there are powerful efficiency savings to be made by building up marginal performance gains, if we build solutions that focus only on what's easy to measure, the solutions we create won't deliver the results the shipping community needs.

This is why, we argue, weather has to be one of the most important building blocks of any digital operations solution.

Weathering (multiple) Storms

Of all the factors influencing a voyage, wind, waves and ocean currents can affect the performance of a vessel most. The resistance when navigating in unfavorable conditions generally increases by 50-100% of the total ship resistance in calm weather. According to MAN Energy Solutions' analysis of trading conditions for a typical 140,000 dwt bulk carrier on some routes, the increased resistance, or sea margin, can reach extreme values up to 220%.

Regardless of the scale of an investment in digital solutions, discounting the weather margin ignores the most existential threat to a voyage. Statistics from the International Union of Marine Insurance (IUMI) indicate that it is the leading cause of total loss of shipping between 1996 and 2015. Weather accounted for 25% of total losses in that period and this increased to 30% in 2001 and 2005. This figure further soared to 48% from 2011 and 2015. With climate change on the rise, the world has been witnessing severe weather events more than ever before.

Weather conditions can also delay arrivals to ports, halt departures, limit loading, compromise fuel efficiency and even expose crews and cargoes to peril. With tight operating margins, taking into account weather forecasting can make the difference between profit and loss for companies sailing across the world.

Focusing on weather is just one part of the puzzle however. The true potential of digital solutions comes in the ability to bring together multiple datasets in a manner that reveals the unexpected and gives actionable insight. We need to build solutions that can monitor the present, analyze the past, and then predict future performance.

One such example is this interactive heatmap, [refer to image: piracy heatmap] which highlights the relative risks of piracy in different areas. Based on this information, a captain can decide where to accelerate through potentially risky areas, and where it will be safer to slow down and save fuel. This map is based on machine learning; a process that examines the relationships between factors, and works out which are the most important.

In this instance, many of the influential factors are as expected; wind speed, direction and wave height and swell direction are the most important, as well as light levels. However, the day of the week also plays a part.

On the face of it, this may seem illogical; is a risk of piracy really worse on a given day of the week?

The answer, it turns out, is yes. In Somalia, Fridays are days of prayer. Pirates, it turns out, can be divided into two groups. Less experienced, opportunistic, 'part-time' pirates, and hardened 'professional' pirates. The former group will observe their holy days, while the latter will venture out regardless. Because of this, if a pirate attack occurs on a Friday, it is more likely to result in a hijacking. Operators can use this information to make their operations safer and more efficient – all thanks to the power of machine learning.

This is just one example of the fascinating possibilities that Big Data opens up. But how can we ensure that as wide a segment of the industry as possible can benefit from solutions like this?

Here are a few ideas:

- *Operate from a neutral perspective: Value datasets based on their impact on the voyage, not just how easy they are to measure.*
- *Look at the voyage as a whole: If there's a threat to the overall success of a voyage, such as dangerous weather, it doesn't matter how optimized your trim is.*
- *Let owners and operators control what they use: Owners and operators don't want to pay multiple times for overlapping data, or have to deal with multiple suppliers for different parts of the data story. Build something that allows your users to access the data they want. And be ready to include datasets you hadn't anticipated.*
- *Remember this has to work at sea: If the solution you're building relies on a stable, excellent internet connection, or requires a laborious amount of input from crew, chances are it'll get ignored, worked around, or won't deliver. Build something that works at sea, not just in an office.*

The battle for control of shipping's data is far from over – and there are bound to be unexpected developments along the way. However, if those building the solutions adopt these principles – we can ensure that it'll be the users who ultimately win.

The Author **Stuart Nicholls**

is founder and CEO of StratumFive, a dedicated maritime data application provider. Over the last 30 years Stuart has witnessed the digital transformation of the shipping industry, from the demise of morse and telex as a young deck officer, to the introduction of internet as a serving deep sea Master. When he came ashore Stuart bootstrapped StratumFive, then a vessel tracking and remote monitoring software company. A decade later, StratumFive now serves 450 shipping companies and 11,000 vessels with an expanding suite of applications emerging from the growing data being sent ashore within the shipping community.

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digitalization

is paving the way for strategic maritime e-procurement

By Kim Skaarup

The shipping industry is experiencing seismic challenges in today's market; the turbulent economy of the last few years created overcapacity issues across the industry, from which it is struggling to recover. 2018 opened with some small murmurs of optimism for market balance within the container liner sector by the end of the year, but recent analyses of the market indicate this optimism is dwindling. Tanker markets are equally struggling to cope with unpredictable oil demand, as well as battling increasingly negative public opinion with attitudes towards fossil fuels on a downward spiral.

Furthermore, upcoming regulations limiting the sulphur content of marine fuels to 0.5% from January 2020, and more broadly the debate around the reduction of carbon emissions from the shipping industry as a whole, are upending the entire marine fuels market and casting shadows over the long-accepted norms of the industry, from vessel operations to naval architecture and beyond.

As such, the traditionally cyclical industry has been thrown into flux, and its transformation into a commercially and environmentally sustainable beast will not come without cost. To remain competitive throughout this journey, shipowners and managers face mounting pressure to streamline their operations, curb costs, and maximize efficiencies to optimize value across every facet of their organization.

OPTIMIZATION VIA DIGITALIZATION

This is not to say that areas for optimization are lacking. In procurement for instance, there is ample opportunity for organizations to switch from transactional procurement – a sporadic, price-per-product approach largely driven by individual intuition – to an overarching, strategic supply and procurement ecosystem driven by data intelligence, which creates cost and time efficiencies and delivers value beyond the basic price of the product. Such a procurement model is certainly achievable, but the realization of full potential is largely reliant on the generation of organized data, which can only be created through a purpose built e-procurement platform.

The last 12 months alone have seen significant advances in digitalization, connectivity and the application of data across the maritime sector. Over the course of the next year and beyond, we are likely to see more developments; however, there are a number of challenges to overcome before digitalization can fully flourish.

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Digitalization by and large has created vast swathes of data with seemingly limitless potential for transforming the industry, but the lack of structure to the mass of data generated prevents it from having real impact. In procurement, data generated from spend tracking and price trends could be used to drive real efficiencies in the procurement and supply process, if only it could be effectively organized and analyzed.

Research conducted by ShipServ with over 100 maritime buyers, spanning shipowners, shipmanagers, shipyards, government and military among others, demonstrated significant demand across the industry for more structured data suitable for measurement and analysis. The research showed that 78% of respondents would like to increase their spend under contract, but are unable to do so due to the complexity and unstructured nature of their data. 69% of respondents stated that they would like to consolidate their spend with fewer suppliers, but in the majority of cases (60%) they were unable to report savings across all spend areas because of inadequate data and reporting tools.

Also, 72% of respondents stated that they could not monitor their procurement spend, which extended to the categories, brands, product types and suppliers that they were using. 72% also emphasized the lack of transparency, in that they were unable to quickly identify where they were delivering orders, what equipment they had bought, or what brands and products each vessel or office had purchased.

THE WAY FORWARD

The results illustrate clear demand for more improved data processing capabilities within the maritime industry, and the necessity for continued research into, as well as the development of, dedicated software solutions. In the procurement space in particular, an e-procurement platform which generates and organizes data to allow for valuable, measurable insights into procurement spend and resources, as well as intelligence on suppliers and their performance, would enable procurement departments to identify areas to optimize to deliver increased efficiency, and inform better and more strategic decision making.

The potential of e-procurement to drive and increase efficiencies within the shipping industry therefore makes it an important element in the overall vessel optimization challenge, as more shipowners, operators and managers look at every opportunity to maximize the value of their assets.

In line with this, for the past 18 years, ShipServ has evolved its e-procurement platform alongside the rise of digitalization to provide a sophisticated and advanced purchasing and supply solution for marine buyers and suppliers. And in recent times, the drive for reliable, actionable data, and understanding the need for increased data analysis and reporting capabilities has been a central focus for development. Success and appetite for e-procurement within shipping can be defined to a certain extent by footfall, and the platform now has 200 maritime buyers (shipowners, operators and managers), representing close to 10,000 vessels and doing an annual $3.5 billion of trade with over 70,000 suppliers.

The rationale for uptake is clear. Marine buyers benefit from increased productivity of typically 30% from procurement time savings, reducing OPEX by optimizing and lowering procurement spend, as well as using actionable intelligence to maximize the performance of suppliers and create better and more dynamic relationships. Suppliers to the industry also generate real commercial gains; they have access to an e-marketplace of active buyers, where they can build and profile their brand. In addition they can increase efficiencies and the speed of processing multiple transactions, responding to RFQs, as well as driving customer retention and winning more business through faster turnaround times.

However, we have only scratched the surface of the potential for what is possible. ShipServ's most recent whitepaper *'E-procurement in maritime: a roadmap to 2021 and beyond'* shows that many purchasers are still using outdated procurement systems, which cannot take full advantage of improved connectivity and structured data, and continue to take a transactional approach to procurement. This is partly because of limitations with archaic procurement systems that don't integrate or talk to each other and the fact that many suppliers and buyers use different systems.

However, there is a real desire for change. Over one third of the people surveyed for the whitepaper believe maritime procurement will transform beyond recognition in five years' time. They see a sector with increased functionality where there is full spend transparency, automation and real time inventories across fleets, where purchasing power is aligned with tangible data, so that they can see what is being bought and the value of what is on board a vessel. There will be simpler systems, where purchasing professionals are not drowned in complex data, but actually using systems that are intuitive. And critically, the data that is harvested will be meaningful and will drive and inform strategic decision making.

This is what a future digitalized, a and strategic approach to maritime procurement looks like; viewed as a key element within the smart shipping ecosystem that drives efficiencies in operations, contributing to time and cost savings, improved performance and increasing the value of the asset as well as competitive advantage. The technology and capabilities are here, available and working to deliver this vision. Shipowners, operators and managers just need to grasp it.

Download the ShipServ *'E-procurement in maritime: a roadmap to 2021 and beyond'* whitepaper by clicking:
https://www.shipserv.com/info/private-page/33146

The Author **Kim Skaarup**

has worked for ShipServ for most of its history and prior to being appointed CEO was the Chief Operating Officer. With over 25 years of shipping and IT experience, Kim started his career as a graduate trainee at J. Lauritzen A/S, then one of the world's largest Reefer operators. After a period in accounting he became the company's first IT Manager introducing, amongst other things, one of the world's earliest e-mail systems in the early 1980's. Kim joined ShipServ in December 2000 and has been a council member of IMPA (International Marine Purchasing Association) since 1994. He has a B.Com from Copenhagen Business School and a degree from INSEAD.

Shipping Ponders the Ultimate Cost of 'Green'

Low Sulphur Fuels, scrubbers, LNG and other solutions are all part of the mix. Handicapping the impact of any of these options for the bottom line is anything but easy. Getting greener is not the problem; determining the best way to get there is quite another.

By Barry Parker

By any measure, the business of running vessels will not be the same after January 1, 2020, when the present 3.5% limit on sulfur content will ratchet downward to 0.5%. With the implementation date for the changes, enacted in late 2016 by the International Maritime Organization (IMO) and recently reiterated in the face of challenges by shipping organizations, less than one year from now, cost structures will certainly change.

Roughly, what will the increased costs be? Using a thick crayon on the back of an envelope, we could estimate that 50,000 deep-sea ships burning an average of 30 + tons/ day of residual fuels, operating 250 days/ year in international trades, will need to pay an extra $250/ton (a reference number in line with recent price differentials) for fuel – a figure approaching a staggering $100 billion annually – with all else held constant. Liner behemoth Maersk has said, "The additional cost for the global container shipping industry to comply could be up to USD 15 billion. Maersk expects its extra fuel costs could exceed USD $2 billion." Separately, Hapag Lloyd has estimated its extra cost at around $1 billion annually.

This starting point, however, and reflecting only the costs associated with lower sulfur content, is possibly at the low end of outcomes. That's because it does not consider a rise in oil prices as refiners push more crude oil (and limited amounts of residual) through their crackers and distillation towers.

A September 2018 article by consultants McKinsey noted "Demand for high-sulfur residual fuel oil for ship bunkers was 3.5 million barrels per day in 2018 – out of 7 million barrels per day of total residual demand – and the global refining system is not yet equipped to make this volume of residual fuel oil at 0.5 percent sulfur once the regulation goes into effect."

All that said; the precise magnitude, and even the directions of impacts on shipping company's bottom lines, is not known. The unknowns are dictated by normally unpredictable shipping market forces and by exogenous impacts of business decisions of oil refiners and downstream participants, all of which impact available supplies of compliant fuels.

