

# WHAT'S ShipInsight

*Where Maritime Regulation and Technology Meet*

# TRENDING

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AUTONOMOUS SHIPS,  
DECARBONISATION...

# 2020



# ShipInsight

*Where Maritime Regulation and Technology Meet*



# Welcome

This year's edition of ShipInsight's annual Journal marks a pivotal year for global shipping. Rarely have ShipInsight's twin themes of regulation and technology been so interdependent as they are this year, with new developments – such as the 2020 sulphur cap – coming into effect and future ones – such as IMO's evolving GHG strategy – taking shape.

But 2020 also marks the start of a new decade and, with these landmarks as their background, all the authors who have contributed to this edition have had them as their guiding principles. And one author looks beyond our present concerns to the future, offering a thoughtful assessment of the carbon decisions that will outlive us.

Other topics discussed in this year's Journal will also have a long term impact. Ship Surveys, for example, are already benefiting from new technology such as drones and better data capture and these will improve detail and accuracy for every survey in the future. Cyber security protection is also becoming more sophisticated in response to growing threats and that is a battle that will only become more strongly fought in the years ahead.

Financing is also changing in response to external influences. The Poseidon Principles aim to link loans to a borrower's environmental practices but lenders may soon be faced with funding decisions where long-term outcomes are unknown and one of our authors has tackled that situation.

All the changes discussed in this Journal will force everyone affected by them to take a fresh outlook on how they interact with other parts of the industry. Who will be responsible for the actions of an autonomous ship, for example? What skills will be needed and where will accountability lie as the industry becomes more data-driven and remotely monitored? And how will education and training adapt to this new world order?

This latest edition of the Journal does not have complete answers to those questions. What it does have are the thoughts and ideas of many people who are working towards finding those answers and have exclusively set out the state of the art in their areas of expertise. I am sure you will enjoy reading them and will be inspired by them.

Paul Gunton  
 Technical Editor, ShipInsight  
[paul@shipinsight.com](mailto:paul@shipinsight.com)



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**Publishing Director** Adam Foster

adam@shipsight.com

+44 (0)1372 285 001

**Lead Editor** Malcolm Latache

malcolm@shipsight.com

**Art Director** Chris Caldwell

**Advertising Sales** Adam Foster

adam@shipsight.com

+44 (0)1372 285 001

Shipsight, 2a The Quadrant, Upper High Street, Epsom, Surrey, KT17 4RH UK  
shipsight.com

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# Ship surveys made smarter



**By Claudia Ohlmeier**  
Group leader port state control  
DNV GL

**Sending a surveyor to a vessel takes time and waiting time impacts the vessel's operational availability. With travel time eliminated and waiting times reduced, remote surveys can be conducted faster than traditional surveys and the results can be shared immediately through DNV GL's electronic certificate and documentation system.**

Since the spring of 2019, DNV GL-classed vessels have been able to take advantage of remote surveys for some inspections. Through an online connection or video-streaming link, a dedicated team of remote surveyors provides support to vessels anywhere in the world.

Traditionally, regulatory bodies have assumed that experts are always physically present on board to verify a ship's situation. This has been standard procedure but times have changed. In the past, with limited communication options, far fewer regulations in place and only basic technology on board, shipowners and classification societies were able to handle surveys in a single visit. Nowadays, with complex technologies on board and dependence on various third-party service suppliers, a single visit is no longer sufficient. So in a world in which every minute counts, the industry is demanding the use of advanced communication technologies to support and speed up the process.

Remote surveys using state-of-the-art technology allow DNV GL to formalise this kind of work, manage the operation from fewer central units and

enhance transparency by standardising their documentation.

Another advantage of remote surveying is that it provides access to a broader range of competencies, regardless of the ship's location. Remote surveys allow us to apply expertise as needed from anywhere the experts are located and, since the same remote-survey teams review all types of cases, the results are more consistent while the level of assurance matches that of on-board surveys.

But not everything can be done remotely because some things are too critical to determine without an expert being there to physically verify the situation. Whether it is possible to conduct a survey remotely is subject to a case-by-case assessment, which is made in the office but based on on-board experience. In addition, some statutory items may require authorisation by the flag administration by means of a remote inspection. Around 85% of requests for remote surveys are accepted, with the rest referred for an on-site survey.

DNV GL has the backing of all major flag states, which have authorised its remote surveys for certain statutory surveys, "but so far we have only scratched the surface," said Dave Wamsley, DNV GL's principal contact at the Republic of the Marshall Islands (RMI) Maritime and Corporate Registries. "But remote and digital services are progressing at a quick pace, driven by communication capabilities," he added.

### **Drones: a new era of inspections**

Another example of how DNV GL is modernising its class services is visual inspections and steel thickness measurements as part of renewal surveys. Preparing ships for these activities is time-consuming and not without safety issues.

A traditional survey requires rafting, roping or staging so the inspection personnel can reach all relevant structural elements. Rafting takes additional time since the vessel must be ballasted and deballasted; both roping and rafting often require voyage surveying and setting up staging can take days. In addition, staging often damages surfaces and coatings that must then be repaired.

In certain situations, owners have to hire subcontractors using rope access techniques, which is an especially hazardous type of work. These conventional inspection methods expose staff to potentially dangerous situations and make ships unavailable for hire for weeks, which means lost income. Logically, owners have an interest in reducing possible injuries and keeping these times as short as possible.

This led to the idea of using drones instead of requiring people to work at height. The first step was to attach a high-resolution camera to a drone so surveyors could take a close look at hard-to-reach places and several off-the-shelf drone models were tested.

After many months of development work and trials, a medium-sized commercial drone fitted with a special accessory frame was designed and manufactured in-house by the Gdansk DNV GL surveyor team and is now standard equipment for inspections around the world. Now, with more than three years of experience of drone-assisted visual inspections on ships and offshore structures, DNV GL's customers expect more, wanting the full scope of inspections to be carried out using this advanced technology.

This includes thickness measurements so, in mid-2018 DNV GL began developing a flying thickness measurement system. After several prototypes, it arrived at a design that satisfied its requirements. Its development included elaborate testing of thickness measurements by drones on

different ship types such as MPVs, bulk carriers and shuttle tankers and DNV GL can now offer owners drone-assisted services including close-up inspection and verification of thickness measurements.

However, it is important to note that classification rules and regulations require a wide range of thickness measurements, most of which are typically performed by subcontractors so its drone measurements are only supplemental to what the contractors are doing. Drones are used only to access structures that cannot be reached by conventional means to perform close-up surveys and to verify and confirm that a ship is structurally in good condition as required under class rules.

The drone accelerates this spot-checking process dramatically and can accomplish it within a single visit, which could be during a voyage or port stay. Wherever conditions are detected that warrant further investigation, traditional access using staging is unavoidable but when the drone survey shows that everything is in good condition, this effort can be avoided.

### **Survey innovations and regulatory impacts**

Regulations are developed with the technical status quo of their time in mind but the world is developing rapidly and providing options than could have been imagined just five years ago. At the same time, innovations make our world even more complex but shipping cannot afford to miss out on smart new developments, especially with regard to the new challenges it faces, such as environmental goals.

Since 1864, DNV GL's purpose has been to safeguard life, property and the environment and continues this journey by exploring new surveying possibilities and supporting their implementation as standard procedures in the applicable rules and regulations.

To this end, it works together with other classification societies in the International Association of Classification Societies and submits new proposals to the IMO. If approved by the necessary majority of flag states, these proposals will enter into force.

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Measured (bar)

2.26

Reference

Liner Wall Temperature

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Measured (deg C)

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# Breaking the blockchain hype cycle: Transforming 2020 compliance



**By Deanna MacDonald**  
Co-founder  
BunkerTrace

About two years ago, blockchain burst onto the scene in shipping and was eagerly promoted as ‘the next big thing.’ Many saw it as a means to resolve all kinds of issues, from cargo brokerage to emissions tracking. Initial coin offerings were seen as an exciting way to raise capital beyond traditional sources and pretty much all sectors of the industry saw blockchain as something they needed to adopt, regardless of whether it made any sense.

The industry has traversed the hype cycle, however, with remarkable speed. Blockchain-based platforms for trade have emerged but are slow to build large enough user bases to become commonplace and the implementation of using crypto currency to represent the trade of cargo is further

away than it was once hyped to be.

So what exactly made the widespread implementation of blockchain in shipping so difficult? And where and how can it truly add value?

A recent report from the Boston Consulting Group (BCG) does a great job of identifying some of the barriers the technology faces in transport and logistics, markets where, initially, the prospect of a secure, decentralised store of information, seemed to be one of the most exciting and applicable sectorial use cases. According to a survey of professionals in the sector, the vast majority of respondents (88%) believe that blockchain will disrupt the industry at least somewhat. And most (59%) believe that the disruptions will take place within the next two to five years. But nearly

three-quarters (74%) say that they are exploring opportunities only superficially or haven't thought about blockchain at all. Why is that?

"The best blockchain networks", it argues (and I agree), "are often the hardest to create". At the crux of the issue is a fundamental element of blockchain: trust. The transformational potential of blockchain networks lies in their potential to create trust between parties without intermediation, but this fundamentally runs counter to many of the business models that we are embedded in.

The BCG report goes on: "These distributed digital ledgers can mitigate the mistrust that often exists among the industry's transacting parties. Yet this same mistrust makes it hard to bring together the industry's diverse participants into a common blockchain ecosystem." This is a salient point, as blockchain-based systems are only as good as their industry-wide or community-wide adoption and use.

It is this contradiction that makes for an important reason as to why so many applications in transport and logistics have struggled to find their feet.

Instead, we've found that the best results come from working with consortia throughout the industry and bringing together industry stakeholders by invitation to align their interests to address shared friction points across entire value-chains. These stakeholders include suppliers, producers, customers, competitors, regulators and governments, to name a few. The pain points we've identified are specific, but important – such as tracing the provenance of a fuel and dangerous goods or ensuring that electronic crew documentation can be relied upon.

This is where the potential for real change happens: creating systems that level informational playing fields and give the industry access to trusted information, helping to solve real-world problems faced by the entire industry. Bringing together stakeholders with competing objectives and finding common ground is the first, most difficult and most important step. It is only if we as an industry are willing to challenge ourselves to work more collaboratively that we can realise the value that can come from decentralised technologies.

The bunkering industry, and specifically,

enforcement of IMO 2020, maps very closely to the type of challenge that blockchain is best placed to solve. It concretely demonstrates the need for this kind of collaboration and the verification of data – and indeed, was the focus of BLOC's first demonstrator project of Maritime Blockchain Labs. After having validated the use case and value propositions, we created a joint venture with Forecast Technology that is now called BunkerTrace as a commercial spin out of the demonstrator.

With the fateful date of 1 January 2020 already behind us, we are beginning to see what life in the new normal is really like and how a lack of traceability in the fuels supply chain is affecting operations. At the time of writing, in early February, the port of Ningbo has reported the third sulphur cap violation seen in China so far. According to commentary by Lloyd's List, this violation may well have resulted from an improper blending of the fuels or an incomplete switch to compliant fuels.

With the authority for enforcement resting upon individual flag states, proving compliance across jurisdictions is one challenge the industry has not yet grappled with. To show inspectors that vessel operators are complying with IMO 2020, many are requiring critical documentation such as bunker delivery notes, bunker transfer procedures, MARPOL Annex VI declarations and oil books be accessible, verifiable and maintained on board the ship for many years. The cost in time, money and resources required to prove compliance will be high for the industry at large.

We are also facing additional uncertainty and risk in the bunker supply chain as many predicted we would. With the implementation of the International Maritime Organization's sulphur cap, several new players have entered the bunkering market while others have expanded their presence to meet the demand for 2020-compliant fuels. With this has come an increase in the complexity and scale of supply chains and increased use of blending.



The changing supply chain behind IMO 2020 threatens to increase similar risks as those we saw in the 2018 contamination crisis originating in Houston. It has brought fundamental changes to the dynamics of the bunkering market, which in turn creates uncertainty and risk: risk for owners, charterers, credit providers and financiers in the fuels they buy or fund; risk for insurers in establishing the risks they must manage; risk for operators and the fuels they burn, and for enforcers policing the fuels market. These risks could result in a loss of insurance coverage for failure to comply with the global sulphur cap, underwriters denying coverage due to ‘risk as a whole’ of the vessel if due diligence against contamination cannot be proven and financiers being unwilling to invest.

Through validation with the Maritime Blockchain Labs consortium, we have found that applying blockchain for this specific case of traceability can prove valuable to complex supply chains, such as bunkering. Securing the proof, time

and geo-stamps of the records of events in an immutable blockchain creates a verifiable source of truth. The marine fuels supply chain is highly fragmented, often reliant on physical paper trails. Replacing this with a more accessible, more secure and more trustworthy platform can help owners, ports, bunker suppliers and insurers to manage risk more carefully. With an immutable chain of custody tracking each bunkering transaction, a blockchain-based system can easily build up a secure picture of where to buy and what to avoid.

However, investigating this problem further demonstrated a significant challenge to overcome – that we are only as good as the information given to us and working in the digital world alone only goes so far to prevent the risk of incorrect data entry or the physical tracking of goods. If we are to be able to truly verify that these digital records represent reality, then we need to be able to link the digital to the physical. We believe that this presents a crucial challenge for the blockchain

It is easy to see how this solution could be applied to sustainable biofuels and other zero-carbon fuels, and how important it will be in future for the industry to trace an entire zero-carbon fuel chain.

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solutions of the future to overcome, especially in an industry like shipping where incentives and information chains can be so fragmented.

For BunkerTrace, true authentication of bunker fuels meant that we needed to physically mark the fuels that we were digitally tracing. This came in the form of partnering with Forecast Technology Ltd to provide a non-invasive synthetic DNA tag to be mixed in with the fuel and follow it through the supply chain. When coupled with the lab test results on the quality of fuels and our software for documenting the handoffs as the fuel is transferred, we create a turn-key solution for validating the authenticity, quality and specifications of fuels.

When looking at a fuel supply chain, a unique tracer can be added as far upstream as the refinery and then, at subsequent points of mixing along the supply chain, other tags can be added. Each time the fuel is lab tested for quality parameters, these are recorded and associated with the unique tags. By the time it reaches a vessel, there will be an entirely auditable trail of specifications contained in the fuel. This authenticates fuel integrity so that vessel owners and operators can be sure that they are getting exactly what they paid for.

With our portable testing devices, bunker surveyors can test for the presence of the tags in less than a minute during their physical field inspections, enabling instant and verified confirmation of the quality and dilution of fuels. This

drastically improves oversight and visibility into the supply chain while empowering vessel owners and operators to make informed decisions prior to transferring the bunker fuel to the vessel.

The result is a powerful tool which provides evidence of compliance with IMO 2020 and enhances marine fuel traceability by showing that at every point in the supply chain, it is easy for stakeholders to check if the fuel they are moving, loading, buying or selling is the product that it's meant to be, even if fuel has been blended or mixed.

We are confident that this is only the beginning when it comes to the potential combinations of blockchain with physical tracking. It is easy to see how this solution could be applied to sustainable biofuels and other zero-carbon fuels, and how important it will be in future for the industry to trace an entire zero-carbon fuel chain.

By demonstrating what happens when we combine blockchain with DNA tracking, we hope that this is just the beginning of a step change towards safety-critical solutions that bridge the physical and the digital.





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# Digitalisation brings new opportunities for women in shipping



**By Dr Katharina Renken**  
Senior researcher  
Center for Shipping and Global Logistics

The maritime industry is a traditional business that has developed over uncounted decades, supporting transport for goods and people, exploration, leisure and research. It is also an ever-changing business. Shipping has experienced evolutions and interruptions to its building materials, design processes and communication.

New major trends, such as sustainability, demographic change, urbanisation, globalisation and information technology, have already reached the shipping industry, requiring traditional and risk-averse actors to rethink their strategies. With

fast-moving developments in data processing, worldwide connections – both physical and digital – between cities and countries and an all-time peak of pressure on costs, digitalisation has emerged as a target as maritime companies plan their strategies.

Shipping is a worldwide operation. Its actors do business around the clock as ports, ships and transport operators are spread out and moving all over the globe in all possible time zones. New processes for transport, such as multimodality, will only become alive with digitalisation. Sustainability goals can be reached and expanded



by gathering, analysing and understanding data. Expectations in regards to flexibility and reliability in transport can be met by ensuring transparency of data within and between businesses.

As a result, digitalisation is now a megatrend, spreading its impacts on shipping. To support its rising importance, there will be a growing need for computer and mathematics experts alongside engineers.

The World Economic Forum (WEF) recognises this and, in 2016, ranked the growth in jobs connected to computing and mathematics as second only to that in architecture- and engineering-related jobs. By 2018, the WEF was listing big data analytics, app- and web-enabled markets and the internet of things as the technologies expected to see the largest adaptation in industry by 2022.

In the changing business environment, required skills are changing as well. In 2016 the WEF produced a list of the 10 skills that it expected to be most important by 2020 (see table), which

include a number of 'soft skills' related to communication. All the skills it identified are needed in the maritime field.

#### **Top 10 skills required in 2020**

1. Complex problem solving
2. Critical thinking
3. Creativity
4. People management
5. Coordinating with others
6. Emotional intelligence
7. Judgement and decision-making
8. Service orientation
9. Negotiation
10. wCognitive flexibility

(Source: World Economic Forum, 2016)

An education in STEM (science, technology, engineering and mathematics) skills, with their

These findings point to women being a better fit for the skills that will be needed in the future and especially for digitalisation.

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focus on critical thinking, problem solving, creativity in solution finding and the overall goal to improve people's lives, immediately addresses four of those Top Ten skills.

However, a 2017 article published by the Microsoft Asia News Center said that women are at risk in this fourth industrial revolution by not being in STEM fields, noting that 20% of tech jobs are held by women, compared with 52% of non-tech positions. Yet an OECD report from the same year showed that 39% of STEM graduates are women.

How is that? Apparently, even though STEM graduates inherently learn some of the most-needed skills for businesses to face the future, industries demonstrate barriers in hiring and promoting women. These include the lack of work-life-balance, unconscious biases among managers and a lack of female role models according to the WEF's 2016 report.

Even worse, from those women that initially entered a tech-job, 50% leave within 10 years. The two most common reasons for leaving are extreme work pressure and hostile macho cultures, which explains why self-employment is the second highest follow-up position for women leaving a STEM-job, according to a Harvard Business Report from 2008.

Clearly, those women that have a STEM education need to enter a STEM job and keep it to increase the number of women designing the digitalisation process – and not only in the maritime industry.

But why would a job in a digitalised world be of interest to women in the first place? And how can employers also benefit from supporting this development?

Women have different motivators from men.

Studies have shown that, for men, goals, success, management support, free opinions and autonomy are the largest above-average drivers for performance. Women draw a different picture: They put an above-average interest in peer relationships, organisational fit and opportunities for growth. Furthermore, studies show that men are more focused on recognition and rewards, while women are more motivated by work-life-balance, listening to others and empathy.

These findings point to women being a better fit for the skills that will be needed in the future and especially for digitalisation: with an inherent motivation to communicate and to form relationships, women are equipped to outperform men in people management, coordinating with others, emotional intelligence, judgement and decision-making, service orientation and negotiation.

Not only are women a good match for these new jobs, they are also a good match for digitalised companies. With technologies in place allowing for digitalisation, many jobs will become available with flexibilities, such as variable work times and work locations. As females often still carry most of the load of family work – either by choice or by default – flexibility in working time and location will allow women to participate fully with their skills, education and motivation.

Even better for the shipping industry, this flexibility requested by women can become the biggest asset in a digitalised company in an ever-changing around-the-clock-working maritime environment.

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## **ClassNK is a major supporter of the Digital Era**

While the maritime industry is reshaping its structure due to digitalization, ClassNK's role of ensuring the safety of ships and environmental protection as a third party organization remains the same. ClassNK is proactively applying digital technology to strengthen its services based on outcomes from a variety of research in areas including robots and analytic technology.

Further, ClassNK contributes to the digital transformation of the entire maritime industry by providing a platform for the collection and distribution of data. Together with industry players, ClassNK is promoting IoS-OP ([www.shipdatacenter.com](http://www.shipdatacenter.com)) consisting of clear rules for fair data use between data owners and users, along with a highly secured data center.

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# Do you dare to finance the unknown?



**By Marjolein van Noort**  
Economy and finance  
Royal Association of  
Netherlands Shipowners

**What will last forever in its original form? Without innovation, every sector is bound to leave the world stage. Yet without solid financing opportunities, there is not even a world stage.**

No innovation happens without adequate financing so a paradox seems to exist between finance and innovation. Where one relies on security, the other thrives on creativity. What they have in common is craftsmanship and that is where we need to build a bridge between these two disciplines.

Let me zoom in on innovation first. Moving forward means changing and developing new methods. Those methods might fail the first time and the second time. Some might never succeed at all. The maritime industry is no exception to this pattern: many vessels are prototypes and a failing ship can not only place a business in a dangerous situation but, more importantly, it can also hurt its crew and the environment where it sails.

Yet it is rare for failure to destroy the ideas underlying an innovation; more often, a series of small improvements create stepping stones to future improvements. So whether the project involves reducing fuel consumption, increasing safety onboard and in ports or a more efficient sailing route from loading to unloading and reloading again, only when one looks back does the

road to innovation become clear. But using the rearview mirror will leave us in the past.

What we label as innovation depends on where and when we live. A decade ago a vessel with sails was a wonderful thing for recreation but a century ago it was a normal sight for cargo vessels. And these days? We are rethinking the use of sails integrated in highly modern vessels. The lesson? Don't overlook old ways of doing things.

A business case can be financed when enough variables are well known and the project has a positive return over the duration of the financing agreement. It makes sense not to finance the greenest but most expensive vessel of the century if its capital expenditure (capex) is too high today and it is not certain whether its turnover will be sufficient enough or that the contract will be renewed by the supplier.

But there are many ways to 'green' a vessel – sailing with an optimal hull form, using recyclable batteries, having hydrogen as its power source to name a few – and it would be wrong to stick to what we know. If the future were predictable and the coming 20-30 years – which is the age most vessels can surely reach – are certain to be a copy of the last twenty years, that would make sense. But when has a period of even five years been a replica of the previous five years?





Consider its pros and cons and reward the company that dares to innovate and is successful.

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Instead, regulation is toughening up, the speed of technological change is increasing and the public opposition to non-sustainable practices is growing.

We know that vessels built today and delivered this year or next year will use technology that will be outdated in 10 years' time. So what do we do? Do we refit those vessels, which makes them relatively more expensive compared to a then-newbuild? Scrap them and burn capital?

Building something new that has to work right away and is safe for those on board is as scary as it is exciting. Buying a prototype like that and trusting that it won't mean the end of your company is a big leap as well. However, unproven technology becomes proven technology and eventually becomes old technology. For example, it is not that long ago that vessels powered by LNG were a thing of the future.

Developing new technology can be compared with running a marathon: it can be completed at a steady pace. Trying to combine the distance of a marathon and the pace of a 100m sprint is never a good idea. You either burn up or you are too slow.

That goes for sustainable solutions as well. Analysing a new maritime project involves, among other things, understanding trade flows, geopolitical developments, the way a vessel will be operated on a long journey, the need for clean energy, how nature bounces back or not and the ageing of equipment.

This is where the bridge must be built: the traditional approach to business will no longer lead us to a clean maritime sector. To build the sustainable vessels our industry needs, two types of cooperation are crucial. First, all the dialogue between companies within the maritime value chain should be an invitation to develop new technologies. Challenge one another to come up with the best solution when building a new vessel. Consider its pros and cons and reward the company that dares to innovate and is successful. Second, if we combine the brainpower of the finance world and the maritime world, we might dare to take bigger risks: knowledge can defeat uncertainty.

Taking a broad view, remember that shipping supports about 90% of world trade. But that is not the end of it. Take the offshore wind sector, for example: it has not reached its full potential and we are not even close to understanding the full scope of the ocean economy, which will influence the need for specific vessels in the future.

In conclusion, we can be sure that the future cannot be found by looking at the past. We must speak up about our ambitions, our views of the future and the certainty that ships will be needed in a global world. If we challenge the world to see the potential of sustainable maritime business solutions, those who are forward looking will dare to finance the future.





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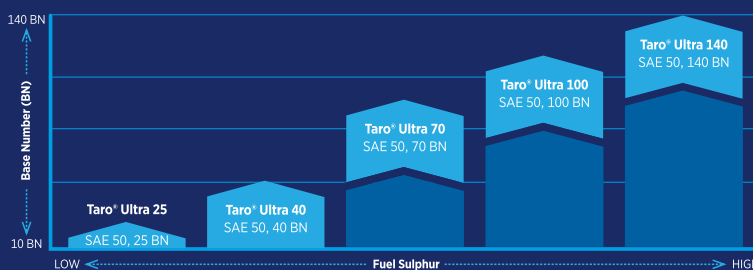
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# Enhancing maritime data quality to enable condition-based class



**By Dr Christina Wang**  
Vice president for digital solutions  
ABS

The pace of technological change is propelling the maritime industry into the heart of the fourth industrial revolution. The fusion of technologies in the cyber world is blurring the lines between physical, digital and biological spheres; connecting people, systems and data.

Digitalisation and connectivity are transforming the industry through the increased use of sensors and communications technology to gather and leverage data to improve both performance and compliance. The new norm is data-intensive and requires us to continuously adapt to technological change.

Collecting high quality data is a challenge in the marine and offshore operational environments, which have unique variables such as noise, dust, temperature, humidity, electronic and magnetic

interference and remote location. These factors can have a significant impact on the sensors, cables and data communication and storage devices used in collecting data from an asset.

Data collected, transmitted and stored in these severe environments and operations may suffer from significant quality issues including data loss, invalid values, transmission delays or incorrect timestamps.

Data quality awareness and knowledge in the marine and offshore industries is far from fully mature and improving data quality often requires a cultural shift within an organisation. Management accountability should be established in organisations to build a culture that values quality data. Establishing a process management cycle ('define-measure-analyse-improve-control') may

ultimately be beneficial to data quality awareness and operational improvements.

At the same time, surveying practices after construction have been on an evolutionary path. With the rise and adoption of digitalisation and data analytics, future surveys will benefit from data-driven insights to provide a more informed and targeted experience.

The past 20 years have seen advances in how surveys are conducted. They are now based on a vessel's particular situation, such as its type and age, the condition of its protective coatings, corrosion levels and equipment condition monitoring.

For ABS, the goal is to unlock the potential of data to provide clients with the least intrusive but highly efficient survey process and deliver 'condition-based class' on an industry-wide basis.

#### **Addressing shipping's data challenge**

Modern ships are increasingly equipped with diverse functionality for monitoring their structural and mechanical health, efficiency and operational performance management and optimisation. These functions collect data through sensors and onboard instrumentation and analyse that data to provide health and condition awareness, operational and crew assistance and operational

optimisation. Data quality for IoT applications is also highly dependent on the quality of subsequent processing. Data acquisition and pre-processing occurs when data is collected and converted into a desired information for future analysis. Data integration and transformation (also known as mapping) consolidates and fuses data from different sources and ensures its compatibility with the structure of the intended target application.

Maritime IoT data is typically collected through a range of onboard sensors with differing hardware and software specifications, format and structures, time intervals and definitions, which increases the difficulty of effectively integrating, cleansing and mapping the data.

Achieving good data quality is not only an IT or data science task; it also requires high quality domain support or expertise specific to maritime operations. Yet the majority of commercially-available automated data profiling tools and software can only help to discover generic data quality problems such as type mismatches.

As a result, data quality assessment, monitoring and control should be considered in the context of maritime applications and implementation objectives must include specific business goals. So the involvement of business and technical subject matter experts is critical to successfully design,



develop and improve data quality validation rules and construct the means for measuring, monitoring and improving data quality.

Maritime domain knowledge will typically be focussed on defining data quality rules and exceptions, which will vary from one application to another, requiring intricate knowledge of vessel operational characteristics.

The key elements of the management process cycle for improving data quality include identifying the critical data issues and business rules, assessing data against expectations, identifying and prioritising opportunities for improvement based on the findings and feedback from stakeholders, such as data stewards, business and technical subject matter experts and data consumers.

There must also be measurement, monitoring and reporting on data quality with improvements made by incorporating incremental changes in the business cycle, such as improving collection systems and integrating quality controls into business and technical processes to prevent issues from recurring.