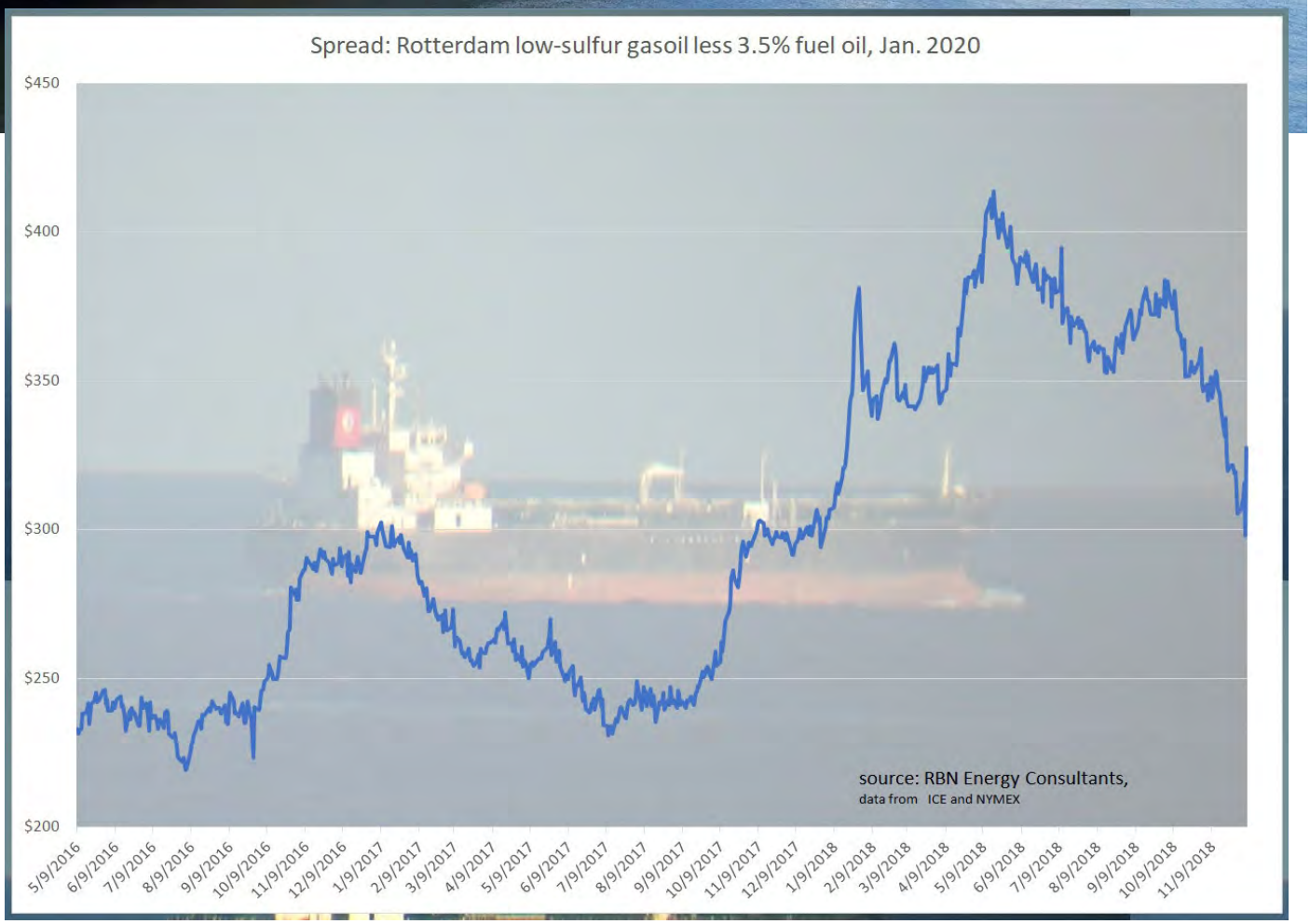
The $250/ton number, and variability surrounding it, does not address strategic advantages may be gained (or lost) relative to competitors, who may adapt different business strategies than their peers. Outcomes are not static; they may move around in a dynamic marketplace.

WHO PAYS THE BILL?

Indeed, the profit number emerging from the income statement starts with the top line, and leverages the uncertain proportion of cost increases that can be passed on to cargo interests paying the freight, or conversely, what degree of owners "savings" can be extracted by the cargo side. More "cost recovery" by shipowners (or less ability of the cargo side to capture "savings") is possible in strong freight markets, than in weak markets (where those paying the freight can drive it downwards).

Much of the conversation centers on scrubber economics and ROIs, with loud voices reverberating from a normally very quiet industry. The business case for scrubbers is defined simply: The capital cost can be paid for by savings in purchasing high sulfur fuel (IFO 380 and similar) relative to their competitors who burn low sulfur fuels (0.5% compliant). The greater the price differential (or 'spread'), the quicker that capital expenditure can be paid off.

Credit: Crowley



"Through the structure of our Seabury Maritime specialized agreements, it is possible to monetize 'savings' that are likely to accrue to consumers of high sulfur fuels, and partially use streams of such savings or charter premiums to cover the costs of exhaust gas 'scrubbers' without draining cash reserves."

– Nikos Petrakokos, Vice President, Head of Maritime Environmental Innovation, at Seabury Securities

But what if the owners wish to capture part of the "savings" in time charter deals where a vessel charterer pays for fuel and the charterer wishes for a scrubber to be installed? Industry association BIMCO is attempting to bring some commercial clarity. In describing a proposed charter party clause due to be published in Q1 2019, it says: "…The main issue that the scrubber clause is likely to address is possible cost sharing between owners and charterers of the installation of a scrubber. The clause could provide a cost sharing formula based on the expected life of the scrubber versus the duration or remaining duration of a time charter."

Savvy financial structuring may be able to put price differentials to real use in the bulk shipping realm. Nikos Petrakokos, Vice President, Head of Maritime Environmental Innovation, at Seabury Securities, told ***MLPro***, "Through the structure of our Seabury Maritime specialized agreements, it is possible to monetize 'savings' that are likely to accrue to consumers of high sulfur fuels, and partially use streams of such savings or charter premiums to cover the costs of exhaust gas 'scrubbers' without draining cash reserves."

On the liner side, the challenges are different, as carriers have unveiled a new type of "black box" in arriving at fuel surcharges. Maersk, in the fate of its estimated $2 billion extra expenditure, announced in September, 2018, that it would preemptively implement Bunker Adjustment Factors, commencing in January 2019, according to a series of (hidden) formulae which consider bunker prices at selected ports (3.5% sulfur throughout 2019, then 0.5% sulfur), with fuel intensity of particular trade routes. In the first iteration, using a notional IFO 380 price of $400/ton the new bunker surcharge, for a 40' box, ranged from $90 (USWC to Far East) to $600 (ECSA to N Europe), with the mainline Far East to Northern Europe route pegged at $480 per box. Hapag Lloyd announced that it too would be developing a new fuel pricing formula.

The lack of transparency is a problem. An October 2018 article by Philip Damas, Head of London-based Drewry Supply Chain Advisors, offered, "Given the scale of the extra costs triggered by the new regulation and the carriers' expectations that their pricing and fuel charge mechanism with customers must be restructured, there is a need for carriers to address the transparency concerns expressed by their customers."

MORE CLARITY ON PRICES: FROM WHERE?

The back of the envelope calculation above starts with a 'spread' of $250/tonne being in effect at the outset of the new rules, in January 2020. That uncertain number reflects pricing of Jan 2020 delivery traded contracts on low sulfur gasoil, versus 3.5% fuel oil throughout 2016 and 2017. During the scrubber-mania phase of mid 2018, as oil prices were turning upward, the spread reached over $400/ton; by end 2018, it had backed down to $300/ton. Uncertainty over fuel prices prevails, with experts, insiders and stakeholder all over the map.

One school of analysts sees residual fuel prices dropping dramatically (which would widen the spread), in early 2020, as refiners cannot process it into higher value outputs. Well known energy consultants Wood McKenzie wrote in September 2018, that: "Displaced HSFO can be processed within the global refining system's spare residue upgrading capacity, but its discount to crude needs to widen to make using this spare capacity economical." They added

LNG: (Another) Pathway to the future

Besides installation of scrubbers, building vessels to burn Liquified Natural Gas (LNG), with "dual fuel" capabilities, or converting existing marine engines to enable dual fuel burn, is another alternative. The business cases, and the cautions regarding market and competitive dynamics, are not unlike those for scrubbers. Over time, the cheaper fuel cost will offset the higher capital cost. DNV GL figures from late November 2018 showed LNG for ships' fuel priced comparably with IFO 380 fuel. However, fuel availability remains an issue for vessels in irregular and tramp trades. Matt Muenster, Senior Manager- Applied Knowledge, at advisors Breakthrough Fuel, wrote in a recent blog: "The world's leading LNG suppliers are working to expand their bunkering capacity to major markets, but existing infrastructure remains limited and will take years to obtain a significant market share." However, looking out further into the future, he notes, "LNG and other alternatives will become more attractive as the IMO begins to set aggressive CO2 targets in the near future." The future will see additional costs as the industry grapples with CO2 issues. Over time, the industry will need to veer away from fossil fuels if it is to meet the IMO's ambitious goal of reducing shipping industry CO2 emissions out in 2050 by 50%. Company strategies will play a vital role within the context of rules that will be put in place to guide the industry towards these targets. Similar to strategies related to sulfur emissions, winners and losers will emerge over time as shipowners make choices about which fuels to consume, and how much capital to expend on making vessels suitable to consume these fuels. Nikos Petrakakos from Seabury summed up the view from the financial side, saying, "Seabury Maritime supports scrubbers as a viable option and believe it is a more environmentally friendly solution than the use of gas oil and fuel blends." However, he acknowledged that solutions are a moving target, adding: "Importantly, we do remain fairly technology 'agnostic' and understand that each of the compliance solutions has its own merits and uses on the path to 2050."

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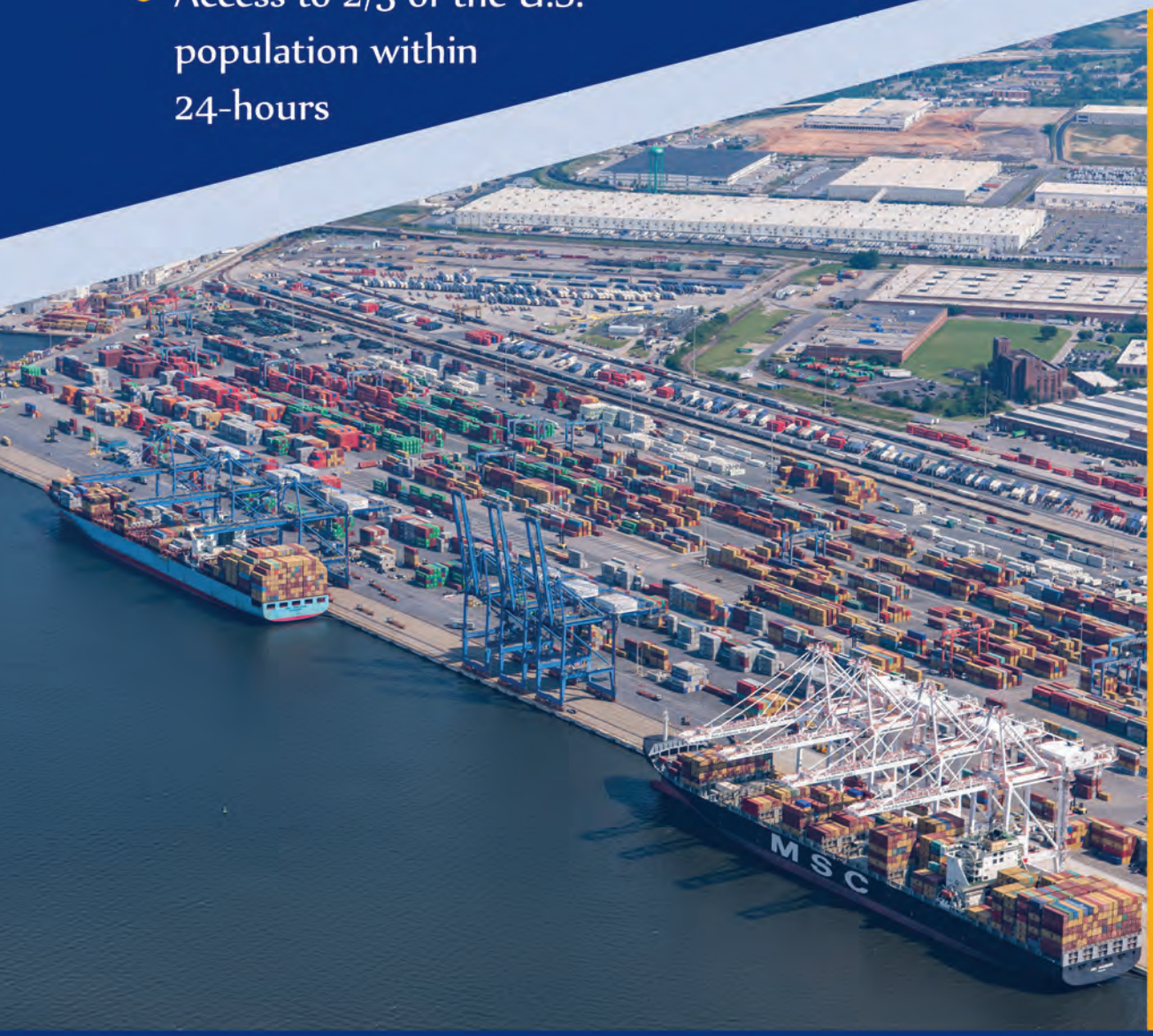

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"We also believe that by 2020, the price differential between gas oil and HSFO will be roughly double the 2017 differential." Drewry agrees, suggesting in an October 2018 article, as energy prices neared their zenith) that "Based on independent 'futures' prices, low-sulphur marine fuel prices per tonne will be 55% higher than current high-sulphur fuels and Drewry considers that the probable 'worst case' scenario is that fuel costs (paid by carriers) and fuel surcharges (paid by shippers) in global container shipping will increase by 55-60% in January 2020." These numbers imply spreads – of IMO low sulfur compliant fuels above high sulfur marine fuels, on the order of $300 to $400/ ton, or more.

Another view, that of narrowing spreads (and, hence, a weaker business case for scrubbers) is borne out by shipping executive Paddy Rodgers, who heads up large tanker owner Euronav. He said, in an October Bloomberg interview that certain refiners have said: "The spread between the old [high sulfur] and the new [low sulfur] fuels will be half of that the analysts have suggested." He added, "We believe that a year out, that's going to come down even further as more oil becomes available and our costs are not materially affected." Laura Blewitt, Energy Fundamentals Analyst at RBN Energy, told ***MLPro***, "With the spread narrowing nearly $100/ton in the past six months to the $300 range, I see trader's confidence in the availability of low-sulfur marine fuel supply is growing."

Ralph Grimmer, Senior Associate at transport fuels consultant Stillwater Associates, based in Irvine, California, noted the challenges bedeviling price forecasters. "All things being equal," he said, "lower crude prices should result in lower product prices, potentially minimizing the negative price impact of impact of IMO 2020 if Brent doesn't climb back to summer 2018 levels." Nevertheless, Grimmer cautions, "With all of the above factors changing IMO 2020 marketplace dynamics markedly over the past 6 months, forward prices and differentials are still a moving target. Many observers have thought that current futures prices through 2020 understated the likely impact of IMO 2020."