There must also be measurement, monitoring and reporting on data quality with improvements made by incorporating incremental changes in the business cycle.

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#### **Delivering condition-based class**

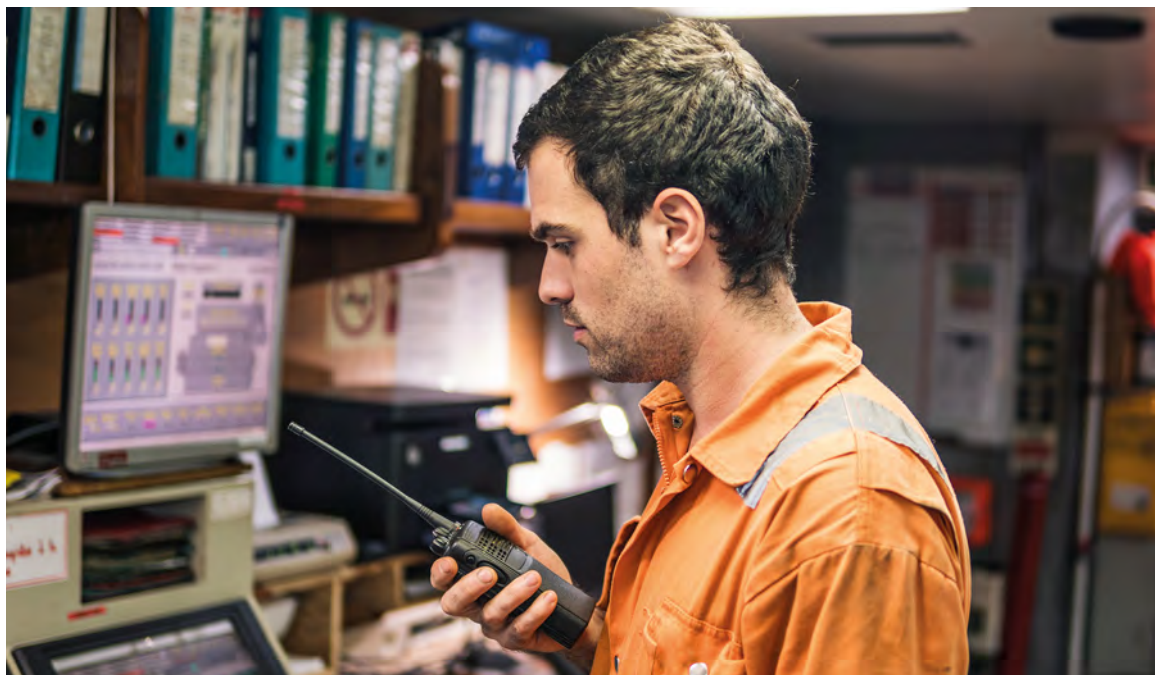
Digitalisation and the tools used to collect, store, and analyse the mass of data streaming from maritime assets will play an increasingly important role in improving their integrity and performance with a lifecycle-based approach that is more vessel-specific, condition-driven and continuous in its approach.

Structural surveys will be guided by historical data compiled from a vessel's own operational profile. For example, load and damage accumulation exposure that is based on real-time AIS route and weather data information will help characterise structural risk, with added sensor-based systems of varying degrees helping to inform and calibrate those approaches.

Surveyors will better understand how to survey such a vessel, basing their work not just on a prescriptive rule-set but also on the vessel's own history. Such information will also factor into advanced survey-planning via the use of drone and robotic technologies.

Machinery surveys will evolve as health monitoring techniques reach new levels of capability and proficiency in the age of smart equipment. Techniques employing comprehensive





solutions to real-time health and performance monitoring will become the norm. Such approaches will employ comprehensive solutions involving traditional condition monitoring techniques as well as both physics-based and analytics-based composite models.

The use of data analytics (covering the application of machine learning and artificial intelligence) will augment traditional survey approaches and help owners better utilise operational data to help understand and diagnose the condition of equipment and provide a prognosis of the time to take corrective action.

### **The way forward**

Data-driven digital business has the potential to transform the shipping industry, but the effects will also be disruptive. Managing this transition calls for a combination of technical and operational measures and a deep understanding of how digitalisation affects classification.

It is clear that supporting the next generation of class survey will be dependent on the data infrastructure necessary to put this information at the attending surveyor's fingertips. Because both owner and class will have access to health status and condition information in real time, the surveyor of the future will be able to use mobile technologies with desktop support to execute the most efficient survey possible.

In terms of business process and adaptation to change, digitalisation is a huge challenge. By helping clients put data at the heart of the conversation, ABS is helping them move forward on the journey to condition-based class and start to realise the opportunity that the digital business presents.

# The shipping fuels of the future



**By Dr Reetta Kaila**  
Technology & Development Manager  
Renewable Gases  
Wärtsilä Marine

Big changes are afoot. The IMO has adopted a new, ambitious emission reduction strategy. The European Parliament has resolved to step up global emission reductions for shipping by including the sector in the European Emissions Trading System. There are calls for the European Commission to fulfil legal obligations on introducing methane reductions.

The IMF is intensifying their work on carbon pricing and supporting governments with fiscal policies to transition towards carbon-free economies.

Helping our customers navigate such mounting pressures to secure sustainable profitability is of paramount importance to us at Wärtsilä. The challenge lies in the fact that the industry is yet to discover the solve-all elixir that will enable a zero-emissions shipping ecosystem, and this can

cause a sense of paralysis when it comes to investing for the future. A combination of energy-saving applications, smart propulsion technologies and broader collaboration can nudge us closer to achieving full decarbonisation. But the single biggest intervention is fuel choice.

For deep ocean-going voyages, batteries are not yet a viable solution since they don't have the energy density needed to propel a 100,000 tn vessel. Battery charging requires high charging power and related infrastructure. The materials used to produce batteries are also in limited supply. On paper, Hydrogen fuel cells present an exciting proposition because they convert clean hydrogen into electrical energy and steam without the need for an emitting combustion process. However, the cost of producing fuel cells and the lack of green





hydrogen refuelling network means that this technology is not yet scalable to keep pace with the high energy needs of our globe-trotting fleets. It's also necessary to consider the emissions from well-to-wake when evaluating future fuels and energy sources – bringing to attention the production and primary source of the fuel as well as the way it's transformed into energy.

We see that the internal combustion engine (ICE) will remain the stalwart at a time when we need to up our game today. ICE offers the most realistic emissions-reduction potential, because we know there's nothing it can do with Heavy Fuel Oil that cannot be done with Liquefied Natural Gas (LNG) and future fuels. Our dual-fuel engines, which entered the market three decades ago, are capable of being converted to use almost all liquid and gaseous fuels, including blends of green ammonia, hydrogen and methanol.

A fossil fuel-free future for the shipping industry likely taking this path: LNG->bioLNG & synthetic LNG. For fuels that cannot be handled as

LNG (eg. Hydrogen, methanol and ammonia), there are considerable obstacles to overcome such as lack of regulation and supply chain infrastructure and poor economic feasibility. LNG only attained commercial viability after a long period of R&D and testing covering the whole supply chain garnered acceptance by marine classification societies. BioLNG and synthetic LNG can leverage the fossil LNG infrastructure since these can be blended in all ratios with fossil LNG as soon as their production rates and economics are in place.

Burning LNG in a modern combustion engine immediately reduces the GHG emissions by 13-30% compared to the diesel engine - methane leakage during production and combustion is still a serious concern since this main constituent of natural gas has a higher global warming potential than CO<sub>2</sub>.

A lot of R&D has gone into testing carbon-neutral biofuels. Bio-LNG is, morally-speaking, the correct route to take, since it works on the principle of Waste-To-Energy using manure, forest residue and many other types of waste. However, the

In the future, there will be also other fuels and technologies that will help us de-fossilise the shipping industry.

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critical aspects to consider when selecting a fuel for a new vessel are the availability and energy density. Biomaterial-based fuels are only sustainable when local availability of feedstock is plentiful and guaranteed. Today, the supply chain is unevenly developed however, latest studies suggest that a sustainable energy supply could be in place by 2030. It is estimated that bio material-based fuels extracted from forestry products & residues, agricultural residues and energy crops could yield enough volume to supply the whole marine industry and most of the heavy road transportation with Bio-LNG, assuming all vessels would be converted to LNG.

Large-scale hydrogen production based on electrolysis demands large amounts of energy and has low total efficiency. This is perhaps one of the biggest challenges for hydrogen as a fuel itself, and for any other synthetic fuels based on hydrogen. Due to the challenges with fuel cells, other sources for hydrogen have gained attention of late, such as side streams from the chemical industry, or gasification of biomass or recovered waste, ie.

plastics. And this has kickstarted research into circular economy-thinking whereby we might well see growth in this area in the future.

If renewable energy is available at even lower costs, the production of hydrogen is not the biggest challenge, unless the electrolysis is difficult to scale up. Another, if not even bigger challenge is the storage of hydrogen as fuel. High-energy density hydrogen can be stored as either gas or liquid. As a gas, it typically requires high-pressure tanks, while storage as a liquid requires cryogenic temperatures because the boiling point of hydrogen at one atmosphere is -253 degrees Celsius, which adds to the complexity.

Therefore, synthetic fuels that can be considered as a hydrogen carrier, become more attractive. Indeed, hydrogen can be bound to CO<sub>2</sub> or N<sub>2</sub> in the form of CH<sub>4</sub> (methane) or NH<sub>3</sub> (ammonia), which makes the transportation, storage and the conversion of the energy much easier. However,







large scale adoption of the hydrogen fuel cell as the primary energy source is unlikely for many years to come and cannot be considered a solution for meeting the IMO 2050 GHG targets.

We must act now. The global carbon budget, as set out in the beginning of 2018, was 420 Gton in order to limit the temperature rise to 1,5 C. With the CO<sub>2</sub>eq emission levels of today, we have only 360 Gton left and that will last only for the coming 8,5 years. So there is no time to wait.

Today, the only established fuel that takes us towards the IMO goals is LNG. Fossil LNG is however only an intermediate fuel and a parallel increase in production capacity for making bio- and synthetic-LNG using renewable energy sources is imperative as we recover side streams from agriculture, food industry, landfills and waste water treatment and turn that into biogas or bio-LNG. In the future, there will be also other fuels and technologies that will help us de-fossilise

the shipping industry. I, personally, do not believe in Ammonia to limit the temperature rise or at least any time soon - due to low readiness levels, its toxicity and rules and regulations still not being in place. Methanol may become commercially-viable to some extent, and fuel cells will be applicable for certain segments with lower power demand. I'll take a punt at predicting that these energy sources may find their applications in road transportation, not ocean-going shipping.

The fuel-flexible combustion engine presents itself as a future-proof technology which will enable the industry to meet future targets as and when alternative and renewable fuels become available. What we really need to see are fiscal policies and regulatory frameworks that encourage expanding capacity investments for biogas and synthetic fuels. We have the technology, so the time to act is now.

# The carbon decisions that will outlive us



**By Sofia Fürstenberg Stott**  
Owner & Chief Advisor  
Fürstenberg Maritime Advisory

We live in very exciting times, perhaps more exciting than we would like them to be. As science provides increasing amounts of disturbing evidence that the world is crumbling under human impact, we are faced with the most crippling challenges mankind has yet seen. In response, we need to find ways to live our lives sustainably, to develop the world sustainably and to do business sustainably.

The shipping industry is so far the only sector that has jointly agreed on a common target: that by 2050, the carbon footprint of international

shipping shall be reduced by at least half. While this has been a remarkable catalyst for decarbonisation initiatives across the shipping ecosystem, with the initiation of, for example, innovative policy programmes, generous investment schemes and pioneering finance mechanisms, it has also catapulted initiatives that may eventually do more harm than good and which could be avoided should the shipping community speed up to bridge its current knowledge gaps.

One recent unfortunate example is the announcement by one of the major cruise liners to



go carbon-neutral from 2020 through the use of ‘blue carbon’ credits. While it is great to see the increased attention and concern over the sustainability impact its business is causing, the initiative is misleading. Restoring mangroves and planting seagrass are all very good initiatives, and coastal ecosystems are very important carbon sinks, but call it what it is: don’t pretend it is also permanently removing CO<sub>2</sub> from circulation, because it doesn’t.

First, there is not enough carbon budget left to use nature-based systems such as mangroves to offset emissions and reach the 1.5°C temperature increase target. Second, the measurement, reporting and verification (MRV) uncertainties for blue carbon offsets are significant because the complex interdependencies are so massive that the benefits are very difficult to prove.

Carbon flows within the highly variable environment in the coastal zone are difficult to measure, particularly in developing countries, so estimates of carbon sequestration are very

uncertain. In addition, it is very difficult to determine which emissions and removals are natural and which are anthropogenic. For instance, land erosion, sea level rise and warmer oceans can make it very difficult for that newly-planted mangrove to survive, or the destruction of another mangrove connected within the same ecosystem can impact the health of the specific carbon offsetting project.

Third, carbon sequestration is often not the best way to help; there are numerous other ecosystem services that are more important for local communities: food, livelihoods, construction materials and coastal protection provide essential life support services. So blue carbon offsetting is not decarbonisation. It’s charity.

It is not just within the shipping sector where knowledge gaps need urgent mitigation; the general community needs an intensive course in elementary chemistry. There are still many who react with scepticism when they are met with the news that 1 tonne of fuel oil releases more than 3

While research is well under way to develop electric airplanes, aviation will continue to need a liquid fuel for many years to come.

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tonnes of CO<sub>2</sub> into the atmosphere upon combustion. “How can that be possible?” they ask. And “CO<sub>2</sub> hardly weighs anything!”

They also react with positive curiosity when they hear that shipping can now operate on natural gas. ‘Natural’ gas can hardly be dangerous, they suggest, and – as crazy it might seem – many people do not realise that natural gas is a fossil fuel. When you then move the conversation of carbon in fuel to also include biofuels, methanol, ethanol and even hydrogen and ammonia, you have usually lost 99% of the audience. Hydrogen and ammonia do not even contain any carbon, so how can they have a carbon impact? they wonder. The topic is complicated so it also opens up the space for ‘alternative facts’, a situation we must do all we can to avoid.

Moving forward, the knowledge gap widens as

we put more complexity into the pot. The shipping sector is not the only one that needs to decarbonise. So does aviation. So do farming and agriculture in general. So does the building sector, so does the clothes industry. So does the larger part of the energy sector.

While research is well under way to develop electric airplanes, aviation will continue to need a liquid fuel for many years to come. Thus, if aviation is to decarbonise, biofuel is probably the most viable opportunity. However, biofuel production competes with food production and the quest of preserving biodiversity, so its resources are by no means plentiful. Is there enough to supply both aviation and shipping with biofuel? Probably not.

Looking at agriculture then: industrial farming is dependent on urea-based fertilisers, essentially produced from fossil methane and air, through the century-old Haber-Bosch process, via ammonia. This is the same ammonia currently being eyeballed by shipping, as a future non-carbon fuel. Ammonia production stands for 2% of global CO<sub>2</sub> emissions and shipping for about 3%. So in order to not just shift the carbon problem over to another fuel, ammonia production needs to become green.

Yet the proportion of non-fossil ammonia production worldwide is currently minuscule and is obviously being grabbed by its prime customer, agriculture. It’s positive that the shipping sector is exploring supply chains for ammonia, but it has to be done looking across all industries.





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Shipping cannot be looked at in isolation when planning for, and building, a new fuel infrastructure that is free from fossil carbon. It has to collaborate across larger industry sectors, identifying mutual win-wins and acceptable losses.

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Scaling up green ammonia production to meet any decent proportion of either of these industries will take several decades.

We must now move into action and with our eyes wide open. Shipping cannot be looked at in isolation when planning for, and building, a new fuel infrastructure that is free from fossil carbon. It has to collaborate across larger industry sectors, identifying mutual win-wins and acceptable losses.

We must also invest in our leaders to help us navigate this transformational shift with foresight, competence and, above all, positivism. That is greatly needed because the future sounds gloomy when listening to all the reports of how we continue to fail taking care of this planet and how we will soon reach global ecological tipping points. People get exhausted from the climate crisis and

they need to hear positive stories, and a lot of good things are happening.

The urgency to mitigate climate change has reached every policy-maker's table. We have better tools and models than ever before to monitor progress and evaluate what works. And we have started to mobilise entire value chains, and entire eco-systems of value chains, to progress on the trajectory towards sustainable decarbonisation.

We truly live in exciting times. There will be a lot of fundamental, structural change coming our way in the decades to come. The opportunity for innovation, and the opportunity for impact, has never been larger.

I look forward to the journey.

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# Collaboration is the future



**By Alexandra Anagnostis-Irons**  
Founder  
Total Marine Solutions

**Imagine being able to improve efficiency, reliability and regulatory compliance simply by sharing data. From shipowners and operators to ports and logistics service providers, the need for data sharing is essential to navigate the ever-increasing demands placed on the maritime industry.**

A study conducted in 2017 by the Business Performance Innovation Network, titled *Competitive gain in the ocean supply chain: Innovation that's driving maritime operational transformation*, found that the maritime industry was suffering "costly inefficiencies" due to ineffective data sharing and poor cross-industry collaboration.

However, that same study went on to conclude

that as shipowners and operators come to realise that collaboration, not only can help their bottom line, but also create a safer and cleaner industry, more stakeholders have begun to embrace it through the adoption of new technology models and processes.

To be sure, changing the industry's mindset has not happened overnight, and it still could be years before cross-collaboration is fully embraced. We still must overcome a number of challenges including costs, misaligned priorities and fear of losing out to the competition, to name a few. But as we move toward an increasingly stricter regulatory environment, the sense of urgency has become greater than ever before.





One of the earliest moves into maritime data sharing came in 2007 when Dimitris Lekkas, a self-described “computer geek” with a love for the ocean, founded MarineTraffic. It started as an open, community-based project that provided real-time ship positional data, along with other key vessel information. Mr Lekkas recognised the value that automatic identification system (AIS) data – which uses transponders on ships to chart their location – could have for the entire industry.

He relied on crowdsourcing to disseminate the information to as wide an audience as possible and at the time, he was considered a disruptor. Many could not see the benefit of sharing information for fear it would impede competition; change is difficult for some. More than a decade later, however, MarineTraffic continues to use publicly-available information and collaboration among those who report the data to help make the maritime industry more efficient, transparent and compliant.

We still must overcome a number of challenges including costs, misaligned priorities and fear of losing out to the competition, to name a few.

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Mr Lekkas knew early on what many in the maritime industry are just started to realise: data can help all shipowners make informed and intelligent decisions that benefit their bottom line.

Many other industries have long-since embraced collaboration and created cross-industry partnerships. For example, Ford is working with the Volkswagen Group on creating autonomous vehicles, while some of the biggest US banks are collaborating with the person-to-person money-transfer tool Zelle, rather than create their own peer-to-peer payment network.

Helping the maritime industry to make smart decisions about environmental compliance is why we developed Ocean Guardian. It provides up-to-date, verified and vetted global environmental regulatory information for fleet operations and voyage planning purposes.

Launched in 2017, Ocean Guardian was developed as an extension of Total Marine Solutions' commitment to provide the shipping industry with state-of-the-art solutions that help them operate efficiently and effectively and to be responsible stewards of the environment.

Today, the database has more than 4,100 active and deployed regulations, covering more than 300 countries and territories and 53 special areas, with information on more than 2,500 ports worldwide.

Although the environmental regulatory data provided via Ocean Guardian's platform is not privately owned and is publicly available, compiling it into one easily accessible paperless database, along with its ease of application interface, is what makes it an invaluable tool.

Compiling that data has been a collaborative effort. Like Mr Lekkas, we use several different feeds of publicly-available information that is collected from our research and data teams as well as being crowd-sourced from ports and port authorities worldwide. It is our goal not only to present reliable, verified and vetted data for industry use, but to allow companies to use that data in the way that suits them.

To that end, Ocean Guardian is built on a customisable application program interface (API) to be configurable and customisable by the end user. It can be integrated with a ship's existing systems or be used as a stand-alone offering. The rules portal is also customisable to allow a user to input a company's or vessel's specific guidance, rules or regulations. The goal is to make the industry more efficient and compliant.

Allowing for wider access and use eliminates barriers and increases flexibility, allowing the data collected to be used in a way that best suits a client's needs. It also streamlines operations by bringing voyage planning and environmental operations together to enhance workflow efficiencies, no matter which existing system a client is using.

The industry has been clear that data collaboration is the way of the future. Using the tool, our clients have notified our team and thus the greater industry about different interpretations of regulatory documents between ports, shared best practices about compliance in critical areas or ports, reported terminal discharge facilities and more. These insights are invaluable not only to the users, but also to the industry as a whole.

The challenges we face and the threats we encounter to our environment are too great to tackle in a vacuum. We believe that when competitors work together, they are better able to solve challenges and prepare for the future.

It is our belief that relevant stakeholders must develop a culture of collaboration in order to create sustainability. Companies must step forward and invest in new technologies and build the future together. A culture of collaboration and sustainability can only be built if we put aside old ways of thinking and take the lead in developing best practices that benefit not only the industry, but the future of our oceans.

When we collaborate, everyone wins!



# Seven steps ship operators can take now



**By Aimee Cords**  
Director corporate systems  
Crowley Maritime

As recently as a decade ago, vessels were not connected. Once they were at sea, their captains and crew would be fortunate if they had email and would have to use their vast experience or consult reams of paper for information about the vessel.

Today the internet at sea is seen as an important benefit that is as much of an entitlement on board as it is in an office. Captains and crew now have the luxury of communications with their families using the same social media platforms as their contemporaries on shore. Crews use electronic charts and GPS to guide them, get analytics from their engines to inform them of their condition and information about all aspects of the vessel is readily available to them.

Unfortunately, along with these advantages, technology has also brought the accompanying downside: cybercrime.



Cyber criminals are using vessels as a springboard. In part they are looking for new horizons to spoof, phish and exploit, and in part to watch for ready opportunities to hop to the shore and infiltrate the corporate offices. The attacks were initially directed at a specific network using direct penetration methods to take as straight a route as possible to achieve their intended disruption or financial gain. While these types of attacks have certainly not gone, cyber security has advanced in cyber crime prevention.

Criminals have also made advances in finding ways to circumvent those defences, using social engineering to trick well-meaning recipients into revealing information and not only inviting the

They have recently used methods that include planting a spy that will observe, sometimes for years, providing information back to the criminal

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criminal into the network but pointing the way to the payload. They have recently used methods that include planting a spy that will observe, sometimes for years, providing information back to the criminal until an opportunity is presented to penetrate the target's external defences.

According to the latest Maritime VSAT Report published by the telecommunications consultancy COMSYS, by the end of 2020 roughly half of all commercial vessels will employ internet-capable



communications. Cyber incidents have also matched that rise. To respond, the International Maritime Organization (IMO) and others will require cyber security measures to be included in onboard safety management systems under the ISM Code by 1 January 2021.

Cyber risk management programmes and processes that satisfy these upcoming requirements can take some time to plan and implement. However, there are reasonably easy and immediate measures that can be done without a large investment to protect the vessels and, by extension, the corporations that support them.

### **Protection comes from a basic understanding of the vessel ecosystem.**

- Vessels typically have two networks, one for the information technology (IT; transactional) side and one the operational technology (OT; machine analytics, navigation).
- Certain crew members have administration rights to the onboard systems.
- Most of the OT systems are vendor-provided.
- Like shoreside personnel, not all crew members are comfortable with technology.

With that ecosystem in mind, the following are some methods that can be used to protect floating assets in parallel with implementing a holistic cyber programme.

#### **1. Protect both the perimeter and the interior transference of data**

It is difficult to block every entrance that can be imagined into a ship's network because the bad actors are constantly finding new ways to circumvent security. Every vessel should have one point where internet traffic is funnelled to

lessen the number of avenues that have to be managed. In addition, all computers on board, regardless whether they are connected to the internet, should have protection. That way, if the exterior defences are breached, the interior defences will continue the fight and limit the damage. This includes the often-overlooked onboard servers.

#### **2. Look to stop behaviour**

Each computer on board, regardless of whether it is connected to the internet, should be equipped with cyber security programs that prohibit behaviours such as executing an encryption routine or installing software. Because updating virus software can be problematic at sea, using software that detects destructive behaviour provides a new layer of protection in addition to scanning for specific virus signatures.

#### **3. Preserve the segregation of the two networks**

Ensure that, while implementing an Internet of Things (IoT), vendors and others do not cross the IT and OT networks allowing a virus on one network to hop to the other. The two separate networks ensure that the part of the network that allows for crew social activities on board and business activities with the shore are conducted separately from the vessel's operational activities that connected with critical components. Crossing the two networks can occur unless vendors are clear that consolidated displays on the bridge must not span the boundaries. It is better to err on the side of caution and add another computer for the OT display than to clean up a virus that has jumped across the networks.

#### **4. Separate admin accounts**

Because of the isolation a vessel has while sailing, it is important to ensure that certain members of the crew have administrative access to manage situations that either cannot be performed due to loss of connectivity or because proximity is required. As this generation of cyber attacks leans on social engineering and preys on good intentions, consider using secondary logins for computer administration. Using a primary account for all business activities and a secondary account only to perform administrative functions



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ensures that even if the crew end up providing the wrong information, the account will have little or no authority to perform administration functions and thereby render the attack harmless.

**5. Use allowable sites rather than blocking bad sites**

Install an application that allows only certain sites to be accessed rather than allowing all sites and then blocking the 'bad' ones. This ensures that any site that is accessed via the internet comes through a secured application and is validated as trusted before it can be accessed by the crew or the equipment. If security relies on dangerous sites being blocked, then every site a crew member might access with a virus has to be anticipated. White-listing sites creates a bit more administration but it dramatically decreases the number of spoofed sites accessed by the crew.

**6. Block USB ports and use a 'safe computer'**

Provide a computer onboard that is not connected and has advanced detection software so that removable media can be scanned before they are used. Make sure to block all USB ports on computers throughout the vessel and allow access to the USB only with an administrative account. Require vendors that are going to do firmware updates to scan their removable media before they are plugged into any vessel computer.

**7. Train the crew**

Training the crew to recognise suspicious communications and how to react quickly to stop the spread of a virus if they have released one into the system is critical to reducing its impact. It can be as simple as unplugging the computer from the network in some cases, but the crew need to recognise the problem and know how to react.

Just as it was impossible to predict three decades ago that someday vessels would be connected at sea, it is equally impossible to predict now what the next generation of cyber crime will entail. With all the cyber security we have available today, the best defence continues to be crew that are vigilant and educated on how best to use their technology.

**Acknowledgements:**

- COMSYS Maritime VSAT Report, 5th Edition
- The Coming Wave of Maritime VSAT Growth presented by iDirect, Satellitetoday.com
- The Guidelines on Cyber Security Onboard Ships, World Shipping Council
- The Little Known Challenge of Maritime Cyber Security, Joseph DiRenzo, Dana Goward and Fred Roberts



# Bringing on-board wireless connectivity to the maritime industry

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# Owners need better support in monitoring compliance



**By Elizabeth Paull**  
Managing Director  
Chelsea Technologies

The shipping industry has spent significant time preparing for ballast water regulations. The International Convention for the Control and Management of Ships' Ballast Water and Sediments (known as the Ballast Water Management Convention, or BWMC) impacts 80% of the global fleet, which transfers approximately 10Bn tonnes of ballast water around the world every year.

Meeting these regulations has always been a huge task for the industry and, with the number of ballast water systems in the market continuing to grow, there will be an inevitable need for more compliance monitoring. This adds one more regulatory challenge to the long list that owners already have, and not an easy one. Since it deals with complex ecosystems, measuring the efficacy of ballast water management is a tricky technical challenge with fragmented regulation.

This article provides an outline of what owners need to know, the consequences of non-compliance, and the solutions that exist.