More clarity on pricing for low sulfur marine fuels and relevant spreads is emerging, starting in December 2018. Two futures exchanges, the New York Mercantile Exchange and the Intercontinental Commodity Exchange (ICE) will initiate contracts specifically on 0.5% sulfur marine fuels. The CME contract (which will settle against prices posted by Platts), began trading December 10th on the electronic GLOBEX platform. The ICE contract was still awaiting regulatory approvals as ***MLPro*** went to press.

Matt Muenster, Senior Manager, Applied Knowledge for Breakthrough Fuels, also weighed in. "While it's true Monday, December 10th, was the first day of trading on NYMEX (CME) Globex, 0.5 percent futures, we have yet to see trade volume begin to move prices in the market. This is not particularly surprising for new products on an exchange. Of course, the interest on these futures will pick up as we move closer to the coming regulatory timelines and as clearer expectations for the price of oil in 2019-2020 take shape."

Ralph Grimmer stressed the role of futures in demystifying the post 2020 landscape, saying, "With the emergence of futures and transactional prices for IMO 2020-compliant marine fuel becoming visible in December and January, industry will finally have a more tangible basis for preparing to optimize operations beginning in late 2019. Shipowners, refiners, and bunker suppliers will all benefit from this increase in price visibility."

Matt Muenster offered a similar sentiment. "Most forecasts still peg 0.5 percent <sulfur> prices in a range of 75 to 90 percent of LS MGO 0.1 percent. Bearing these figures in mind and analyzing established futures markets for IFO 380 and LS MGO reveals it is presently reasonable to expect 0.5 percent sulfur fuels to have at least the premium LS MGO had over IFO 380 across geographies in the past year, or about $225-$250 per metric ton. Estimates with steeper discounts to high sulfur fuel oil due to excess supply have pushed this figure closer to $300 per metric ton."

Looking ahead, the only thing that is truly clear is that there are many variables – most of them difficult to predict – that will impact the cost of 'green' in the future for shipping. Less clear is how much green it will take to produce that greener footprint that the IMO aims to produce. Shipping is going to get cleaner and more expensive as the January 2020 deadline comes and goes. All that said; the former metric will be much easier to predict than the latter. That much we can count on.

Remote Reporting

Beyond the issue of sulfur emissions, the industry's Greenhouse Gas emissions (CO2) have been the subject of scrutiny in the broader context of climate change. With effect from 2013, new vessels have adhered to the International Maritime Organization (IMO)'s Energy Efficiency Design Index (EEDI), which sets a minimum energy efficiency per ton mile for different vessel types and sizes, letting owners pick the best solution that meets the standards. The standards will continue to be tightened (meaning more efficiency will be required) in subsequent phases, and the IMO's Marine Environmental Protection Committee (MEPC) will be publishing a revised strategy for lowering CO2 emissions, in 2023.

As part of its efforts to evaluate its progress, and inform the new strategies for reducing the industry's carbon footprint, the European Union, for vessels calling at member nation's ports, has now begun to collect data on fuel consumption of vessels greater than 5,000 gt, beginning with 2018 data to be submitted in early 2019.This parallels the IMO's data collection efforts, for similarly sized vessels on international voyages calling at member nations' ports, where submissions of 2019 data will be made starting at the beginning of 2020 .

The Class societies, already at the forefront of industry digitalization, have developed software for reporting fuel consumption parameters to the European Commission, to the IMO and to Flag states. Their involvement complements their role as a verifier of the data. Over time, reporting may play into cost reduction; for example, the digital loop may include instructions back to the vessel on optimizing fuel burns by slowing down the vessels. All of this, of course, also comes at a cost to the global supply chain.

The Author

Barry Parker

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FOR JAXPORT, LNG SPELLS SUCCESS

Credit: Crowley

'A thousand firsts' and a constantly growing list of players underscores the rapid development of LNG as a fuel – especially along the East Coast of the United States. This is no longer the story of 'if you build it, will they come?' In fact, they're already here.

By Rick Eyerdam

Click on the headlines for the phrase "LNG Bunkering" and you immediately learn that it is an industry of a thousand firsts and a constantly growing list of players.

"Russia's Novatek ships first LNG cargo to China via Arctic; Yamal LNG ships first LNG cargo to Spain; Qatar ships first LNG to Japan, signs accord; Japan orders its first LNG bunker vessel; Damen to Construct Baltic Sea's First LNG Ship-to-Ship Bunkering; UPDATE 1-Japan's Inpex expects to ship first LNG cargo from Ichthys; Eesti Gaas places order for the first LNG bunker vessel for North-East; and Germany: world's first LNG liner named." These are but a few of the LNG accomplishments headlined online in the first ten months of 2018.

And, then, there is Florida, more precisely the Ports of Jacksonville and Port Canaveral where LNG Bunkering history and the very hard work to make it happen began almost seven years ago at the hands of America's two largest Jones Act ocean cargo carriers and the worlds largest cruise line. At Jaxport, today three LNG powered cargo ships, the first two at Tote Maritime Puerto Rico and the third at Crowley Maritime, already sail regular voyages to Puerto Rico supported by the elaborate infrastructure of LNG bunkering accomplished by both barge and shore-based methods.

Largest LNG Cruise Liner

Port Canaveral has spent the time preparing for the largest LNG powered cruise ship in the world to homeport at a newly constructed terminal. The ship from Carnival Cruise Line, named Mardi Gras after the first Carnival cruise liner, is due in 2020. Carnival plans to bunker the ship by barge, which will fill up at a terminal in Georgia. The ship will have a capacity of 5,286 passengers, based on double-occupancy of its cabins, and a maximum capacity of 6,500. It is likely to have an onboard crew of about 2,000.

Carnival will not be the only LNG user, according to Port Canaveral Chief Executive Officer John Murray who expects Disney Cruise Line to base two or three of its new LNG-powered ships at Port Canaveral after they come into service in 2021, 2022 and 2023. By that time, the barge may be inadequate and a more permanent LNG storage operation could be developed, although there are no plans underway for that process.

What Tote and then Crowley have accomplished at Jaxport and what Canaveral is working through is the highly regulated industry of harvesting natural gas and then holding it in cryogenic vats that chill it to at least 160 degrees below zero. The liquid product is then moved under pressure from the plant to a truck or barge and then to the receiving ship where it becomes fuel.

LNG 101

Liquefied natural gas or LNG is a natural gas, primarily methane (CH4) that has been converted to liquid form for ease of storage or transport. When natural gas is cooled to below its liquefaction point of minus 163 degrees Celsius at atmospheric pressure, it forms a liquid with a specific gravity in the 0.45 range. When liquefied there is also a 600:1 reduction in volume. Because of that shrinkage, and because of the vast amount of natural gas revealed each year via fracking, LNG is worth the selling. It can be transported in huge volumes on LNG tankers to terminals around the world. It can also power huge ships that need to reduce pollution. And LNG as fuel dramatically reduces pollution.

The International Maritime Organization set a clock on the amount of sulphur dioxide that is eliminated from ships exhausts when fuel is burned. Most ships are expected to utilize new blends that are produced to meet the 0.50% limit on sulfur dioxide in fuel oil. Currently, the maximum sulfur limit in fuel oil is 3.50% globally (and 0.10 % in the four Emission Control Areas (ECAs): the Baltic Sea area; the North Sea area; the North Ameri-

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can area (covering designated coastal areas off the United States and Canada); and the United States Caribbean Sea area (around Puerto Rico and the United States Virgin Islands)).

By January of 2020 all ocean-going vessels must achieve an exhaust that contains 0.50% sulfur dioxide. In October 2018, the IMO also ordered a ban on the carriage of high sulphur fuel by vessels unless they are fitted with a scrubber. This order takes effect two months after the January 1, 2020 edict for the 0.5% sulphur cap comes into force.

There are several ways to achieve that goal; some are as simple as dramatically slowing vessels down to reduce all exhaust gasses. Other ways extend to the complicated and costly process of attaching an aftermarket scrubber to the existing exhaust system of a ship that continues to burn high sulfur fuel. With the most common scrubbers, open and closed loop wet scrubbers, the exhaust is blended with alkaline water that dissolves the sulfur after passing through a lot of plumbing and sends it into the ocean. Then there is the LNG fuel alternative and all that entails.

TOTE Maritime Puerto Rico

The US Jones Act carrier TOTE Maritime, through its subsidiary TOTE Shipholdings, placed an order for two LNG-powered container ships in 2012, long before the IMO's rules were completed. The new Marlin class vessels are the first ships of their kind. They had a combined cost of US$324 million. They were ordered from the USA's General Dynamics NASSCO and included an option for an additional three vessels.

General Dynamics NASSCO commenced construction of the first Marlin-class vessel with a steel-cutting ceremony in February 2014, which took place at NASSCO's shipyard in San Diego. The Maritime Administration (MARAD) sanctioned a $324.6 million loan guarantee to TOTE and its parent company, Saltchuk Resources, for the construction of the two Marlin Class vessels in September 2014.

The first vessel, Isla Bella, was launched in April 2015. The second vessel, Perla del Caribe, was christened and launched in August 2015. The first vessel entered into service in October 2015 while its sister vessel was delivered in January 2016. Both sail from Jaxport's Blount Island Marine Terminal.

In January 2015, WesPac Midstream and the AGL Resources' wholly owned subsidiary, Pivotal LNG, signed a long-term agreement with TOTE to provide LNG for its container ships.

WesPac Midstream and Pivotal acquired land to build a new natural gas liquefaction bunker facility at Dames Point with capacity to produce in excess of 120,000 gallons of LNG per day in mid-2016 to meet the LNG fuel requirements of the Southeastern United States and the TOTE fleet. This LNG is distributed to TOTE ships by North America's first LNG bunker barge, Clean Jacksonville.

Meet the TOTE Marlin class

Daewoo Shipbuilding & Marine Engineering Co (DSME) subsidiary Daewoo Ship Engineering Co (DSEC), based in Busan, South Korea, designed the Marlin class vessels. For its commercial vessels, NASSCO cooperates with DSME, which enables the American shipbuilder to have access to DSME's substantial ship designing skill as well as sharing its shipbuilding technology.

> *In addition to JAX LNG, TOTE has collaborated with the United States Coast Guard, specifically Sector Jacksonville and the Liquefied Gas Carrier National Center of Expertise; Jacksonville Fire Department, Port of Jacksonville, American Bureau of Shipping and numerous vendors and trade associations.*

Isla Bella's overall design and that of the subsequent sister ship, Perla del Caribe were based on a proven DSME container ship design that features a double hull. Both have an overall length of 764.4 feet) and a beam of 105.6 feet, which equates to 13 rows of containers, and a draft of 34.4 feet). Their capacity of 3,100 TEUs makes Isla Bella and Perla del Caribe the largest container ships currently deployed on the intra-America container trades.

According to the company, main propulsion is provided by a single MAN B&W 8L70MEC8.2- GI (ME-GI) unit, which is the world's first gas-injected, dual-fuel, low speed diesel engine that can run on both gas and standard bunker fuel oil. It is said to be a significant advance in propulsion technology. It provides a total of 25,191kW at 104 rpm, giving Isla Bella and Perla del Caribe a maximum service speed of 22 knots. The engines were built under license from MAN Diesel & Turbo by Doosan Engine of South Korea, which successfully won the order in 2013.

TOTE says the lynchpin for the new design to pass all its tests was the ME-GI Fuel Gas Supply System (FGSS), which has 300 bar of operating pressure. Doosan tested this at its Changwon plant and after two months of extensive tests the new gas system passed all of the substantial regulations and restrictions set down by the American Bureau of Shipping (ABS) and the United States Coast Guard (USCG).

On June 3, 2014 the engine successfully completed its first official test run. The main engine is aspirated by two MAN TCA66 turbochargers. The ships Isla Bella and Perla del Caribe primarily operate on LNG. The ME-GI engines selected to propel them are next generation, eco-friendly engines designed to reduce particulate matter (PM) by 99%, sulphur oxide (SOx) emissions by 98%, carbon dioxide (CO2) emissions by 71% and nitrous oxide (NOx) emissions by 91% when compared with existing diesel engines. Auxiliary power is provided by three MAN 9L28/32DF auxiliary engines, also manufactured by Doosan Engine, each featuring a single MAN TCR18 turbocharger.

Both of the Tote Marlin class ships feature two stainless steel cryogenic tanks manufactured by Cryo of Sweden and weighing 380 tons each. The tanks each have a capacity of 900m3 and are located aft of the accommodation. They provide a total capacity of around 465,000 gallons. DSME's patented LNG fuel-gas sys-


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tem is used to supply the LNG fuel to the engine.

Entering service in late 2015 and early 2016 respectively, the Isla Bella and Perla del Caribe first used an innovative truck-to-ship bunkering operation. Barge-to-ship LNG bunkering from Clean Jacksonville began in 2018 after elaborate regulatory review and because of the partnership with JAX LNG.

TOTE Maritime worked with a number of partners to develop the state-of-the-art operations that are currently in use at the Port of Jacksonville. In addition to JAX LNG, TOTE has collaborated with the United States Coast Guard, specifically Sector Jacksonville and the Liquefied Gas Carrier National Center of Expertise; Jacksonville Fire Department, Port of Jacksonville, American Bureau of Shipping and numerous vendors and trade associations.

JAX LNG got its Letter of Acceptance from the United States Coast Guard (USCG) for the operation of their waterfront LNG facility and the approval to conduct barge-to-ship LNG bunkering operations with TOTE Maritime's Marlin Class ships and its LNG barge, Clean Jacksonville.

"TOTE Maritime is committed to safety above all else. Thanks to the commitment of our partner, JAX LNG, we have developed strong standards for landside LNG bunkering that will continue to be the hallmark of our barge-to-ship bunkering operations," noted Peter Keller, who is both chairman of industry coalition SEA\LNG and executive vice president of TOTE.

With the future of LNG firmly established at TOTE, Rear Admiral (USN-Ret.) Phil Greene Jr. announced his retirement from TOTE Services effective January 4, 2019. Under Greene's leadership, TOTE Services emerged as a leader in liquefied natural gas (LNG) maritime technology and expanded its portfolio of government and commercial vessels currently being managed by the company, which now includes 28 vessels.