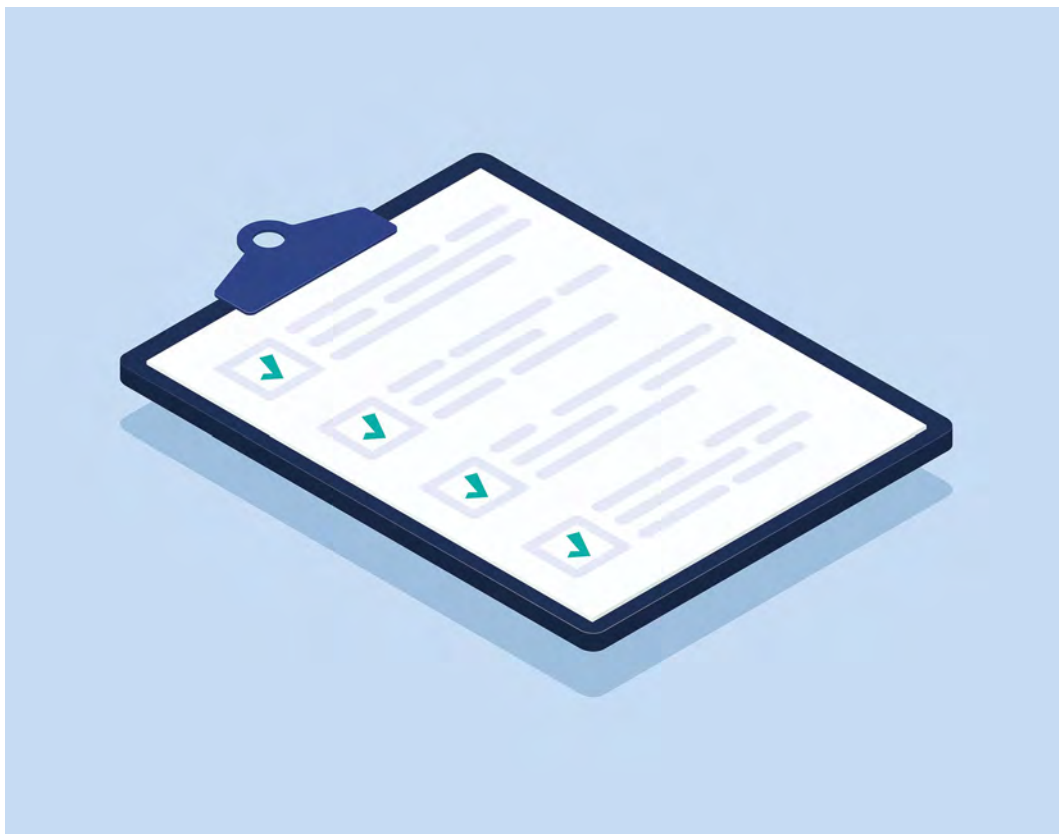
## **Regulatory landscape**

The IMO's standard for ballast water treatment currently requires that ships carry a ballast water management plan, a ballast water record book and an international ballast water management certificate. In addition, it also requires that all ships must adhere to either the D1 or D2 standard for ballast water management.

D1 requires a ship to exchange ballast water in open seas away from coastal areas and is now confined to a contingency measure. D2 states that a ship must treat ballast water to ensure that it meets certain standards before it is discharged. These standards relate to the number of 'viable organisms' in ballast water, measured by volume. This presents significant challenges when it comes to measuring what constitutes a 'viable organism'.

With flag states requiring that all ships registered with them meet the D2 standard no later than 8 September 2024, there has been growing concern that the industry will struggle to become compliant and remain operationally-compliant.





This is further complicated by the patchwork of national and sub-national regulation that has emerged on ballast water management, including separate regulations with different standards set by the USA and some of its states, such as California.

The industry is taking D2 ballast water regulations seriously and big operators not only aim to be compliant but expect to be. The problem that currently exists is that ballast water treatment is not flawless, with many operators reporting failures based on technological faults in their system, failures in staff training and other operational or technical issues. Many have found the cause of such non-compliance hard to decipher, and in turn rectify, when they have not had appropriate testing equipment.

#### **Measuring what you manage**

It is therefore clear that ballast water treatment systems are only as effective as the data available to

prove that they are working. Therefore, ensuring that operational or technical issues that cause non-compliance issues are promptly caught and amended provides shipowners with the chance to efficiently rectify issues. This not only includes rectifying the problem before a mistake leads to the release of non-compliant ballast water, but also includes being better able to understand issues that impact the efficiency of a ballast water system.

There currently exists a wide variation between different ballast water testing standards, which in turn poses serious challenges for regulators as they seek to create solid and reliable guidelines. Under Article 9 of the BWMC, the IMO is charged with creating industry guidelines on how tests should be carried out, which allows flexibility to alter testing methods as technology advances. However, the lack of certainty means that Port State Control is having to fill in the gaps as portable testing is increasingly becoming key. The uncertainty and

There currently exists a wide variation between different ballast water testing standards, which in turn poses serious challenges for regulators as they seek to create solid and reliable guidelines.

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inconsistency is leading to genuine risk for shipowners who could inadvertently be found non-compliant.

This is where the main challenge for owners is found. Currently, there are no solutions that can accurately measure every regulated constituent of ballast water (ie specified bacteria and all types of potentially-invasive organism between 10µm and >50µm, both living and non-viable) within a suitable timeframe. It is therefore of increasing importance to select an instrument capable of providing the most representative results.

Guidance on this selection process is thin on the ground. Despite the ISO 11711-1:2013 standard providing guidance on the materials, design, and installation of equipment used to take samples of treated ballast water from a vessel's discharge pipe, it fails to include a standard on how to perform the representative sampling and analysis of ballast water. This in turn leads to inaccurate results potentially landing even compliant shipowners in hot water.

The IMO therefore needs to strike a fine balance between this clear need for accuracy and practicality. Modes of testing that require a ship to be held for a long period of time would cause a disproportionate impact on shipowners and may be incompatible with Article 12 of the BWMC, which requires ships to not be unduly delayed.

There is a lot of debate amongst lawyers and legal academics about the precise meaning of 'unduly' within Article 12. It seems that the most common interpretation is broadly that ships can only be delayed by a reasonable amount of time considering the tests required by the IMO stand-

ards, the administration required, and the tests and administrative solutions available.

If a ship is 'unduly' detained, the shipowner will be entitled to recover compensation for losses that are provable, caused directly by the delay and reasonably foreseeable to the authority. It is therefore understandable that shipowners are concerned about uncertainty while these standards are being formulated.

### **Building the solution**

Chelsea Technologies, a leading global expert in advanced sensor technologies and systems, is working closely with regulators, including the IMO, ISO and port authorities, to develop a trusted, practicable and workable international standard developed for ballast water sampling and analysis that is based on a proven and accurate methodology. It is important that the development of regulations and standards associated with indicative compliance testing of ballast water considers the practical applications and limitations of the technologies available for indicative ballast water testing.

It is clear that portable devices that use proven methodology play a vital role; systems like Chelsea's FastBallast provide a lab-accurate assessment of ship's ballast water discharge against the D2 standard. This accurate, fast and practical indicative analysis is vital for the enforcement of the convention, while it also provides the data that shipowners need to take preventative action to ensure that non-compliant discharges do not occur if ballast water treatment systems or processes fail.

Invasive aquatic species transported through ballast water have had a significant ecological and economic impact throughout the world. The purpose of the BWMC is to stop that happening in the future, but without accurate compliance testing the convention will not have the impact it was designed to have. There must therefore be routes for port authorities and shipowners to verify operational compliance for compliance to be guaranteed.

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# Enduring MASS market appeal within global regulation



**By Pia Meling**  
Vice President  
Massterly

Autonomous ships can, to varying degrees, operate independently of human interaction and IMO has defined four degrees of autonomy for the 'Maritime Autonomous Surface Ship', or 'MASS', from which Massterly has derived its name. In summary, these are:

1. Automated processes and decision support: Seafarers are on board to operate the ship, but some operations are automated;
2. A remotely-controlled ship with seafarers on board;
3. A remotely controlled ship without seafarers on board; and
4. A fully-autonomous ship, whose operating

system is able to make decisions and determine actions by itself.

Massterly works with customers and vessels that have all the variations above but in this article we will discuss levels of autonomy where there is no crew onboard and the vessel is monitored and controlled from shore. We will also look at the opportunities of technology adoption in the context of the global regulatory framework.

## **What are the benefits of adopting autonomy technology?**

Autonomous ships are good for business, for the environment and improve safety both at sea and

on land. Autonomy introduces a new competition area for short-sea shipping and opens a larger market for maritime players – on the expense of polluting, congested and accident-prone truck transportation.

For short sea shipping, the major cost drivers are crew and manual port handling. These costs can be significantly reduced by introducing autonomy:

- Fully autonomous vessels can be built with lower investment cost as there is no need for crew accommodation, crew safety equipment, air condition, sanitary systems or bridge.
- Both fully autonomous and automated vessels offer lower operational cost as crew onboard may be reduced or fully replaced by crew on shore who are supporting several vessels.

Autonomous ships provide significant safety benefits, as 75% of maritime accidents are caused by human error with the leading cause being

fatigue and attention deficit.

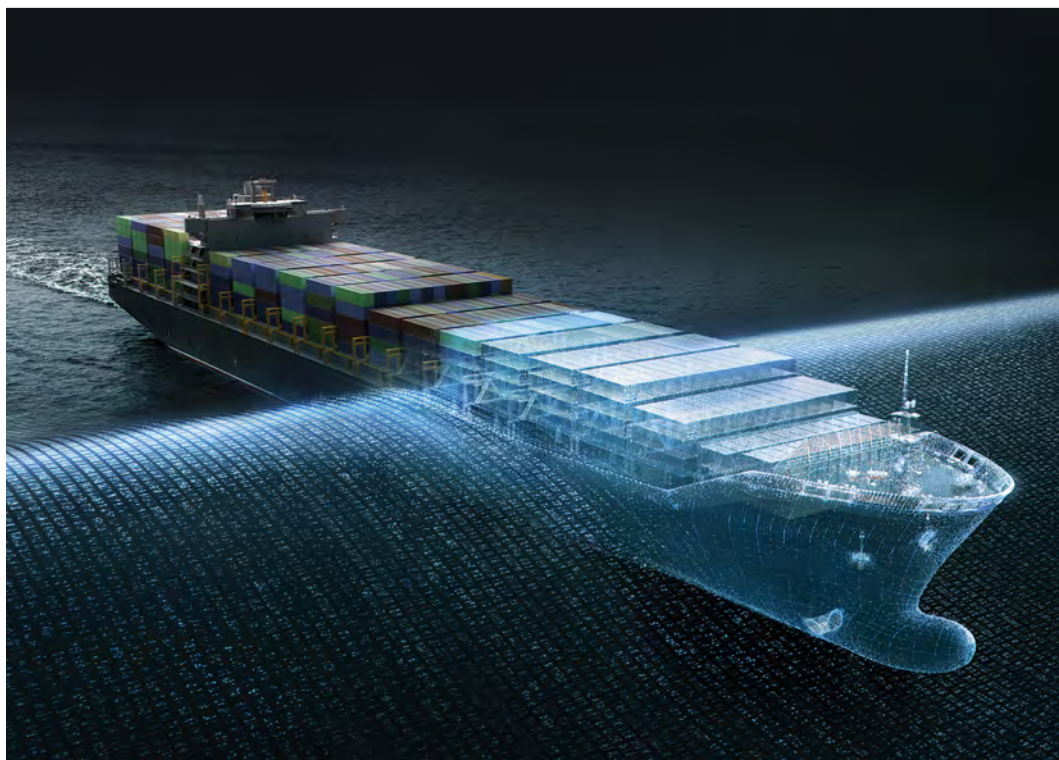
As there is no crew that needs to go ashore for crew change, fully autonomous vessels can more easily adopt slow speed and save energy/fuel.

Autonomous vessels will primarily be maintained when in port. Hence the vessel is designed with a minimum of rotating parts and its propulsion is likely to be battery-driven or driven by gas or fuel cells. This means that autonomous vessels will have zero or low emissions to air and sea.

Seagoing professions are increasingly perceived as unattractive for the young generation, contributing to a forecasted global shortage of about 150,000 seagoing officers by 2025, according to the latest ICS and BIMCO Manpower Report, published in 2015. But autonomous vessels allow mariners to control and monitor vessels from ashore and enjoy their social life.

#### **What can be achieved within our global regulatory framework?**

The IMO instruments governing the safety of





commercial shipping do not provide any regulations for autonomous operations, but IMO has started a scoping exercise for new regulations.

Meantime, the organisation's Maritime Safety Committee, at its 101st session in June 2019, approved Interim Guidelines for MASS trials, with the aim of assisting relevant authorities and stakeholders and ensuring that trials of MASS-related systems and infrastructure are conducted safely, securely, and with due regard for protection of the environment.

The term 'trial' means an experiment or series of experiments, conducted over a limited period, in order to evaluate alternative methods of performing specific functions or satisfying regulatory requirements prescribed by various IMO instruments, which would provide at least the same degree of safety, security and protection of the environment as provided by those instruments.

Massterly is currently working with the Norwegian maritime authorities to gain approval to operate unmanned vessels within Norway's territorial waters.

Testing the first vessels will take place with crew onboard and shore-based operation in parallel and this testing phase will last until we are confident enough to operate unmanned.

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The work consists of documentation, testing and simulations to prove that autonomous and remote-controlled vessel functions will have a level of safety equivalent to or better than conventional vessel operations, with respect to safeguarding life, property and the environment. Testing the first vessels will take place with crew onboard and shore-based operation in parallel and this testing phase will last until we are confident enough to operate unmanned.

Some of the documents we are preparing for specific vessel projects together with our partners (including Kongsberg, Wilhelmsen, DNV GL, University of South-Eastern Norway) cover the project's concept of operations, safety philosophy, design philosophy, maintenance philosophy and hazard identification.

There are many international regulations that must be considered, and where compliance with the intent of mandatory instruments should be ensured. For example, considering the International Regulations for Preventing Collisions at Sea (COLREGs), we should ensure a level of navigational safety that is equivalent or better

when compared to a conventional vessel on which navigation is performed by navigators on board.

Other examples of applicable IMO conventions to consider are the International Convention for Safety of Life At Sea (SOLAS) and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW).

These regulations all assume there are navigators on board having a full situational awareness based on their own perceptions and situation analysis, supported by the aids prescribed by the regulations. We need to demonstrate how the regulation's objectives can be met when the navigator's presence on board is replaced by autonomous and remote navigation.

A shore control centre is under construction at Massterly's office in Norway and the plan is that this will be manned by crew and operators employed by Wilhelmsen Ship Management (WSM) which, as a company, will hold a valid ISM Code Document of Compliance and a customised Safety Management System for operating autonomous vessels from shore. WSM's long experience and deep competence provides quality assurance for safe operations of the vessels. This, coupled with



market-leading automation technology and cyber security measures from Kongsberg, will enable us to offer the safest possible operations for the first generation of unmanned commercial vessels.

The shore control centre is not only about replacing the onboard crew. Its real potential lies in the added value of integrating information from various sources in the logistics value chain and systems onboard the vessel into a sensible front-end. This will result in increased decision support for the operator, lower operating costs and improved life cycle management of the vessel and fleet.

We are confident that we will be able to scale the advantages of autonomous vessels within Norway's territorial waters but, for the true potential of autonomy to be unleashed, we need IMO regulations to adapt to the new technology reality. Our hope is that the pioneering work and trials initiated in many countries will give insights that can help shape future IMO regulations and accelerate the speed of this work. Meanwhile, the industry must keep innovating under regulatory uncertainty.



# Education, technology and the fourth industrial revolution



**By Julie Lithgow**  
Director  
Institute of Chartered Shipbrokers

The fourth industrial revolution – that is, the digital technology revolution – should not be defined within the maritime industry by technology alone. Rather, it should also promote education and training, seek poverty alleviation and knowledge propagation as the foundations of sustainable global trade.

Let's adopt an approach that puts the emphasis on development as a means of meeting human needs; then we have an opportunity to create an

industry that reflects diversity, encourages personal achievement, reflects social values and is fit for the challenges of the future.

Technology alone cannot achieve this; it requires skills and innovation, new champions and entrepreneurs to shape it. These are all traits common to shipping but, in the next generation of emerging leaders, they must be used to develop an industry that encourages the development of human capital.



### **The trouble with technology**

The shipping industry is in danger of being overwhelmed by a focus on new technology and, in the process, being led into a future defined by technology vendors. Unfortunately, the western view of technology tends towards the patrician – as divisive as it is unifying – and does not address the needs of the majority of the world’s citizens.

This does not stop it being touted as the solution to everything from the crewing crisis to greenhouse gas emissions but, without the social and political groundwork in place to enable it, there is little chance of such results.

In particular, the industry is very bad at recognising the difference between the personal technology that we in westernised economies enjoy and the industrial technologies that can be used to further global development.

These are emerging – quantum computing, gene therapy and AI for example – but the lesson from consumer technologies is the necessity of understanding whether the benefits and risks are properly understood before they are adopted.

The other problem with a technology-led approach is that very few of the technologies with which we are apparently obsessed provide solutions to the majority of our very physical problems.

Instead, they are like another patch of code, released to update software that is no longer performing as designed. Simply adopting new technologies as a means of solving short term problems is not a long-term answer.

### **Trade and development**

It has become fashionable for western economists to call the end of globalisation and a consequent structural decline in world trade, even though a large proportion of the world’s population is still effectively living near or below the poverty line.

Shipping is the connector between global supply and demand and, given the scale of economic development challenge remaining, there is good reason to believe that demand can be sustained, albeit at a lower rate.

In fact the world may be about to see another period of economic development that completes the gravitational shift to the east. China’s Belt and Road programme covers an area that is home to three-fifths of the world’s population and could re-shape supply chains in regions and countries whose development has been stalled by isolation or political systems.

These regions are also home to concentrations of poverty for which the positive impact of globalisation is an increased opportunity for

learning and education. We know that bringing people out of poverty depends to a large extent on better access to education, especially for women. It is a once-in-a-generation opportunity.

Greater connectivity makes it harder for barriers to exist in practice but we also need rule-makers who are able to respond to the challenges of the 21st century. The shipping industry needs people who can advocate for it as well as those who can critically appraise it.

### **A better image?**

While these external influences continue to make their mark, the shipping industry continues to obsess about its lack of public recognition. In practice this means it is missing an opportunity to use its central role in world trade to support the creation of better societies and even win back trust in globalisation.

In the process it would have a much better chance of building for itself a sustainable public policy position, using the profits it generates to invest in further education. Such a programme could help to create the professionals that the industry needs and in turn could also foster new technologies from which it could benefit in the longer term.

There are laudable and concrete projects that are already making investments in people and communities but education, unless it is for the seafaring workforce, receives far too little attention.

Above all, what is needed is an understanding about the kind of people we need to attract to the industry in future and how to train and educate them.

In the future we are likely to see an increase in automation and machine learning, a change to the way that industrial sectors operate and how many people they employ. The same is arguably true for education; it cannot simply rely on either national public education or mandatory skills training to shape and nurture the talent we need.

### **Going beyond technology**

The reason that technology is so attractive a solution to so many owners and operators is that it requires so little intellectual effort, only more capex and opex. It allows the patch to be applied without addressing the industry's deeper needs.

In part because of the clamour around technol-

The reason that technology is so attractive a solution to so many owners and operators is that it requires so little intellectual effort, only more capex and opex.

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ogy adoption, too few people recognise the importance of educating the workforce we will need to work with these new technologies, systems and business models.

I am a classic member of 'Generation-X' so my attitude to technology has been shaped to a great extent by the speed of its rise and scale of its adoption. Its social and political impact form a new part of the conversation, one that has not yet widely taken place in shipping.

The 'Millennials' and 'Gen Zeroes' taking their place in the workforce are likely to take a much less indulgent view of shipping's traditional exceptionalism and instead see their professional lives as a means of addressing social issues as well as professional ones.

Yes, their 'native' attitude towards the use of technology will cause its own displacement and disruption but if this is something they are doing with broader goals in mind, then the result is likely to be a greener, leaner and more socially-engaged shipping industry.

Creating that future would be a far greater achievement than simply applying technology as a means of circumventing the industry's current challenges. And we do have an opportunity to develop that future. It is almost within reach, but it must reflect not just the dreams of a technology-driven ideal, but the education and nurturing of the minds that will help to make it a reality.



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# China enhances its strengths while the maritime market waits for recovery



**By Jane Chen**  
Vice president of strategy and head of China  
MacGregor

The global shipping and shipbuilding markets are waiting for recovery and at the forefront of this hungry queue is China. When recovery comes, it will be met by leaner, more efficient and more technologically advanced players than the industry has ever known.

Gaps between the global shipbuilding giants are narrowing and capabilities that once distinguished a country's expertise in building particular vessel types are gradually diminishing. Within this levelling market, China is poised and ready to compete in both its traditional grounds and within previously untapped arenas.

It is not possible to consider China's maritime position without taking into account the whole

market and its potential for growth. Intelligence specialist Clarksons Research, downgraded its forecast for global seaborne trade growth from 2.9% to 1.7% for 2019 as a whole, representing the slowest annual growth rate since 2009. However, it still predicts a recovery starting this year with more meaningful growth forecast during 2021 and 2022.

The recovery of the offshore oil and gas market is expected to take a few more years. Currently, the price per barrel of oil has stabilised at around US\$60, which has been widely accepted as a viable level for offshore field development. This is possible because the industry has become more cost-competitive than before and adopted new solutions and technology advances that have

realised efficiency benefits. However, oversupply in the market means that there are still many vessels waiting to be reactivated before the need to build new ones materially increases.

### Barriers to growth

Global economic uncertainty still grips the maritime industry; a difficult situation exacerbated by protectionism, trade tensions and sanctions.

As the growth of advanced economies has been slowing down, growth in emerging economies has not been sufficient to close the gap, adding to current difficulties. Furthermore, service growth, which should be visible in a market where owners are keeping vessels for longer, is also slow and indicative of cash-strapped companies undertaking only essential maintenance.

An additional impact is the need to comply with environmental regulations, particularly the lower limits on sulphur emissions, and their associated costs. Global shipbuilding recovery in both the merchant and offshore markets is driven most strongly by the scrapping of older fleets, with the greatest driver being environmental and regulatory legislation.

Whilst environmental regulations place short-term capital and operating expenditure pressure on the industry and its participants, it will bring us all a much better world in the longer term.

### Global shipbuilding stakes

China's position in the global shipbuilding industry is substantial. In terms of contracting activity, Clarksons' analysis at the end of August 2019 showed that China held a 44% share of global shipbuilding by number of newbuild contracts placed and a 38% share by tonnage.

However, China currently only secures around 33% of the market by value, which is similar to the European shipbuilding industry, which builds around 10% of the global fleet by tonnage.

This indicates that whilst China has diversified from building smaller, simpler vessels to larger and more value-added ships, it is still not comparable with the European yards focused on high-value, high-technology vessels: cruise ships in particular.

This is well-recognised by China; it has been on a long learning curve but the gaps between it and other shipbuilding regions are narrowing. Whilst this has been driven in part by the 'Made in China



2025' initiative, strategies were already in place to close the value gap. Chinese state-owned shipyards are now targeting higher-value ship types, including LNG carriers and cruise ships.

In preparation for growth and consistent with the industry consolidation trend, there are mega-mergers taking place within China's shipbuilding industry, primarily between the two state-owned enterprises (SOEs), China Shipbuilding Industry Company (CSIC) and China State Shipbuilding Corp (CSSC). Post-merger, the combined group will be the largest shipbuilder in the world.

### Increasing shipowning position

China also has a growing shipowning role in the industry. For a long time, it ranked fourth in this sector but in 2018 became the second largest shipowning nation, overtaking Japan.

Whilst Greece remains the world's largest shipowner, many new investments have been backed up by Chinese financing and China also became the leader in the second-hand tonnage market during 2019.

State-owned China COSCO Shipping, including newly-acquired OOCL, has a relatively young and modern fleet. It is now the largest global shipowner and is expanding its footprint in international ports through significant investments.

### Becoming self-sufficient

All Chinese companies, and particularly the SOEs, are being encouraged to be more independent in technology development and to become self-suffi-

cient. This is designed to safeguard the country's long-term growth, the integrity of its critical industries and to accelerate China rise up the value chain.

China's SOEs are also major employers, stabilising local communities, and their survival and increasing competitiveness is therefore essential. A strategy that underpins this goal is based on vertical integration, where a company controls more than one aspect of the supply chain.

While the market is depressed, it is natural for the Chinese SOEs to prioritise 'feeding the family first'. Hence being regarded as a 'family' member for a Western player would be beneficial, either through a strategic cooperation or joint ventures.

### **MacGregor in China**

MacGregor has held a strong market position in China for decades, which has been further strengthened through the acquisition of TTS, which was concluded on 1 August 2019.

TTS has three joint ventures in China, two with CSSC and one with CSIC, which are well established and recognised by Chinese customers. In accordance with Chinese competition authority conditions related to the acquisition approval and for a hold-separate period, MacGregor and the TTS joint ventures must operate independently in the China market until July 2021. This applies to certain equipment supplied for newbuild projects.

The combination of MacGregor and TTS capabilities globally provides a stronger service network, a wider product range and greater expertise to offer optimised solutions that create even more value for customers, both shipbuilders and shipowners. With a strong parent company and shareholder support, we also have the financial capacity to invest and innovate for our customers; something that not everyone can afford in this climate.

MacGregor also needs to compete effectively in the Chinese market with 'fit for purpose' reliable equipment that is cost-competitive. As such, and for example, we have reengineered and optimised our portfolio of selected equipment to ensure that

Whilst China has diversified from building smaller, simpler vessels to larger and more value-added ships, it is still not comparable with the European yards focused on high-value, high-technology vessels: cruise ships in particular.



it meets the needs of customers with both technologically-advanced and more simple requirements.

### **Ready for tomorrow**

As an industry leader, we must move forward. MacGregor is doing this through the development of innovative, digital technology-enabled and environmentally sustainable solutions that deliver tangible commercial and operational benefits to customers, as well as fulfilling our social responsibilities.

One notable example is OnWatch Scout, a cloud-based digital solution designed to maximise operational availability and minimise unplanned downtime through continuous monitoring of installed equipment performance. A number of OnWatch Scout pilot trials are currently ongoing, including with Chinese shipowners.

Whilst we are operating in an era of considerable change, MacGregor has extensive local experience and we are able to compete strongly in the market through leveraging an asset-light business model and striving to ensure that our products, systems and services fully meet the needs of our shipbuilding and shipowning customers.

Strategic alliances and joint ventures with Chinese state-owned key stakeholders further strengthen our relationships and market foothold, while also helping to build a stronger platform to support future growth in China.



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# How maritime regulation impacts technology and its forced adaptation



**By Karina Boudjema**  
VP, global carrier strategy and digitisation  
WiseTech Global

The maritime industry is inherently international and inextricably linked to the landside. The supply chain crosses borders and wharves and extends into the hinterland far from the ocean. Because of its international and intermodal scope, the regulations and standards that govern the maritime industry must have an equally broad scope.

However, the international supply chain is not static. Changes in governmental and business processes, coupled with advances in technology, have both necessitated and made possible greater connectivity up and down the supply chain.

It is technically possible for each link in the

supply chain to communicate instantaneously with every other link but such interconnectivity between businesses, governments and other organisations up and down the supply chain is yet to be realised. One stumbling block is a lack of agreed standards, although there are efforts to overcome this and build a regulatory framework for the development of standards.

## **Existing structures**

While the IMO (International Maritime Organization) develops and maintains a comprehensive regulatory framework for the maritime industry, data exchange harmonisation is beyond

its remit. Instead, the UN Centre for Trade Facilitation and Electronic Business (UN/CEFACT) works to develop and maintain such standards. Along with ancillary organisations, it has established working groups to address standards for data exchange in the industry.

But technology companies have been ahead of the curve, developing their own standards and interfaces. Systems such as electronic data interchange (EDI) and application programming interface (API) are in widespread use across the logistics industry. The technology companies that have developed these systems have approached their development with an agile mindset, finding ways to translate data and information from one format to another.

### **The future towards interoperability**

Interoperability, or the ability for computers to exchange and use data, will continue to be important as a vehicle to reinforce standards.

Increasing interoperability would mean the broader supply-chain network would gain value from adopting universal standards. A technology provider offering a solution that does not take on the full scope of the issue would have little chance of succeeding.

Many have tried but, while solutions tend to be promising at first, their narrow scope limits growth. Meanwhile, large technology providers have been building supply-chain ecosystems for many years to create value-added services.