Crowley enters with its Commitment Class

The first vessel of Crowley Maritime Corporation's Commitment (C) Class LNG-Powered ConRo Ships was commissioned in March 2017. Crowley signed a contract with VT System's subsidiary, VT Halter Marine of Pascagoula, Miss for two vessels of the new Commitment (C) Class in November 2013. The total value of the contract is estimated to be $350 million.

Crowley says the Commitment-class vessels; named El Coquí and Taíno are equipped with a single low-speed, dual-fueled MAN Turbo & Diesel ME-GI Main Engines. Like the Tote Marlin engines, the Crowley engines are capable of operating interchangeably on LNG or marine diesel fuel.

Wartsila Ship Design engineered the ships in conjunction with Crowley subsidiary Jensen Maritime, a leading Seattle-based naval architecture and marine engineering firm. The new double-hulled ConRo ships have been designed to maximize the carriage of 102-inch-wide containers, which offer the most cubic cargo capacity in the trade. The ships are 219.5 meters long, 32.3 meters wide (beam), have a deep draft of 10 meters, and an approximate deadweight capacity of 26,500 metric tons.

Crowley says cargo capacity is approximately 2,400 TEUs (20-foot-equivalent-units), with additional space for nearly 400 vehicles. A wide range of container sizes and types will be accommodated, including 53-foot by 102-inch-wide, high-capacity containers, up to 300 refrigerated containers, and a mix of about 400 cars and larger vehicles in the enclosed, ventilated and weather-tight Ro/Ro decks. This type of shipboard garage is offered exclusively by Crowley in the trade and caters to the North American intermodal so-called "53 foot" container model.

The Commitment Class, Jones Act ships replace Crowley's fleet of towed triple-deck barges, which had been operational since the early 1970s.

"This delivery represents another milestone in our unwavering commitment to Puerto Rico and the Jones Act," said Tom Crowley, chairman and CEO. "We have dedicated significant time, effort and more than $550 million, which includes these new ships, to transform our Puerto Rico shipping and logistics services to world-class standards. We thank the men and women at Crowley, VT Halter Marine and other partners, who have dedicated themselves to bringing this magnificent new ship to life."

The Title XI applications released by the US Maritime Administration shows that on May 30, 2014, Crowley filed an application for Title XI loan guarantee support for a requested loan amount of US$362.7 million over 25 years on an actual cost of US$414.6 million.

Crowley has contracted with Eagle LNG Partners to bunker the ships from a shore-side fuel depot at JAXPORT's Talleyrand terminal which is separate and distinct from the planned JAX LNG terminal at Jaxport's Dames Point terminal. And in November of this year, Eagle LNG Partners received notice from the United States Federal Energy Regulatory Commission (FERC) that it had granted the company their draft environmental impact statement (DEIS). The draft EIS puts Eagle LNG on a clear path to a Final Investment Decision (FID) on the Jacksonville Export Proj-

Credit: TOTE

ect, And that continues Eagle LNG's success in using small-scale LNG trains to supply bunkering to the marine industry and small scale LNG cargoes to markets in the Caribbean.

Eagle LNG operates a liquefaction plant in West Jacksonville able to produce 200,000 gallons a day and a holding facility at Talleyrand Marine Terminal. The plant and storage facility serves Crowley Maritime. Eagle is also building an LNG production and storage facility near the Blount Island Terminal.

"Our customers, and potential clients, join us in being encouraged that FERC has released the DEIS ahead of schedule. It moves us considerably closer to meeting our goal of expanding clean burning, domestic, and affordable LNG supply for marine bunkering and for small-scale LNG projects in the Caribbean. Once completed, the Jacksonville Export Facility will be the lowest cost source of small-scale LNG available for our marine bunkering and power generation clients," said Sean Lalani, President of Eagle LNG Partners.

Canaveral's Prospective LNG Fleet

Shell Global announced in September 2016, it had signed a supply agreement with Carnival to supply LNG to fuel two of the world's largest passenger cruise ships, the first of which will be home ported at Port Canaveral. Later as many as four LNG powered cruise ships, including three new LNG Disney ships will be berthed at Port Canaveral.

Carnival Group, MSC Cruises and Royal Caribbean Cruise Lines have placed orders for LNG fueled ships. Disney has ordered three and Carnival Group has seven LNG-powered vessels on order. Royal Caribbean Cruises placed orders for two LNG and fuel cell powered vessels to be built on a prototype platform. On June 5, 2017, MSC Cruises announced its order of four 200,000-ton LNG-fueled cruise ships. The cruise ship orders are expected to be delivered between 2020 and 2026 and will certainly bring the Port of Miami and Port Everglades into the LNG realm.

Responding to regulatory pressures and readily available cheap LNG supplies, industry built the necessary infrastructure to facilitate the next wave of technology on the water. That wave isn't coming, however; it's already here.

The Author

Rick Eyerdam

is an award winning journalist and editor. Formerly, he was Editor of Florida Shipper Magazine. Additionally, he was Executive Director of the Miami River Marine Group and Captain of the Port of the Miami River. He is a graduate of Florida State University with majors in English and Government. His articles have appeared in myriad shipping magazines and newspapers since 1970.

No Turning Back

A multidisciplinary Rolls-Royce man is helping LNG's rise on the water and ashore. For LNG, the future is now.

By William Stoichevski

The Rolls-Royce equipped LNG-powered Ro-Paxes of Havila Kystruten

At the heart of Europe's growing marine supply chain for liquefied natural gas is a man with a degree in anthropology but steeped in engineering and business. Oscar Kallerdahl is Rolls-Royce Marine's vice-president of LNG systems, and he's the company's production, purchasing, engineering and finance lead for getting gas engines aboard vessels.

Kallerdahl has 10 years of experience overseeing LNG propulsion projects in Norway and four in Korea. When we speak, he's savoring a contract to put Rolls-Royce gas engines aboard the Ro-Pax vessels of brand-new Norwegian coastal-steamer line, Havila Kystruten.

As we gear up to discuss the readiness of LNG marine refueling infrastructure for the widespread use of LNG-fueled engines, Kallerdahl's mixed arts-science background seizes our interest. But, he's quick to point out that even as he studied anthropology, "I always knew I would be a mechanical engineer." We put it aside and stick to facts that might help ship owners, vessel operators, energy-company charterers and even maritime municipalities weighing the March 2020 IMO sulphur ban or regional air quality rules against a perpetual need to save money.

The New Workplace: a crew favorite

Rolls-Royce offers three gas-fueled Bergen engines to shipowners, national grids and anyone needing "lean-burning" power. Yet, some potential RR clients we've covered over the years are only just learning to study their operations for ways to save cash while being emissions-compliant.

Kallerdahl admits he sometimes finds himself teaching. There are things about LNG engines that few know. "It gets lost in the discussions, but you talk to a crew that has operated an LNG vessel and they never want to go back to a diesel because in the engine room of one of our pure-gas engines there is no oil mist. There's no spill. No nothing. It's completely clean. Shipowners have said they've reduced costs just by reducing cleaning in the engine room. (Crew) don't need the strong chemicals anymore. Their working environment improves a lot. Crews tell us they don't want to go back."

Bunkering LNG and operating vessels running on LNG require a different skill set. The precautions are different. Kallerdahl says crews need to "pay more attention, be more precise." Rolls-Royce offers LNG courses for mariners using their systems: "The crews on a conventional vessel today can easily be trained, but they definitely need to be trained. They have to understand (LNG) as a liquid and as a gas." That training covers LNG hardware, engines, process plant, alarms and controls, much of it done on SIM courses in Norway that are needed before a mariner can set out on an LNG vessel. "Mariners get all the support they need in their

"It gets lost in the discussions, but you talk to a crew that has operated an LNG vessel and they never want to go back to a diesel because in the engine room of one of our pure-gas engines there is no oil mist. There's no spill. No nothing. It's completely clean. Shipowners have said they've reduced costs just by reducing cleaning in the engine room. (Crew) don't need the strong chemicals anymore. Their working environment improves a lot. Crews tell us they don't want to go back."

– Oscar Kallerdahl, Rolls-Royce Marine VP, LNG systems

first year, but after that, their shoulders relax a bit, and they're pretty much operating it themselves without any problems. The experience is key."

When it comes to noise, smallish 200 to 300 kilowatt diesel engines are understood to make more engine noise than two Rolls-Royce P6 LNG engines of 1,500 kw or 1,700 kw, their gas gensets included.

So, from 2021, the four Havila-designed coastal Ro-Paxes can run quietly between central and Arctic Norway on two LNG fuel tanks feeding a process system, four Bergen engines driving Azipull and Permanent Magnet motors and PM thrusters. The low-noise tunnel thrusters allow for a slimmer hull, so less resistance and better fuel numbers. Each vessel will have two variable-speed engines churning nine in-line cylinders and two engines of six cylinders. Despite all the combustion, running Bergen gas engines is said to curbs "total" greenhouse gas emissions by about 20 percent. On the Havila vessels, the fuel-system designs let the owners' vessel bunker-up both left and right tanks from one side of the ship. A redundancy option supplies front and aft machine rooms from either tank.

While the Bergen gas engines are already aboard passenger, cargo, offshore vessels and tugs, vessels, Kallerdahl says the Ro-Pax segment appears ready to really run with LNG savings.

Availability

While Rolls-Royce offers a barge design to fuel berthing vessels, LNG bunkering on the Norwegian coast seems largely the realm of Shell-owned Gasnor. The company accounts for at least part of the infrastructure of that'll be needed by new LNG vessels, distributing via tanker truck and specialist vessels from bunkering stations near large-scale gas and oil production plant.

"That (LNG bunker-supply) hurdle was passed a long time ago in Norway," Kallerdahl says, adding that "It's now only a design or technical issue. It's no longer an argument to say that we don't know if LNG will be available." Indeed, LNG as a fuel is no longer limited to Norway or Northern Europe.

The frontier is moving along, and it is, says Kallerdahl, no problem getting hold of LNG in Norway. The Baltic, too, "is very close." LNG use, he says, is gaining traction across the whole southern Baltic Sea coastline; across the ports of Northern Germany and west to The Netherlands and Belgium. Ports are either already offering LNG "or in the process of securing suppliers or the logistics for it."

"I think that through all of Northern Europe that it's fairly straightforward to run a vessel on LNG these days. When it comes to the Mediterranean, I think it's less (straightforward), but we have examples of LNG vessels that have been bunkering in Italy

LNG stations in Northern Europe.

Credit: DNV GL

and Spain," he says, adding that several vessels built in Turkey and given Rolls-Royce equipment also had access to LNG.

"I have always argued that LNG availability is not the biggest issue. It might be the rules and regulations connected to the bunkering procedure. When we built tug boats in Turkey that came out in 2013, I could order the trucks and have LNG quayside in three or four days. Actually, the approval before the bunkering was the difficult part. So, I think the discussion about infrastructure has been skewed in the sense that you can actually bunker from a truck quite easily, and that's how we started in Norway, and I think that's actually a way to springboard the whole thing."

LNG Asia

Asia, too, is building LNG vessels. The flurry of new-builds hasn't been as "frenzied" as in Norway, but the continent has added the weight of their shipyards to a count of active LNG-powered vessels DNV GL has at 247, including duel-fuel, with over 110 likely on the way.

Rolls-Royce, alone, has just hit 1,000 marine and non-marine gas-engine references. Its 100th LNG marine engine will be aboard a vessel by the first-half of 2019. Kallerdahl calls the growth something of a boom.

A notable reference to the growth was the pioneering 2015 voyage of the Nor Lines "short-sea" vessel, Kvitbjorn, a 5,000 DWT cargo vessel that traded in its main diesel engine for an LNG engine to make an ocean crossing. "The ones on gas can run for something like 4,000 nautical miles," or from Australia to China on one fuel-up, "depending on the tank size and fuel used."

Gas Futures

Critics of gas say it's still a fossil fuel. They point to methane emissions or the need to secure hydrocarbon fuel sources (which seem to be growing every day; see Arctic gas).

While compliance with Tier III and sulphur-cap emissions rules is still foremost on shipowner minds, Kallerdahl says that a fleet put on LNG, apart from curbing harmful emissions, allows for the use of bio-waste gas sourced from the sludge of industries like aquaculture or agriculture. The LNG equipment onboard allows for the switch to biogas "without switching parts."

"It doesn't matter for the engines how these molecules are produced. If over time we can replace fossil fuel with biogas, that'll be great. It'll make the whole CO2 calculation completely different for the vessel," he says, adding that not all countries have LNG. Attracting ship owners from countries without LNG could lead to the major usage breakthrough that has eluded gas-bunker proponents.

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An LNG bunkering truck at the Port of Rotterdam.

Credit: Port of Rotterdam

Knowing when that breakthrough will come, "That's the million-dollar question," says Kallerdahl. He's heard the talk about "this big gold rush" and "when it will come". He suggests the "cut-over period" from 2020 will help drive usage.

But, the Ro-Pax and Kvitbjorn breakthroughs are real. "Anything to do with shortsea shipping," he says, might spur the next LNG fuel-usage boom.

Diminishing Risk

It may require the industry's newest decision makers to show the new tech to an industry often called conservative.

"So far, the industry has seen a lot of companies that want to be at the forefront of trying new technologies, while others don't want to be the first to go because it seems to them a bit risky. When there is a certain critical mass of companies and competitors going into (LNG), then it'll pull through," Kallerdahl says. Once the industry learns to handle LNG — and they look at fuel prices and supply forecasts — then, he says, LNG as a marine fuel ought to really take off.

"Once (shipyards) acquire the particular knowledge of LNG, then they should be able to move into it," he says. It might be his anthropology training, but he's also observed smaller LNG players "moving in and out of" LNG process and support systems from land-based LNG. Shipowners, Kallerdahl asserts, face a competitive future of purpose-built vessels optimized for operations: "They need to do their homework"; study their fuel use and then plan their LNG bunkering.

But some have already done their homework and, he confides, there's "a steady stream of requests for retrofits." Some inquire about fitting LNG tanks on-deck to avoid moving kit.

"I think if you're a ship owner now, you need to move and be aware that the whole market is moving. To sit back and wait is not an option. Harbors are focused on creating bunkering facilities, so I wouldn't worry about going into LNG."

The Author

William Stoichevski arrived in Norway in 1999 to lead a media campaign for Norwegian green group Bellona. He later served as regional feature writer for the Associated Press in Oslo. In 2003, he left the AP to begin building, overseeing and writing for a number of print and electronic energy-industry publications in the Norwegian capital.

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Coast Guard Proposes Annual Great Lakes Pilotage Increase

"When somebody says it's not about the money, it's about the money."

– H.L. Mencken, American journalist and essayist, 1880-1956.

By Tom Ewing

This report is about Great Lakes pilotage rates. It's all about the money. In fact, it's hard to find someone who even suggests that it's not about the money.

For fifty or so Great Lakes pilots, it's about cold hard cash: now. For others, say, vessel owners, it's about wasted resources, about lost chances for a more efficient and sustainable system; "opportunity costs," as economists like to say. Others charge that pilotage costs are indefensible and work against the pilots themselves, extracting unsustainable short-term benefits, but sending a poisonous signal that this system is rigged, that the Great Lakes isn't a region for maritime investment; to the contrary: it's time to get out.

Methodology & Money

The acrimonious – no middle ground – debate about pilotage rates was recharged in October when the U.S. Coast Guard published its "*Great Lakes Pilotage Rates—2019 Annual Review and Revisions to Methodology.*" This starts the required process for adjusting US pilotage rates, keeping the rates linked, with some sense of parity, to certain economic indicators. (Canadian pilots, of course, work within a different system). The Great Lakes Pilotage Act of 1960 established the US ratemaking process. Once the Great Lakes pilotage rates are set, those are the rates charged to shippers for pilots' services.

Under U.S. Coast Guard regulations, all U.S. vessels sailing on register and all non-Canadian, foreign merchant vessels (often referred to as ''salties''), are required to engage U.S. or Canadian pilots during their transit through regulated waters. United States and Canadian ''lakers,'' which account for most commercial shipping on the Great Lakes, are not subject to these regs.

The Coast Guard uses a somewhat formulaic approach to set an hourly rate that allows three American pilotage organizations to cover all of their costs, e.g., wages, infrastructure and training. The pilots work for the pilot organizations, considered independent businesses.

In 2018, pilotage rates ranged from $271 to $653 per pilot hour (rates vary depending on specific Great Lake service areas). For each pilot, that equals a "compensation benchmark" of $352,485.

For 2019, rates get ratcheted up again, to between $304 to $698 per hour, a per pilot compensation benchmark of $359,887, a $7,402 raise, or 2%. Again, that's proposed. Final rates could end higher, or lower. In 2018, for example, the proposed benchmark started at $319,617, but, as noted, when finished, increased by $33,868, to $352,485.

The Coast Guard estimates the 2019 rate would increase shippers' payments by more than USD $2 million, totaling $27,222,585 compared to the 2018 total estimated at $25,156,442. That money is just for pilots – not new equipment, software, ships, education, training, nothing that makes the pie bigger; except, of course, the pilots' pie.

For government work, the Great Lakes benchmark of $359,887 is a nice gig. By comparison, the Department of Vet-

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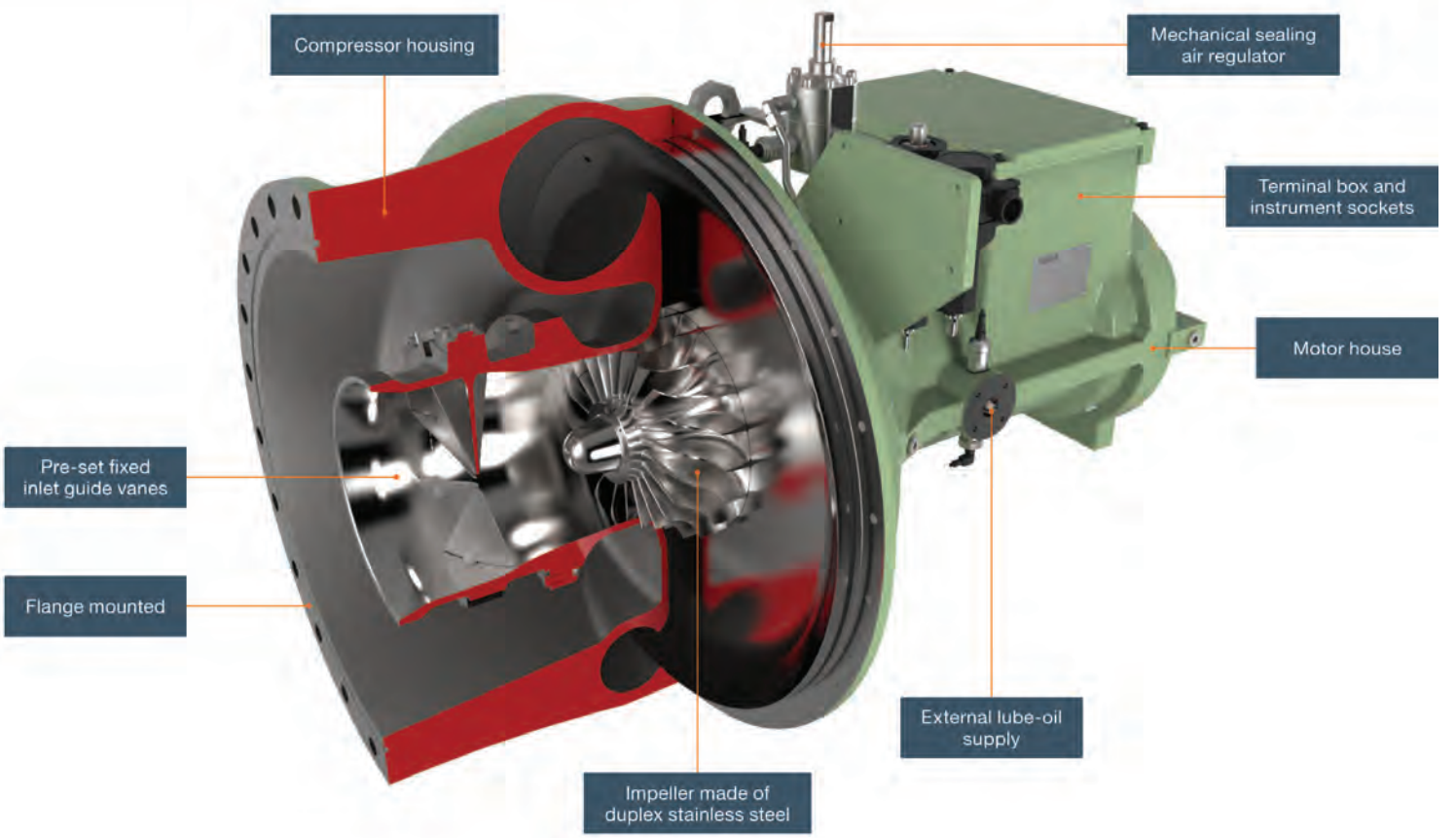

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erans Affairs annual pay ranges for physicians, dentists and podiatrists, effective November 2018, starts at $103,395 and tops out at $262,000. Likely, some docs and dentists make more, but, of course, so do some pilots. The Coast Guard references pilot salaries ranging from a rather piddling $173,554 annually to a high of $758,922.

This comparison isn't meant to be flippant. It's a core part of how the Coast Guard develops a comparative number, historically linked to American Maritime Officers Union (AMOU) data, but something of a black-box process now because AMOU, citing proprietary reasons, stopped providing the Coast Guard with contract information. However, the Coast Guard used AMOU data, available through 2015, to build a new compensation model. The Coast Guard is confident that its model fairly captures and reflects comparative wages, inflation and, importantly, a value of service, always difficult to price in, essentially, a monopoly.

Push Back

It's surely an understatement to say that maritime businesses find pilotage rates and rate setting to be unfair, untenable and largely indefensible, something that perpetuates, via extraction, a rich and largely untouchable economic fortress for a select few who, of course, have no incentive to change anything except to make the cash pipeline even bigger.

Businesses express outrage about direct and indirect pilotage costs. The Chamber of Marine Commerce, for example, an industry group based in Ontario, with American and Canadian membership, writes in its current issue of Marine Delivers magazine that on the St. Lawrence River, "the hourly cost of pilotage exceeds the cost of the entire crew of a vessel, or more than double the cost of a vessel's captain."

Just as galling are wage disparities between American and Canadian pilots (who also work within a monopoly type structure, although there are significant differences). In comments regarding the Coast Guard's 2018 pilotage review an industry compendium (the Shipping Federation of Canada, the American Great Lakes Ports Association and the United States Great Lakes Shipping Association) points out that U.S. pilotage fees are "now often the single highest cost component of vessel operations in the St. Lawrence Seaway and they frequently, if not always, significantly exceed the pilotage costs for similar or identical vessel itineraries when pilotage is provided by Canadian pilots." (Generally, vessels are assigned a U.S. or Canadian pilot depending on the order in which they transit a particular area of the Great Lakes, and do not choose the pilot they receive.)

As an example, the industry group cites 2016 Canadian and U.S. pilotage rates and compares an identical, hypothetical transit between Buoy 33 at Thunder Bay (northwestern Lake Superior) to Port Colborne (eastern Lake Erie). Cost with a Canadian pilot: CDN$28,000. An American pilot: approximately US$41,800. The group writes that "adjusting for currency exchange rates at the time, the U.S. pilotage costs are roughly double the Canadian costs. This hypothetical assumes no delays and normal transit times."

That smooth-sailing reference is important because pilots are paid, of course, even when they are not piloting, stuck like everyone else, for example, because of weather or an accident or unexpectedly delayed in a queue at a series of locks. Some vessel owners charge that pilots are dismissive of logistical efficiency; after all, slow transit pads a pilot's billing sheet. That may be overly cynical, but it references major concerns among vessel owners, i.e. that pilotage fees are opaque, that pilot-related decisions are arbitrary regarding operations and schedules. Vessel owners complain of widely variable pilot decisions made within similar, even identical, maritime operating conditions. These peculiarities cost a lot of money.

Pilotage Invoices

Great Lakes Pilotage Authority	5/5/2017	226	CAD	$ 3,927.53	$ 510.58	$ 4,438.11	1	$ 4,438.11		Wire
Great Lakes Pilotage Authority	5/5/2017	225	CAD	$ 13,979.44	$ 1,817.33	$ 15,796.77	1	$ 15,796.77		($28159.08)
Great Lakes Pilotage Authority	5/5/2017	227	CAD	$ 12,504.28	$ 1,872.51	$ 14,376.79	1	$ 14,376.79		Chq #13138 ($6452.59)
St. Lawrence Seaway Pilotage Authority	5/1/2017	170109	*USD*	$ 6,003.00		$ 6,003.00	1.3662	$ 8,201.30		
St. Lawrence Seaway Pilotage Authority	5/1/2017	170110	*USD*	$ 6,003.00		$ 6,003.00	1.3662	$ 8,201.30		
St. Lawrence Seaway Pilotage Authority	5/1/2017	170111	*USD*	$ 6,169.75		$ 6,169.75	1.3662	$ 8,429.11		Chq #206
St. Lawrence Seaway Pilotage Authority	5/1/2017	170112	*USD*	$ 6,169.75		$ 6,169.75	1.3662	$ 8,429.11		
Laurentian Pilotage Authority	4/27/2017	H29578	CAD	$ 3,558.50	$ 532.89	$ 4,091.39	1	$ 4,091.39		
Laurentian Pilotage Authority	4/27/2017	H29579	CAD	$ 2,061.20	$ 308.66	$ 2,369.86	1	$ 2,369.86		
Laurentian Pilotage Authority	4/27/2017	H29580	CAD	$ 2,061.20	$ 308.66	$ 2,369.86	1	$ 2,369.86		
Laurentian Pilotage Authority	4/27/2017	M84597	CAD	$ 3,011.27	$ 450.93	$ 3,462.20	1	$ 3,462.20		
Laurentian Pilotage Authority	4/27/2017	M84598	CAD	$ 2,661.74	$ 398.60	$ 3,060.34	1	$ 3,060.34		Wayne c/c
Laurentian Pilotage Authority	4/27/2017	M84599	CAD	$ 2,656.10	$ 397.76	$ 3,053.86	1	$ 3,053.86		
Laurentian Pilotage Authority	4/27/2017	M84600	CAD	$ 2,545.50	$ 381.19	$ 2,926.69	1	$ 2,926.69		
Laurentian Pilotage Authority	4/27/2017	M84601	CAD	$ 2,539.86	$ 380.34	$ 2,920.20	1	$ 2,920.20		
Laurentian Pilotage Authority	4/27/2017	M84602	CAD	$ 2,762.78	$ 413.73	$ 3,176.51	1	$ 3,176.51		
Total Pilotage amounts (converted to CDN)								$ 95,303.40		

NOTE: NON-CONVERTED TOTALS	USD $ Total:	$ 24,345.50	Pre-tax converted amount:
	CDN $ Total:	$ 62,042.58	
CONVERTED $ BEFORE TAX:		$ 87,530.22	

Credit: MRC

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In September, the US Government Accountability Office (GAO) released a report on freight transport issues within the Great Lakes, citing pilotage issues as one particular challenge. Importantly, GAO is working on another report with an exclusive focus on pilotage, requested by Senators John Thune (SD) and Todd Young (IN).

Murky Water

Wayne Elliott is Founder and Director of Business Development at Marine Recycling Corporation (MRC), headquartered in Port Colborne. MRC's experiences with pilotage problems are cited within Transport Canada's report "2018 Pilotage Act Review," released earlier this year, a study that has started an in-depth evaluation of Canada's pilotage system, established in 1972.

Elliott presents a common litany of concerns, including:

- *Trying to estimate towing costs, due primarily to the inconsistency in the number of pilots required for any given tow. (He refers to this as "likely the most difficult situation for our company.")*
- *Tows with same size vessels in the same waters, e.g., Toronto Harbour to Port Colborne, through the Welland Canal, are sometimes required to have one, two or as many as three pilots. ("The canal is a cement ditch," Elliott commented.)*
- *Recently, on a tow from Quebec City to Port Colborne six pilots were assigned in one section and five in another.*

Elliott explained that during one trip, once in American waters, "the American pilots got on for the American locks (and) we had 10 pilots." Elliott, unhappily, called this "a record, never happened in the world."