Container-shipping companies are beginning to recognise the imperative to digitalise supply chains. These companies are looking to apply developing technologies such as the internet of things (IoT), distributed ledger technology (or blockchain), machine learning and end-to-end



The sun is setting on  
the current,  
fragmented mode of  
supply-chain  
connectivity.

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supply-chain data management systems.

However, due to the industry's complexity and the lack of adoption of universal standards, digitalisation is a complex task. For instance, ports are frequently referred to with different codes by different stakeholders in the supply chain, despite the best efforts of UN/CEFACT to harmonise these codes.

That lack of adoption of standards stems from the slow adoption of technology solutions within the supply chain. Different systems are unable to communicate and this prevents true interoperability throughout the supply chain.

### **A new hope**

A step towards true interoperability was the April 2019 launch of the Digital Container Shipping Association (DCSA). This neutral non-profit organisation aims to drive interoperability and standardisation in the container-shipping industry. Most of the largest ocean carriers have agreed to support it and its members represent more than 70% of the global TEU capacity.

The DCSA hopes to address the common challenges experienced by all the container shipping companies in transmitting, receiving and exchanging data. A broad aim of the organisation is to function in the shipping sector like the International Air Transport Association (IATA, founded in 1945) functions in the aviation sector.

It is still early days for the organisation and it has yet to make any substantive announcements regarding its activities. It has also yet to announce which technology provider, or providers, to partner with.

The DCSA seems to be looking at enabling

differentiated offerings, cost-effective and value-added services for the container shipping companies. The potential benefits across the wider transportation sector could be tremendous, with greater connectivity and decreased cyber risks.

However, the DCSA has a steep climb ahead of it. The ocean carriers are notoriously competitive and it remains to be seen whether they can put aside their differences long enough to work as a united front to thrash out a set of usable industry standards. As the adage goes, "standards are like toothbrushes: everyone agrees you should have them but no one wants to use yours."

The benefits that an organisation such as the DCSA could bring would certainly be a boon for all actors in the supply chain but other supply-chain stakeholders, such as shippers, have yet to be heard from regarding these standards.

Warming to tech

Outside of their interest in the DCSA, many ocean carriers have shown an increased willingness to invest in adjacent technology. Many carriers have joined forces with tech companies and venture-capital firms to create platforms based on these technologies.

The sun is setting on the current, fragmented mode of supply-chain connectivity. It is being replaced by dedicated platforms that can provide straight-through digital processing for all parts of the supply chain.

If managed properly, the DCSA can lead the way towards a new, more connected and transparent supply chain by establishing workable industry standards. While this organisation is the best hope at present to drive standardisation in the industry, its next move will be critical.



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# Autonomous ships and autonomy in the spotlight



**By Elina Uusimäki**  
Product manager  
NAPA Shipping Solutions

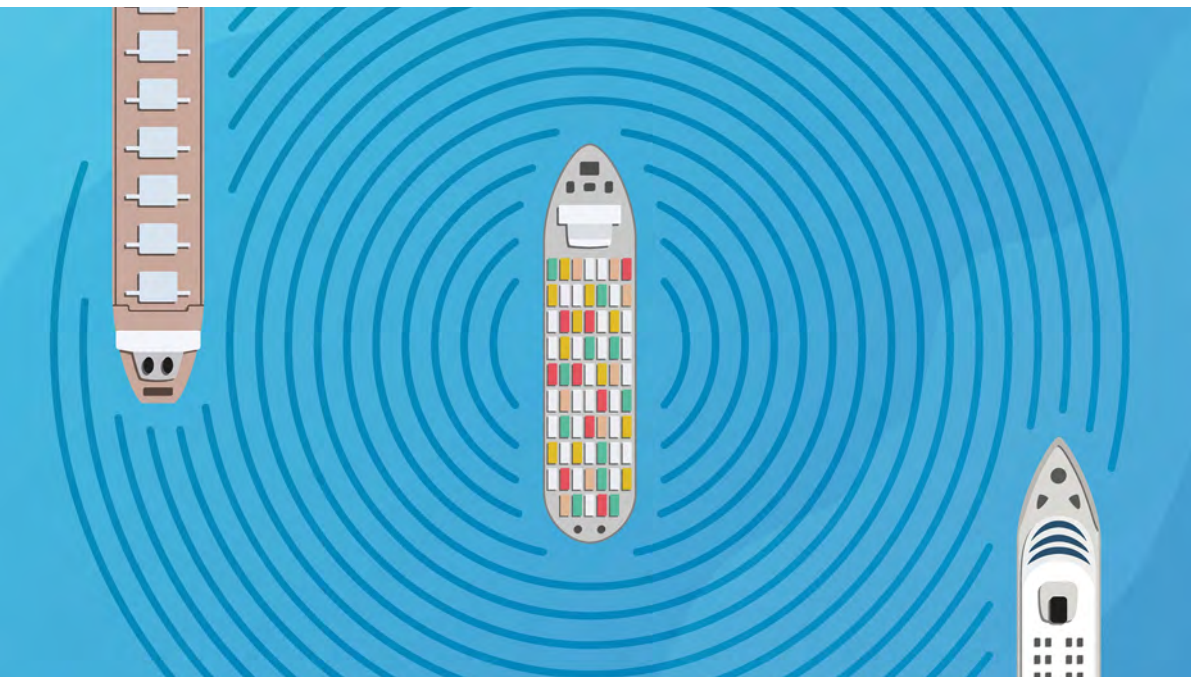
Sustained good news has been hard to come by over the past decade. For many in shipping, autonomous vessels have been the warm sun they dream about on cloudy days. Yet it's a technology that has many naysayers. Do we need to proceed tentatively? Or is there a case for cautious optimism?

Almost daily I come across contradictory titles such as "Autonomous ships are almost here" and "Why we will never see fully autonomous commercial ships". How can the views of experienced individuals, working in the same industry, be so far

removed from each other?

So, why would the world never see fully autonomous transoceanic commercial cargo ships? USCG Commander David Dubay wrote in an article in June 2019 that "autonomous vessels operated by computers and remote operators quite simply pose too many vulnerabilities, and they likely will prove too expensive to replace today's manned vessels." His view is that they would be too complex and too expensive to design and that they can therefore never deliver large enough cost-savings over human crew.





At the same time, there are huge investments, several R&D projects and national and international co-operation consortiums that aim to advance autonomous and remotely-operated ships.

The year 2025 jumps out as the milestone for several of these projects. For example, a Japanese consortium of shipbuilders and maritime shippers aim to make self-navigating ships a reality by 2025 and DIMECC's One Sea – Autonomous Maritime Ecosystem programme aims to lead the way towards an operating autonomous maritime ecosystem by 2025.

We've also seen the launch of ONE SEA and, in 2016, the Rolls-Royce led Finnish industry project AAWA (Advanced Autonomous Waterborne Applications). Oskar Levander, now SVP Concepts & Innovation at Kongsberg Maritime, recently noted that "by 2025, some forward-thinking shipping companies will be operating remotely controlled, completely un-crewed vessels on the high seas."

By September this year, the Mayflower autonomous ship is scheduled to attempt the

world's first transatlantic voyage, using artificial intelligence, cloud and edge computing and remote monitoring technology.

However, the reality is that these opposing viewpoints have numerous similarities. All seem to agree that advances in technology continue to make shipping safer and more efficient. No one seems to believe that the whole industry would change in a short period to completely unmanned ships, but rather adopt the technology first in limited situations, during specific periods of a voyage, or on an unchangingly predictable route. More extensive change will happen over a longer period of time.

Even in the autonomous ship trials, such as Maersk installing Autonomous Technology and Advanced Perception platform to a series of containership newbuildings, this does not aim for unmanned operations; its goal is to enhance safety, efficiency and reliability.

Nevertheless, in my experience, the reality at work and discussions from friends and colleagues is that the market-wide shift in the levels of

It's a trend that has the support of most of the major flag states, and can be seen most clearly in the growth of digital systems that automate mundane logging and reporting tasks.

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automation and remote control is happening behind the news headlines and mostly to tackle precise day-to-day business challenges.

#### **Organic development**

The shift to more autonomous vessels is happening day-by-day in the decisions that are made when shipping companies seek to increase safety, make their operations more ecological and save costs. These steps are not taken to remove crew, but to help the crew with their workload through enabling them to concentrate on more critical aspects of a voyage, or ensure they are not alone with their toughest decisions.

It's a trend that has the support of most of the major flag states, and can be seen most clearly in the growth of digital systems that automate mundane logging and reporting tasks. To take a recent example, Canada's BC Ferries recently installed NAPA Logbook and in the six months since installation we've been pleased to see that it's already substantially decreasing crew workload and avoiding errors from manual reporting.

I predict that this year we'll see substantial growth in the implementation of decision support systems that help choose the most fuel-efficient and/or safest route, considering forecast weather conditions and ocean currents, while also forecasting how the vessel's efficiency, timetable and safety could be affected by such conditions.


We're taking the steps towards remote control and monitoring in small chunks through providing better support for the crew onboard. Instead of needing to have capabilities for maintaining all

special equipment onboard, crew can contact their team ashore for instructions, let them see the problem instantly via a camera, or enable a specialist to trouble-shoot their operational hiccups via remote connection.

These kinds of steps in increased automation and remote control are happening on many fronts simultaneously. Automation and remote connections do not progress by emptying the bridges of crew but by empowering them with intelligent tools, and increased connections to support teams ashore.

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# New Year, New Decade, New Industry



**By Gillian Lovering**  
Business development manager  
Rivertrace

**At the beginning of 2020, our industry immediately finds itself entering a new chapter. Working within marine over the last decade or so, I have experienced the shifts driven by the economy, environmental legislation and new technology. The world is constantly changing, and the marine sector is playing catch-up to change with it.**

I was born in the late 1980s (a millennial, if you must) and have grown up listening to how the world needs to change for the sake of protecting our environment. I always thought I was 'doing my bit' but recently, a series of high profile and demographically diverse activists, including Greta Thunberg and Sir David Attenborough among others, have created a sense of great urgency around the need for change that has made many of us sit up and listen.

The marine sector is often perceived by the public as being part of the problem. Therefore when I began working for Rivertrace – a UK company that designs and manufactures oil in

water monitoring technology – in 2017, my focus on environmental change went from being a personal issue to a professional one. At both an industry and organisational level, we have been actively discussing and developing ways to reduce our footprint and to modernise a typically traditional space with progression: whether that may be ballast water management systems, scrubbers, IoT or blockchain.

1 January marked a momentous milestone for the industry as the global cap on fuel sulphur content entered into force as a mechanism for reducing ship emissions. While the three options to achieve regulatory compliance permitted by the IMO may be relatively clear-cut, opportunities and challenges exist for all of them. One of these options is the use of scrubbers, which provide emissions abatement by scrubbing the sulphur out of exhaust gas emissions using seawater.

Scrubber technology has a range of benefits over other options, including fuel cost, reduced



particulate matter and good quality of washwater, providing the systems are used correctly. Despite these benefits, we have seen recent bans in some ports on operating open-loop scrubbers, which dispose of the seawater used as washwater back into the sea. Although scientific reports providing reassurance, some ports are concerned about washwater discharge quality and its impact on the marine environment.

There is an acceptance that the continued use of scrubbers by ships may depend on their manufacturers being able to prove that washwater quality is constantly monitored and shown to meet appropriate standards. However, this will require IMO to provide clarification by converting current guidelines on the monitoring of scrubber washwater into detailed and precise regulations. This is badly needed to provide assurances to operators and ports alike that any scrubber washwater discharge is safe for our marine ecosystems.

While we at Rivertrace welcome new environmental regulations, they come at a cost, and often a hefty one. Many operators are still recovering from the global economic downturn and decreases in newbuild activities that created great pressure to lower operating costs. This combination created a

perfect storm in which corners were being cut and investments were not being made. Even today, seeking cheaper alternatives has too often become the route taken by owners and operators.

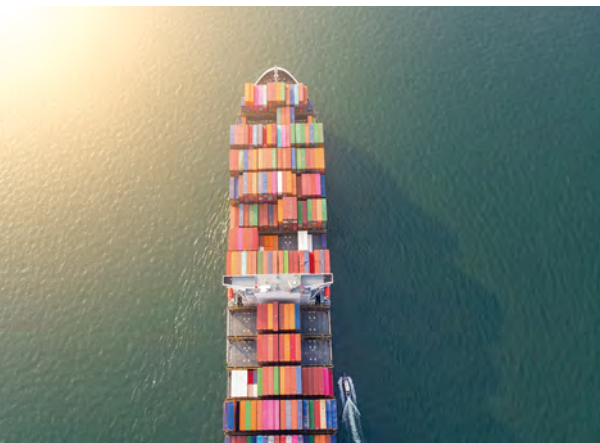
With a need to lower operating costs, there exists an underlying temptation to bypass good practices and, through negligence on the part of poorly-trained crews or intent on the part of cost-saving-focused operators, to seek easy non-complying solutions that skirt around regulations.

The use of 'magic pipes' that allow polluted waste liquids to be directly discharged overboard continues, even in era of environmental and climate crisis, despite the risk of huge fines and even imprisonment for those conducting the illegal activity. Falsification of record logs also often occurs as a result of using magic pipe discharges.

However, while non-compliance, be it deliberate or unintentional, continues, there are of course many shipping companies with outstanding records in good corporate governance. These are the 'good guys' that should be supported.

Above all, the need to control operating expenditures must be put into realistic context. Efficiency, not cheating, is the ultimate answer to





optimising costs. The surreptitious changing of onboard waste-handling equipment using magic pipes is a problem that can easily be made to go away. Systems based on logic should be viewed as being good practice, not as a burden.

Today, I feel privileged to be able to work for a company that is dedicated to supporting the industry's drive to achieve a cleaner environment by providing compliance assurance for all water discharges. Rivertrace remains a family-run company that has a global presence. It is also a company that encourages gender diversity: an important topic that has been brought to the fore in the industry during the past year. This was thanks to the 2019 International Maritime Organization's World Maritime Day theme for the year being 'Empowering Women in Maritime'.

I've never considered myself a feminist as such and our engineering business is typically one of camaraderie which I immersed myself into, enjoying working within predominantly male teams. That said, looking back even a few years it was obvious more women should be given a chance in marine. It's important for a workforce to be diverse, and recently I noticed my shifting opinion on this subject becoming firmer.