This was surely the trip from hell. The tow was stopped for darkness. Elliott commented sarcastically, "It gets dark every night. In our 60-year history and more than 100 dead ship tows, this tow set a record for the number of pilots assigned and a first for stopping a tow for darkness." Actually, Elliott said they laid over two nights. His crew costs were $3,000/hour. Elliott wired payment for over $200,000 in pilotage fees before casting off one line. "We do everything we can to avoid needing pilots," Elliott said.

It's reference to safety that forms the core pushback to complaints about pilotage. A pilot in a tricky waterway should not be thinking about cutting corners just to help a captain get to London one day sooner. This arms-length expertise takes money. Salary is a top concern for the Coast Guard. The Great Lakes competes for pilots with coastal ports paying considerably more. For example, the average 2014 compensation set by the Louisiana Public Rate Commission for the Associated Branch Pilots for the Port of New Orleans was $459,051, not including medical or pension benefits, compensated separately.

Pilots explain that concerns about safety may not be well understood by outsiders. Consider remarks by George Haynes, Pilot with Lakes Pilots Association District 2, during discussion at the September Great Lakes pilotage Advisory Committee meeting in Cape Vincent, NY. There was discussion about pilots' unwarranted calls for tugs in Cleveland and Detroit. More specifically, the reference was to ships with bow thrusters – tugs not needed.

Maybe. Maybe not, remarked Haynes. Equipment doesn't always deliver as expected. Haynes described how bow-thrusters can be rated at 1200hp, but "sometimes you only get 600. We may not know if the thing's going to work properly or not. Tugs are relatively cheap insurance. When it comes to the cost of an accident, even a fender bender can be tens of thousands of dollars."

Actually, the bow-thruster discussion was more complex, highlighting a kind of planar disconnect between industry and pilots. The bow-thruster issue was raised by Michael Broad, President of the Shipping Federation of Canada. He referenced it as a policy question, not a comment about singular events. Broad notes that in 2017, there were 57 cases of ship masters filing formal disagreements with the Coast Guard regarding pilots' use of tugs on ships with bow-thrusters. Other than acknowledging the filings, the Coast Guard did nothing, according to Broad. "It's incumbent on the Coast Guard to look into these things and provide an answer," Broad emphasized.

Accountability

Ship owners complain there is no accountability for pilots' decisions. Business as usual persists and persists for decades, despite outrageous costs. Ship owners contend that if this relationship has to stay wired together, i.e., political leaders don't have the courage to take it on, that doesn't mean it can't work better, with more accountability, oversight, transparency and operational efficiency reflecting the world of 2018, not the ancient world of 1960, or even 1972, in Canada's case.

Clay Diamond, with the American Pilots' Association, presented a rather lofty position at the September meeting, commenting that "a pilot's primary responsibility is to protect the interest of the public." He added that "with all due respect, the principal customer of a pilot is not the ship or the ship owner, it's the public interest."

But, the Great Lakes Pilots comments to the Coast Guard regarding 2018 rates don't reference the term "public interest"

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JANUARY/FEBRUARY
Cruise Ports Annual

- Carriers: Cruise Shipping
- Ports: Global Cruise Port Logistics
- IT: Breakbulk Tech Feature Load and Stress Measurement Instrumentation
- Tech: Port Security Training
- Product: Passenger and Cargo Gantries

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CMA Shipping 2019
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Container Ports

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- Energy Ports: The Logistics of Fuel 2020
- IT: Container Terminal Automation
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doesn't appear even once. It's all about the money. Every paragraph on every page builds to the same scold: that the Coast Guard, once again, is giving us the shaft.

In both the U.S. and Canada there are prospects of change. As noted, Transport Canada issued a 145-page analysis of shipping and pilotage issues with 38 recommendations for change, covering governance, labor, safety and tariffs and fees.

The Chamber of Marine Commerce is working to leverage the TC analysis. In October, the Chamber's "Marine Day on the Hill" focused on pilotage reform and infrastructure funding. The Chamber pressed these issues in discussions on Parliament Hill, including sessions with Transport Minister Marc Garneau and a multi-party panel with Liberal MP Vance Badawey, NDP MP Brian Masse and Conservative MP Kelly Block.

"Canada's pilotage system has not been overhauled in more than 40 years and is inefficient, inflexible, out-of-date and desperately needs to be modernized," explains Bruce Burrows, President of the Chamber of Marine Commerce.

He continued, "We urge the Minister of Transport to now move forward to introduce legislation that promotes safety and provides greater transparency and oversight of pilotage services while making the best use of proven and modern technology. The Pilotage Review Chair has made a series of recommendations that would achieve these goals while still maintaining the highest levels of safety and reliability."

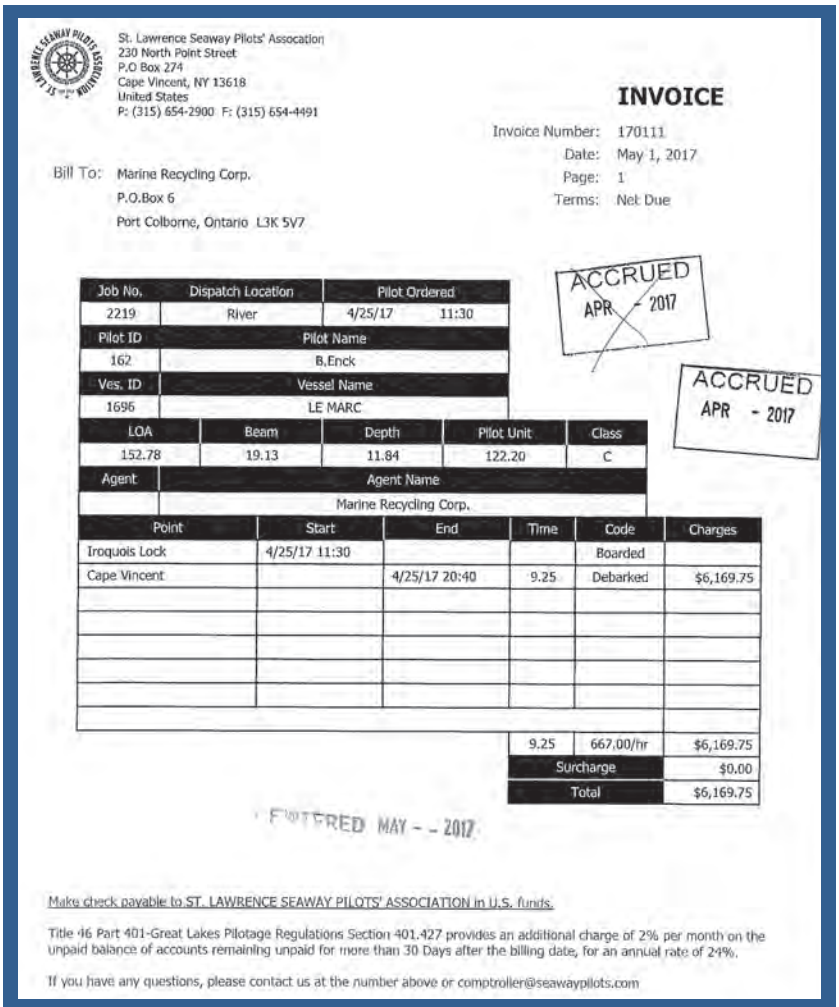
Similarly, on the other side of the border, pilotage issues are getting new attention. First, of course, is the Coast Guard rate setting process, open now. This process really just keeps the current system working but it surely serves to highlight the extreme concerns about pilotage. Another forum is the President's focus on regulatory reform within the maritime industry. Pilotage rates were specifically called out by American and Canadian industry and trade groups, including The Great Lakes St. Lawrence Governors & Premiers who described a "toxic environment between the Coast Guard, system users, and the pilotage associations."

Secondly, pushback is emerging among states. In October, Jacksonville-based Crowley Holdings Inc., the holding company for Crowley Maritime Corporation, released a statement urging Florida's Board of Pilot Commissioners to reject a proposed pilotage increase. Crowley wrote that the fee increase would "raise average pilotage costs more than 100%." Crowley is the port's largest tenant and recently signed a new 10-year Port Everglades lease. Crowley calculated that pilotage fees would increase between 88 to 139 percent depending on vessel size.

State issues came to the fore in Houston, too, when, the Houston Pilots, in October, withdrew their application asking the Port of Houston Authority to approve higher rates. The pullback came after 15 shipping companies presented a unified "No Way!" to the Authority. More than one firm said it would be forced to look for other ports of call because the new Houston rates would be so far out of line with similar ports that they would have no other choice. Shippers said they have made substantial cost cuts to survive and suggest that the pilots do the same. Imagine this: one shipper even called for a rate reduction.

In September, the US Government Accountability Office (GAO) released a report on freight transport issues within the Great Lakes, citing pilotage issues as one particular challenge. Importantly, GAO is working on another report with an exclusive focus on pilotage, requested by Senators John Thune (SD) and Todd Young (IN).

Eventually, this analytical momentum has to turn into legislative engagement, at least at the federal level. After all, agencies can only do so much. They comply with the law as written in 1960. Politically savvy insiders know this, of course. You can be sure they are getting ready to refocus the debate and move it to a different set of players.



St. Lawrence Seaway Pilots' Association
230 North Point Street
P.O Box 274
Cape Vincent, NY 13618
United States
P: (315) 654-2900 F: (315) 654-4491

INVOICE

Invoice Number: 170111
Date: May 1, 2017
Page: 1
Terms: Net Due

Bill To: Marine Recycling Corp.
P.O.Box 6
Port Colborne, Ontario L3K 5V7

ACCRUED APR - 2017

ACCRUED APR - 2017

Job No.	Dispatch Location	Pilot Ordered	
2219	River	4/25/17	11:30
Pilot ID	**Pilot Name**		
162	B.Enck		
Ves. ID	**Vessel Name**		
1696	LE MARC		

LOA	Beam	Depth	Pilot Unit	Class
152.78	19.13	11.84	122.20	C
Agent	**Agent Name**			
	Marine Recycling Corp.			

Point	Start	End	Time	Code	Charges
Iroquois Lock	4/25/17 11:30			Boarded	
Cape Vincent		4/25/17 20:40	9.25	Debarked	$6,169.75
			9.25	667.00/hr	$6,169.75
				Surcharge	$0.00
				Total	$6,169.75

FILTERED MAY - - 2017

Make check payable to ST. LAWRENCE SEAWAY PILOTS' ASSOCIATION in U.S. funds.

Title 46 Part 401-Great Lakes Pilotage Regulations Section 401.427 provides an additional charge of 2% per month on the unpaid balance of accounts remaining unpaid for more than 30 Days after the billing date, for an annual rate of 24%.

If you have any questions, please contact us at the number above or comptroller@seawaypilots.com

A typical Seaway pilotage invoice

Credit: MRC

The Author

Tom Ewing
is a freelance writer specializing in energy, environmental and related regulatory issues.

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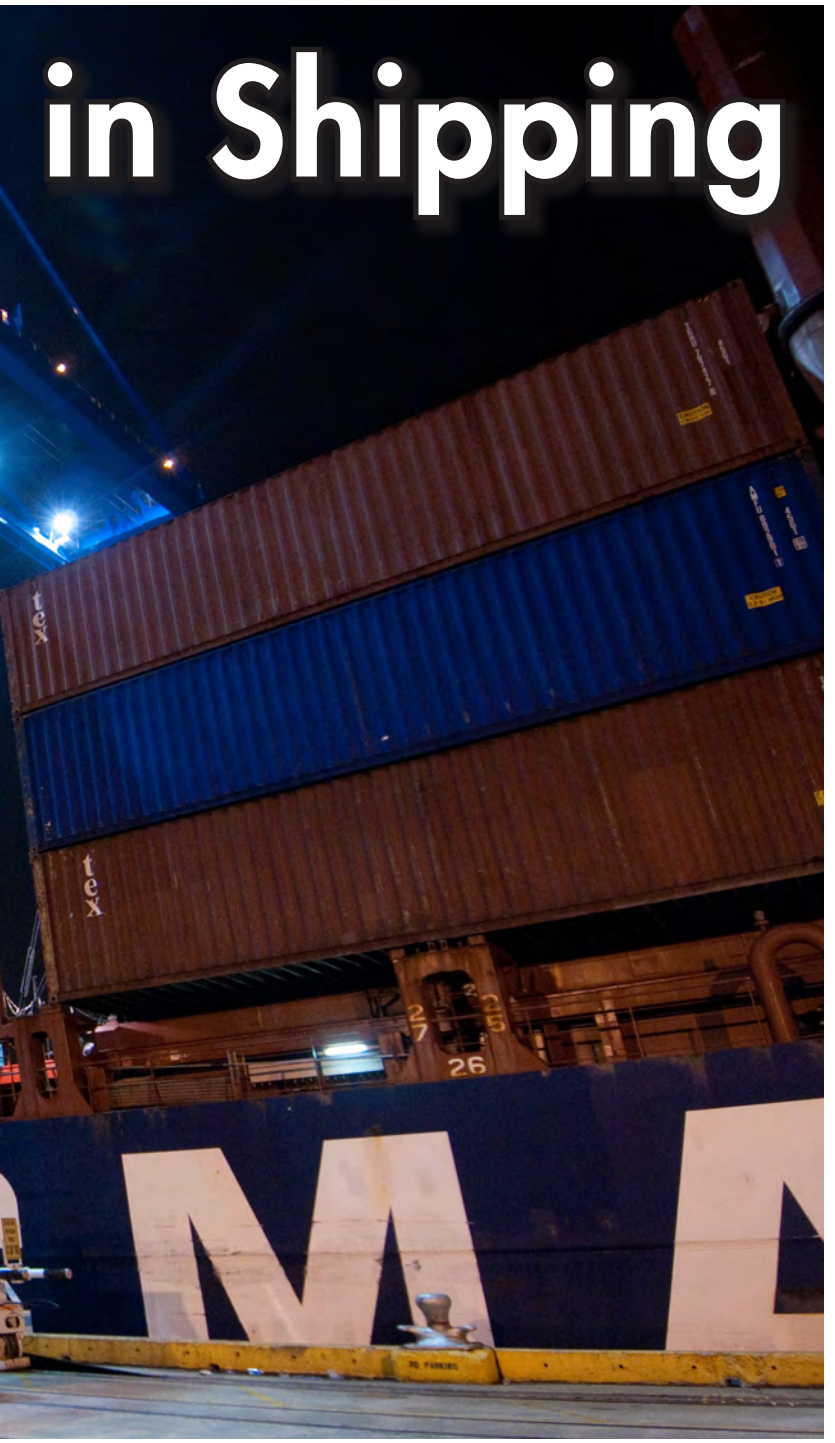
Advancing Digitization

Credit: CMA CGM

CMA CGM becomes the first ocean carrier listed on Freightos. Global freight moves towards the 'one-stop shopping' standard.

By Tom Mulligan

in Shipping



CMA CGM Group and global online freight marketplace company Freightos have established an ambitious pilot agreement whereby CMA CGM has become the first ocean carrier listed on Freightos. Online bookings, guaranteed pricing, and secured capacity on CMA CGM China-US trade lanes are available on the platform, with further extension to additional lanes planned in the near future.

For its part, CMA CGM says that it has reinforced its position as a digital leader within the industry and taken yet another step towards its customer-centric strategy, offering importers and exporters of all sizes direct access to instant pricing, routing, and concrete sailing information in seconds, as well as guaranteed capacity. CMA CGM rates can now be found free of charge on the Freightos website, www.freightos.com.

Real Change for Industry

"This development represents a real change for the industry because, for the first time, global shipping on key trade lanes functions like passenger travel or e-commerce, where customers can obtain guaranteed prices within seconds," said Mathieu Friedberg, Senior Vice President – Commercial Agencies Network at CMA CGM Group. "This initiative demonstrates our commitment to customer centricity. We've been on a journey to provide our customers with innovative offerings to ensure them the best shipping experience. This partnership raises the bar for ourselves, and the industry, with this important step into the digital era, selling directly to shippers on Freightos."

Zvi Schreiber, CEO and founder of Freightos, added, "This is a true win-win for the industry and a major step toward improving the customer experience. With CMA CGM selling on Freightos, smaller shippers now have direct access to a major carrier with competitive pricing. Additionally, shippers of all sizes will have access to guaranteed prices and capacity. This aligns with our goal to help logistics providers drive more value for customers, enabling smoother global trade, and ensuring more reliable and affordable supply of goods to end consumers."

CMA CGM is a worldwide shipping group with 506 vessels calling at more than 420 ports on five continents and in 2017 the company carried almost 19 million TEUs. The company has a presence in 160 countries and, through its 755 agencies network, the Group employs 34,000 people worldwide, including 2,400 in its headquarters in Marseilles, France.

Freightos' mission is to make global trade frictionless with the world's online marketplace for the trillion dollar international shipping industry. The Freightos Marketplace is designed to help importers and exporters reduce logistics spend and save time with instant comparison, booking and management of air, ocean and land shipments from top logistics providers to book international shipping as smoothly as booking a flight online.

Freightos also provides patent-pending technology that empowers carriers and logistics providers around the world to automate freight sales. With Freightos AcceleRate and Freightos WebCargo power rate management, automated pricing and online freight sales are made available for more than 1,000 logistics service providers and carriers, including multi-billion dollar companies such as Panalpina and Nippon Express. Freightos has accumulated the world's largest global database of multimodal freight rates, providing industry transparency with its Freightos Baltic Index.

An 'Expedia' for Freight

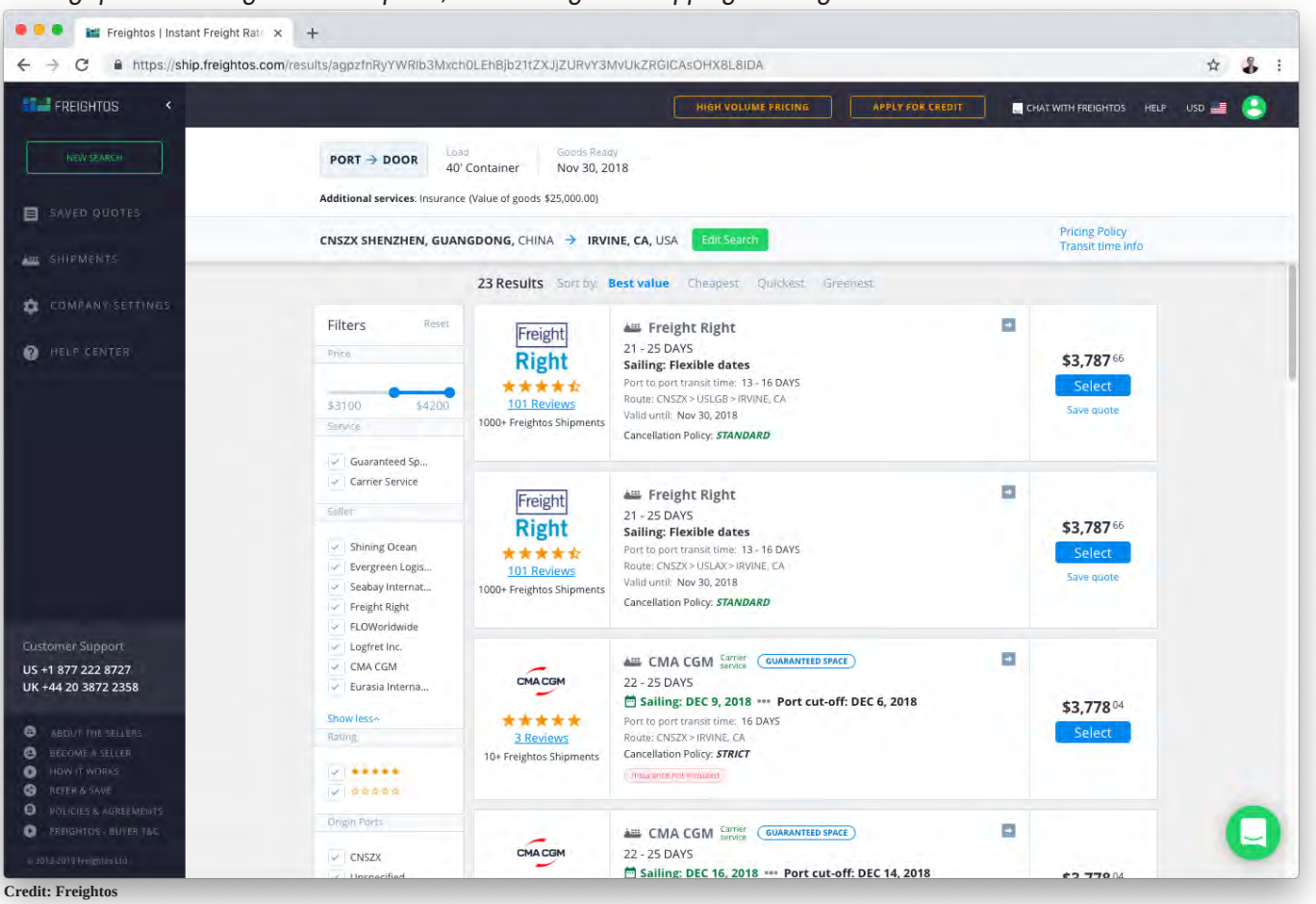
Freightos was founded in 2012 by Schreiber, a serial entrepreneur who has sold companies to General Electric, IBM and others. At his previous company, Schreiber shipped regularly

from China to the United States and was "shocked" at the inefficiency he experienced as a shipper every time he needed to ship goods.

He said his experience wasn't unique: "Freightos research shows it takes an average of three days for a shipper to receive a simple price quote even on a major trade lane. Twenty-five percent of containers don't make it on to the ship you expect them to go on. Eighty-three percent of shipments don't have proper track and trace visibility door to door." And so he decided to create an 'Expedia' for freight.

Between 2012 and 2015, Freightos focused on digitizing the supply via a solution for logistics service providers to use internally. This platform, Freightos AcceleRate, does rate management, instant freight quoting, business intelligence and tender management. Additionally, Freightos acquired Freightos WebCargo with the world's largest database of air cargo rates.

Finding quotes on Freightos Marketplace, the online global shipping booking service.



Credit: Freightos

Instant, door-to-door international air & ocean freight quotes

Once the company reached the milestone where dozens of forwarders such as Hellmann Logistics, CH Robinson and CEVA Logistics, to name a few, were managing their rates in Freightos, it began building the supply side. Freightos Marketplace launched in the summer of 2016 for small and mid-size shippers on a few trade lanes. On a weekly basis, more than a thousand shippers use the platform, and it is growing rapidly. The service offers instant, door-to-door international air and ocean freight quotes and small and mid-size businesses can log in to ship.freightos.com, search and compare freight quotes from forwarders, and now also direct from CMA CGM, the third-largest ocean carrier in the world, which is offering its rates on the marketplace, enabling shippers to compare freight quotes and book online.

Once booked, Freightos also helps manage the shipments. Documents, tracking and payments are all managed digitally on the Freightos website, while logistics service providers can use the Freightos Marketplace as a sales channel. Large providers are also happy to receive new orders from new shippers with a very low cost of sale, an easy quoting process and a low customer acquisition cost.

Benefiting the shipping industry?

One benefit of the system is that Freightos is partnering with incumbent carriers, forwarders and shippers to bring digitization. "The benefits are lower cost, better transparency and a superior modern customer experience," said Schreiber. "Our independent research shows that 86 percent of forwarders see technology as their biggest lever for growth – this is way above the other tactics they've discussed in the past, such as mergers and acquisitions.

"Freightos has been talking about online freight forwarding for years," he added. "A shipper should be able to get his/her freight quote automatically online, self-service, just like you can book a hotel online. And for years it has been just talk; but today you now have several big logistics providers offering price quotes on major trade lanes on their websites. This is a big change, all within the span of one to two years, and proof the big players understand the freight experience must be online.

"Containers probably won't be changing in the next 20 years; but everything around how the industry manages them has started to change and needs to continue changing in a big way."

Expanding user base

Schreiber also added that as Freightos evolves, a broader range of importers and exporters tend to use the system "The initial user base centered around the long tail of smaller importers and exporters," he said." E-commerce stood out as a key market, belaying a rapidly growing market of first-time importers that were graduating from local sourcing to international sourcing and, with time, Freightos has expanded to significantly larger volumes. While ease of use and education was a hallmark value for smaller shippers, we now attract larger shippers who now benefit not only from a digital experience but also from more aggressive pricing. The introduction of CMA CGM's secured capacity is a game-changer; reliability is often more important than pricing for larger importers and exporters and marrying public reviews with guaranteed capacity and competitive pricing means increased interest from top-tier companies, albeit centered on their spot shipment volume.

"A good digital platform is never complete," he continued. "For our roadmap, we're guided by the need to provide an exceptional customer experience, while remembering that as a two-sided marketplace, we also need to provide an outstanding, secure environment for our sellers.

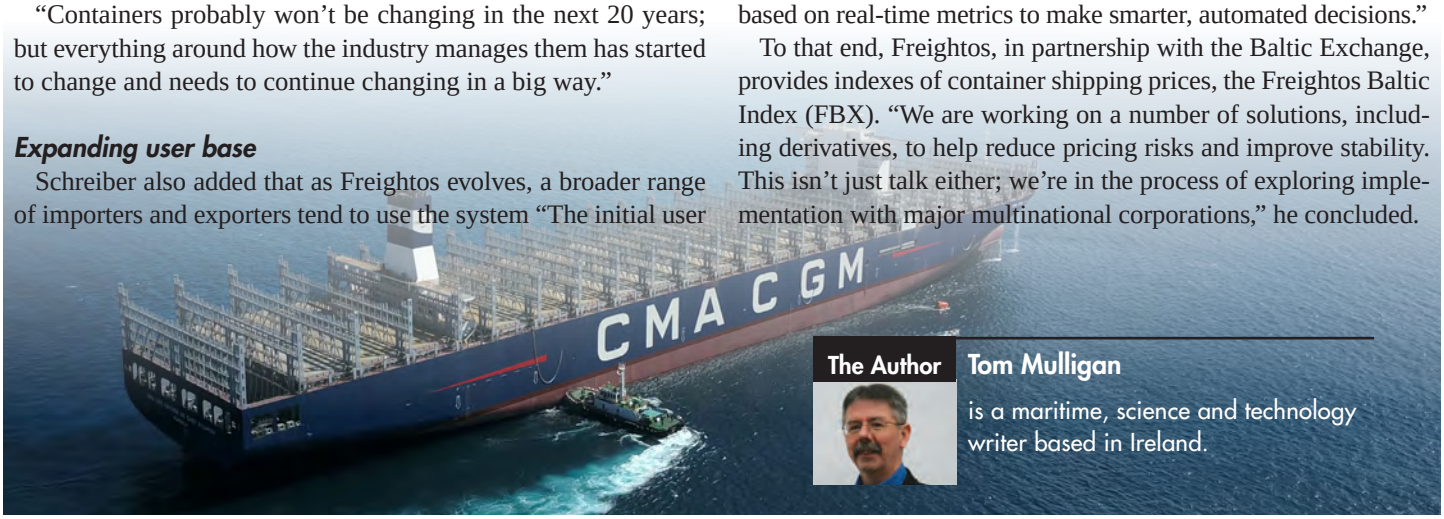
"We're continuing to make headway on creating a better shipment management experience, with more direct integrations into seller TMS systems and other data resources, facilitating better proactive exception management and user life cycle operations."

Schreiber also knows that reliability is also a key parameter when selecting providers. He adds, "As we increase the number and quality of the Freightos sellers, we are also putting systems in place to track reliability and customer service levels, and then feed those back into rate selection. Expanding the types of sellers on the marketplace to include even more carriers, as well as ancillary services that drive value for importers in a one-stop platform is also an exciting direction that we're pursuing."

Improving global digital infrastructure

Schrieber stated that Freightos is working on improving its underlying global digital infrastructure. "While we've already automated freight pricing and sales for over 1,200 logistics providers globally, this internal automation must be augmented with increased agility. Nearly every major global industry leverages dynamic pricing based on real-time metrics to make smarter, automated decisions."

To that end, Freightos, in partnership with the Baltic Exchange, provides indexes of container shipping prices, the Freightos Baltic Index (FBX). "We are working on a number of solutions, including derivatives, to help reduce pricing risks and improve stability. This isn't just talk either; we're in the process of exploring implementation with major multinational corporations," he concluded.



Credit: CMA

The Author **Tom Mulligan**

is a maritime, science and technology writer based in Ireland.

PORTS, LOGISTICS AND INTERMODAL

A U.S. Logistics and Transportation Q3 survey issued by TCompanies finds continued strong optimism regarding U.S. economy. Separately, Moody's is maintaining its stable outlook on the U.S. ports sector for 2019, reflecting healthy cargo and cruise demand supported by a strong U.S. economy and continued – albeit moderating – global growth. All of that comes with a caveat.

According to TCompanies, the broad based survey representing the full spectrum of the intermodal transportation sectors found that 74% are optimistic about the U.S. economy over next three months. And, that's unchanged from Q2 2018. Other highlights of the report include:

- ***80% expect increased revenues (up from previous quarter 75%) and 73% expect increased profitability (up from 67%):***
- ***Inflationary pressure still remain strong as 56% plan to increase prices in next quarter;***
- ***By a 2-to-1 margin, workforce shortage remains the bigger obstacles to growth – even more so than trade tariffs.***

"The survey shows continued strong optimism in the U.S. economy and in the logistics and transportation industry," said Tom Burke, CEO of TCompanies. "As with the Q2 2018 survey, there is still concern with inflationary pressures as a majority plan to increase pricing and pass costs on to customers in the next three months."

Who said so? A wide range of intermodal stakeholders participated:

Sector Responder	PCT
3PL	15.75%
4PL	0.68%
Broker	8.9%
Depot	0.68%
Freight forwarder	9.59%
Leasing	1.37%
Rail	3.42%
Shipper	4.79%
Steamship	4.79%
Trucking	41.1%
Warehouse	4.11%
Software	1.37%
Technology	3.42%

TCompanies, with offices in eight U.S. cities, includes portfolio companies servicing the transportation industry include Terminal Operations Management, DrayMaster, PEIR, Tires For Containers, Comprehensive Incentive Solutions and Capacity Connection. The TCompanies survey, conducted during the month of October 2018, revealed, among other things:

With regard to the U.S. Economy, respondents were:

	Q3 2018	Q2 2018
Optimistic	74.15%	73.71%
Neutral	23.13%	18.29%
Pessimistic	2.72%	8%

Company Hiring in the coming quarter:

	Q3 2018	Q2 2018
Increase	63.51%	64.37%
Stay the same	31.76%	30.46%
Decrease	4.73%	5.17%

Company Revenues in the coming quarter:

	Q3 2018	Q2 2018
Increase	80.41%	74.86%
Stay the same	17.57%	18.86%
Decrease	2.03%	6.29%

Company Profitability over the next quarter:

	Q3 2018	Q2 2018
Increase	73.65%	67.24%
Stay the same	23.65%	25.29%
Decrease	2.70%	7.47%

Wage Growth over the next quarter:

	Q3 2018	Q2 2018
Increase	47.30%	38.29%
Stay the same	52.03%	57.71%
Decrease	0.68%	4%

Pricing of goods/services over the next quarter will:

	Q3 2018	Q2 2018
Increase	56.46%	57.71%
Stay the same	40.82%	39.43%
Decrease	2.72%	2.86%

Obstacles to growth include:

	Q3 2018	Q2 2018
Workforce shortage	46.58%	43.6%
Trade Tariffs	18.49%	17.44%
Regulatory issues	10.96%	18.6%
Wage Costs	8.22%	5.23%
Energy Costs	6.16%	2.33%
Access to credit	5.48%	8.72%
Repair expense	4.11%	4.07%

In another equally interesting look at the intermodal supply chain, Moody's – focusing far more on the waterfront – is maintaining its stable outlook on the U.S. ports sector for 2019. Nevertheless, these positive trends are balanced by a fundamentally weak ocean shipping industry, which constrains ports' pricing ability and weakens cost recovery for capital investments.

Transportation Outlook

Consumer demand will drive growth in cruise activity as all major cruise lines significantly expand their capacity, but the still fragile financial state of the container shipping industry will significantly constrain the prices that ports are able to charge. Beyond this, says Moody's, consolidation among container shipping lines has made shipping companies more effective at curbing price increases.

Amid pricing pressures for U.S. ports, recent or planned capital spending continues to exceed 100% of operating cash flow for the sector in the aggregate, and is likely to exceed 150% in 2019. The sector will remain dependent on new borrowing and federal and state funding to finance capital investments and the benefit of healthy container volume activity will be tempered by higher debt service costs and capital outlays.

Importantly, the deceleration in domestic and global growth comes against a backdrop of rising trade protectionism, and without a major change in sourcing or a de-escalation of the U.S.-China dispute, cargo owners will face higher prices on a wider range of products in 2019. Moody's would consider changing its outlook on the U.S. public ports sector if expected container volume growth were to decelerate below 1% over the next 12 to 18 months.

2019: Stable Outlook, Healthy Demand, but spending and pricing pressures persist

The outlook for U.S. ports over the next 12-18 months is stable, reflecting healthy demand supported by a strong U.S. economy and continued global growth. These positive aspects are balanced by financial pressures facing ocean freight carriers, which constrains ports' pricing ability and weakens cost recovery for the large capital investments occurring in the sector. The following variables, says moody's will impact the port sector the most:

- *Healthy cargo and cruise demand to continue in 2019, supported by container volume growth of 2%-3% supported by a strong U.S. economy with favorable consumer activity.*
- *Pricing and cost recovery remain constrained by challenges among ocean carriers. The container shipping industry remains challenged by overcapacity and faces higher fuel costs. As container shipping consolidates and gains negotiating leverage relative to ports, carriers will more effectively constrain price increases.*
- *Capital spending remains substantial even as pricing power comes under pressure. Increasingly larger vessel deployments in the container and cruise segments are keeping capital spending high. For many ports, adaptation is necessary to prevent obsolescence, which makes these expenditures only semi-discretionary.*
- *Impact of higher tariffs will intensify in 2019, a downside risk. Moreover, the deceleration in domestic and global growth comes against a backdrop of rising trade protectionism. Indeed, a Moody's expectation of lower volume growth in 2019 reflects the fact that some shipments were front-loaded into 2018, ahead of planned tariff increases.*

Sector Projections, By the Numbers, look something like this:

- *Auto and vehicle cargo is forecast to increase 0.9% and light vehicle sales are forecast to decrease 1.0% in 2019.*
- *Roll-on/roll-off cargo represents close to 5% of revenues for most major ports.*
- *Energy and petrochemical cargo will grow in 2019. U.S. oil production is forecast by the U.S. Energy Information Administration to increase 11% in 2019.*
- *Average net natural gas exports are expected to more than triple from 2.0 billion cubic feet per day (Bcf/d) in 2018 to 7.6 Bcf/d in 2019*
- *Agriculture cargo will remain stable despite retaliatory tariffs, with U.S. agricultural exports (by value) decreasing by 1.6% in 2019 and imports decreasing 0.5%*
- *Over the last 12 months, bunker fuel prices have increased more than 30% compared with 5%-10% increases in freight rates on major trades (see exhibits 4 and 5.*
- *Fuel costs represent approximately 50% of ocean carriers' operating costs, and likely increase from the impact of the so-called IMO 2020 global sulfur cap on marine fuels.*
- *Based on industry surveys, between 80%-90% of carriers are initially expected to meet the mandate by burning compliant fuel, which is projected to add $12 billion to the industry's fuel costs, or up to $500 per TEU on trans-Pacific eastbound service to the U.S.*
- *The IMO low sulfur mandate will pressure smaller and less fuel-efficient container vessels with low employment demand, for which the installation of scrubbers is uneconomic, which could lead to further scrapping of boxships smaller than 5,000 TEUs.*

Tariff impact is on course to intensify in 2019, a downside risk to the outlook. The still healthy but slowing domestic growth comes against a backdrop of rising trade protectionism and weakening momentum in global trade. Without a major change in sourcing or in the trade dispute, cargo owners will face higher prices on a wider range of products in 2019. Indeed, existing tariffs of 10% on 7,000 product classifications have already caused prices on certain consumer goods and manufacturing inputs to rise, though the strengthening dollar and weakening Yuan are mitigating the impact to a degree.

Moody's: What could change the outlook?

Within the report, Moody's offers, "We would consider changing our outlook to negative if we expect container volume growth to decelerate below 1% over the next 12 to 18 months. An escalation of the trade dispute between the U.S. and China remains the key risk. We would consider revising the outlook to positive if we expect volume growth to exceed 4% and the shipping industry exhibits improved financial stability, supporting an improved pricing environment for port operators."

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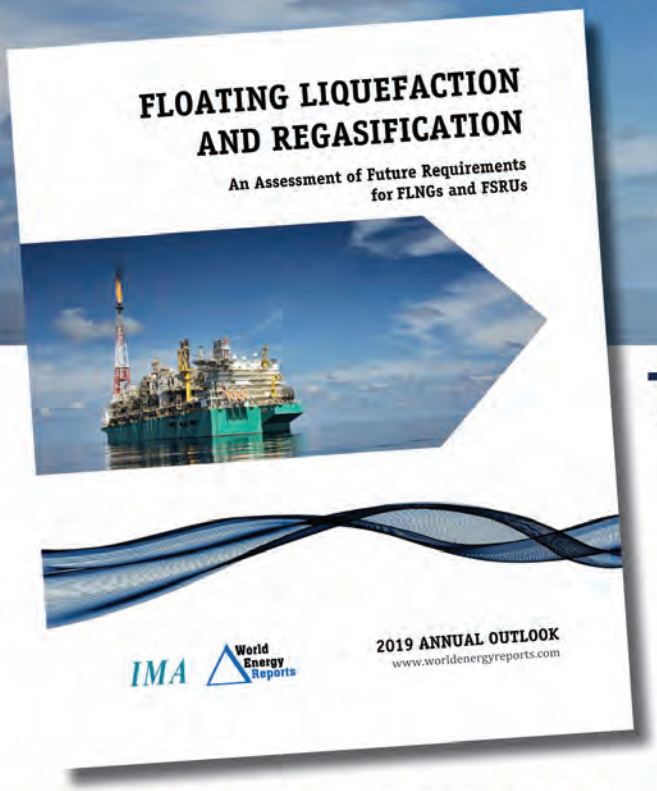

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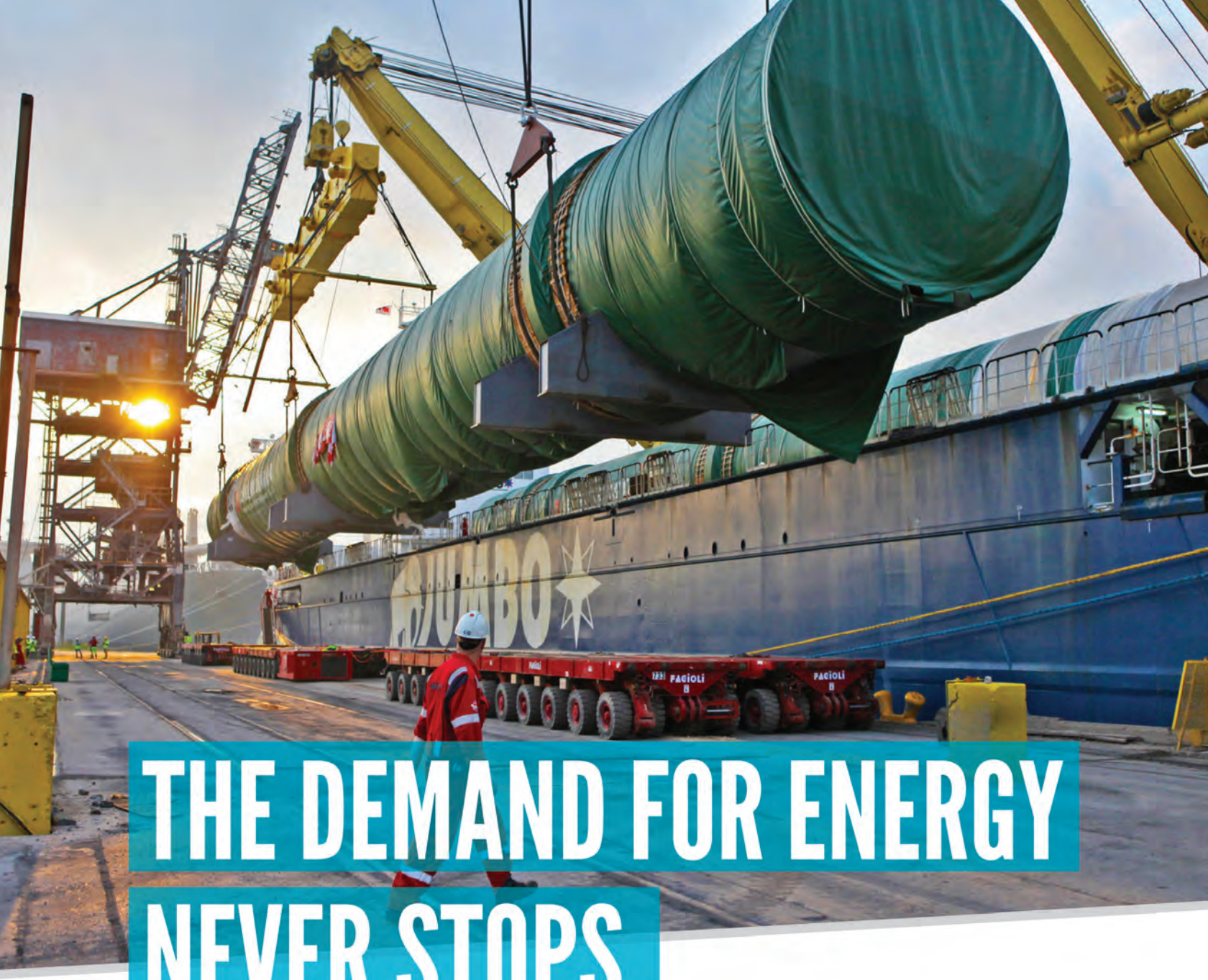

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