When I first started out, I was the only female in a technical role at my organisation. I've had a quickly progressive and satisfying career within the sector thus far, with opportunities to work on FPSOs, rigs and tankers, and to travel the world and meet some incredible people.

This decade is our time to make a real change through diversity in gender, age and technology. I'm excited, and by working together, innovating and modernising I know we can achieve a cleaner, smarter industry.

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A key moment, when I noticed how far we had come, was at an event last year where the entire panel for a technical discussion was female. I was so proud that I took a photo and sent it to my family. I have grown to love this industry and the enthusiasm my colleagues have for it, and I want to inspire other women to join our clan.

This decade is our time to make a real change through diversity in gender, age and technology. I'm excited, and by working together, innovating and modernising I know we can achieve a cleaner, smarter industry.

If you would like to learn more about what Rivertrace are doing to support our shipping community in environmental compliance please visit [www.rivertrace.com/library](http://www.rivertrace.com/library) to download our whitepapers.

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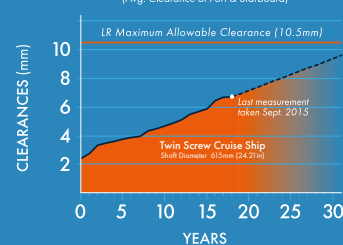
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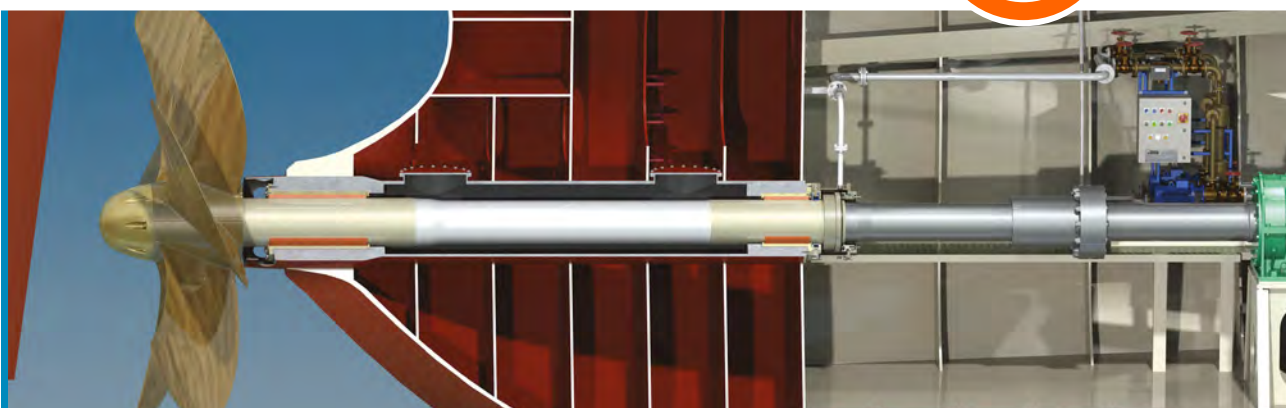
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# The shipping industry at a crossroads



**By Fabiola Hernandez**  
HSEQ & Technical Director, Total  
Marine Fuels Global Solutions  
and SGMF, Director

Today, shipowners of the world stand at a major crossroads. For over a century, the shipping industry has relied almost entirely on heavy fuel oil (HFO) to power the colossal engines housed in the ships that carry the world's cargoes from continent to continent.

While relatively inexpensive as a commodity, its high sulphur content and significant SO<sub>x</sub> and NO<sub>x</sub> emissions that result from burning HFO imposed a significant environmental penalty. Therefore, the industry has been under pressure in recent years to

clean up its act and make the shift to burning cleaner fuels.

With the International Maritime Organization's (IMO's) global sulphur cap entering into force on 1 January 2020, the pressure on the industry to use cleaner fuels for ship propulsion has intensified. This race to achieve regulatory compliance has forced shipowners to make important decisions on how to comply, and rapidly. Choices ranged from continuing to use HFO and install scrubbers, through considering gasoil or low sulphur fuel oil, to upgrading liquefied natural gas (LNG).

These decisions have forced shipowners to weigh up capital investment costs (CAPEX) versus long-term operating costs (OPEX) while also taking a stand on their environmental impact, both today and in the future.

However, while installing a scrubber on board or switching to low-sulphur fuel may achieve compliance with the IMO Global Sulphur Cap 2020 regulation, it does not help reduce greenhouse gas (GHG) emissions. Therefore, LNG has proved itself to be a viable and competitive option as a marine fuel since it is the best available option today that meets global sulphur cap regulations and helps achieve a significant reduction in GHG emissions.

An independent study commissioned by SGMF

However, while installing a scrubber on board or switching to low-sulphur fuel may achieve compliance with the IMO Global Sulphur Cap 2020 regulation, it does not help reduce greenhouse gas (GHG) emissions.

and SEA\LNG in April 2019 showed that burning LNG generates almost zero sulphur and particulate matter emissions. It also contributes to a reduction of up to 21% of GHG emissions from well-to-wake when compared to current, conventional, oil-based marine fuels. These GHG reductions are expected to improve as technological enhancements help to further reduce methane slip from certain engine types.

#### **Removing barriers to the adoption of LNG**

With such a clear environmental advantage compared to other solutions, the question that must be asked is: which obstacles could hinder the adoption of LNG as a marine fuel? These fall into two broad categories. First, there are concerns





surrounding higher CAPEX requirements to retrofit a fleet. A response to this obstacle is that, over time, LNG remains competitive due to its lower molecule price per energy unit compared to conventional fuel.

Second, questions of standardisation, education, perception and industry acceptance remain obstacles. As already mentioned, we are working in an industry that has been burning the same fuel, and generally operating in the same way, since the beginning of the last century. And even though LNG is an irrefutable, safe, clean fuel that is well-known and appreciated in other industries, adopting a new fuel in the shipping industry is a major responsibility.

Safety standards, interfaces and operational procedures must be agreed upon. Training programmes must be established. Ports must be guided and prepared. In each of these areas, SGMF has stepped forward to bring stakeholders together, allowing us to collaborate and advance much more quickly than if everyone had stayed working in their own corners. The guidelines and frameworks issued by SGMF to support the safe use of gas fuel have become the industry standards.

We are indeed advancing as an industry and together we have already accomplished major achievements. LNG bunkering infrastructure is already well developed in north west Europe (in Rotterdam and Zeebrugge) and is developing very rapidly across maritime hubs in Asia (Singapore, China, Japan and South Korea), around the Mediterranean Sea and in the US Gulf and along the US East Coast. Consequently, nine out of the

The guidelines and frameworks issued by SGMF to support the safe use of gas fuel have become the industry standards.

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top 10 bunkering ports will have LNG available in the short term.

At Total Marine Fuels Global Solutions (TMFGS), we are developing safe, competitive and highly compelling LNG bunkering solutions that adapt to the logistical needs of a wide variety of customers, ranging from deep-sea container vessels to cruise vessels, ferries and tankers based on their operational requirements. This includes LNG bunker vessels, LNG trucks and ISO containers. We are moving rapidly and, as we progress, we value the work that we do with SGMF very highly to help bring the entire industry forward on standardisation, in educating stakeholders, in training and in providing a common industry voice when it comes to regulatory bodies.

This is a critical time for the shipping industry as it shifts to a low-emission era while simultaneously answering the call to help solve the critical issue of our time: climate change.





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# New fuels bring new liabilities



**By Tiejha Smyth**  
Deputy director (FD&D)  
North P&I Club

At 10 seconds before midnight on 31 December, the final countdown to 2020 but the level of trepidation felt for the impending new year would have varied significantly between those in the shipping industry and those blissfully unaware about IMO's 0.50% sulphur cap arriving.

It will be a while before the industry can take full stock of the impact of the new sulphur cap, particularly as – at the time of writing – we still have the carriage ban to prepare for, which arrives on 1 March 2020, but we already have a clearer idea of where the challenges lie.

Many have speculated that there will be an increase in bunker quality issues (particularly with new VLSFO) in terms of stability and compatibility: there is no guarantee that 0.50% fuel supplied in different parts of the world will be compatible. There are also concerns about fuel contaminants such as phenols and cat fines. Some such cases arrived at the end of 2019 and there will undoubtedly be more, although bunker quality issues are nothing new for the industry – this is something that we have been dealing with for many years, but

it is still too early to predict the extent of such cases arising due to the new sulphur cap.

We have already seen the bunker markets fluctuating and we anticipate further variability moving forward, although it is expected that markets will settle down in a few months from a 2020 point of view. However, bunker markets could still be affected by world political developments, such as sanctions, trade wars and physical conflict, which are outside the shipping industry's control.

Fuel availability is a big concern (both for compliant fuel and HFO for vessels fitted with scrubbers). It is thought that there will be enough compliant fuel (fuel that has a maximum sulphur content of 0.50%) but it may not be in all bunkering ports or not in the quantities needed. This could have an impact on a vessel's trading options and increased congestion could be seen at certain bunkering ports, which will lead to commercial losses.

All methods of compliance may bring about extra operational issues and crew will need to be able to demonstrate that they are familiar with relevant operations, which will be an inspection

This all paints a very negative picture and ignores the opportunities that arise with the new sulphur cap.

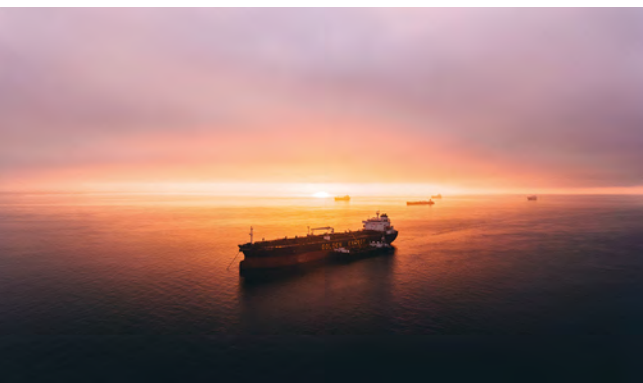
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point for port state control.

All of this, and the fluctuating bunker markets, will almost certainly involve additional costs. When there are increased costs in shipping, it will always lead to disputes. Add to this the fact that owners and charterers are already operating in a competitive environment where every cent counts, and the industry has the perfect recipe for becoming increasingly litigious. If parties fail to co-operate with each other and compromise from time to time, then the legal industry will be the big winner.

This all paints a very negative picture and ignores the opportunities that arise with the new sulphur cap. Those in the debunkering industry will surely benefit in the early months of the new regime as the industry prepares for the carriage ban. However, this opportunity will be short-lived and limited. For everyone else, there might be longer-term opportunities, in addition to the benefits to air quality that have provided the motivation for the new sulphur cap.

The IMO has promised greater scrutiny of bunker suppliers. As the bunker supply industry is unregulated, this will hopefully have a positive





effect for the shipping industry, which ultimately bears the cost of the bunker supply industry's failings. We will likely see more bunker supply licence schemes too, although the value of these will depend upon how they are set up. Greater focus on bunker suppliers, and their role in allowing vessels to comply with sulphur regulations, can only be a positive step in the right direction but will the opportunity be taken to move towards the type of dynamic that we see in the automotive and aeronautical fuel supply sectors? Owners and time charterers must hope so.

Some uncertainty still remains around the new sulphur cap, particularly in relation to fuel quality and the enforcement landscape. Although fuel quality issues might result in engine damage, that

will not always be the case and we anticipate that the vast majority of 2020 sulphur cap issues will be of a commercial nature not covered by insurance, which is a trend that we saw developing in the final quarter of 2019 when issues were arising in relation to vessels preparing for transition.

Uninsured commercial issues will need to be dealt with by in-house legal teams or external lawyers, so those owners and charterers with the benefit of FD&D cover will have far less risk of incurring substantial legal costs in dealing with such issues, which presents an opportunity for FD&D providers such as North. Opportunities also exist for those P&I clubs able to assist their members with preparing for the future, both from a technical and legal/commercial point of view. The role of the P&I club has always involved an element of loss prevention, but this is an increasingly important area for the members of P&I clubs who need assistance with facing future uncertainties in an ever-changing industry, particularly those who do not have the benefit of large in-house support teams.

At North, we have been working on 2020 sulphur cap issues with our members since the beginning of 2018, in the knowledge that highlighting the issues early would help our members to be better prepared and, consequently, in a better position to avoid or limit losses. This work has been a team effort by colleagues across a number of different departments, particularly the Loss Prevention and FD&D departments. As the industry sees more environmental regulation in the future, and new technology developing to meet such regulation, we will continue to help our members to look ahead and prepare for upcoming changes. After all, we are not just here to help when things go wrong – we are also here to help our members avoid problems.





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# On the course for decarbonising shipping



**By Maria Skipper Schwenn**  
Executive director of safety, environment  
and maritime research  
Danish Shipping

**In the pursuit of new sustainable alternative fuels for the shipping sector the future can seem very distant. At Danish Shipping we recently announced that we are working towards carbon neutrality by 2050, both for ferries in Danish waters and for international shipping companies.**

We naturally remain strong supporters of the IMO Greenhouse Gas Strategy and its objectives.

2050 may seem distant but, as part of the shipping business for almost a decade, I know very well that this massive industry follows the slow pace of change set by ships' 20-25 year lifespan. Consequently, the ships we are about to design and build now will be part of the world fleet when we approach 2050. In other words, we don't have much time.

It is not an easy task to replace 250M tonnes of fossil fuels with a carbon-neutral alternative. It has even been called a Herculean task, which means it is close to impossible. But every now and then, I find myself struck by optimism as I read the news. Just before Christmas 2019, when the Danish minister for climate, Dan Jørgensen, announced a DKK128M (\$19M) funding to support two conversion and storage schemes for surplus electricity – called 'Power-to-X plants' – in Denmark was one of these occasions. The plants are set to produce, among other things, new fuels for the shipping sector.

The two projects both deal with the conversion of electricity into hydrogen. They both have strong players behind them, including E.ON and Shell,



and are part of an industrial symbiosis with a connection to the current industry. This means that they take place close to market-like conditions and can therefore help shed light on the barriers hindering further deployment of the technology, both in terms of regulation and market conditions.

Both projects are intended to develop their technology and capacity significantly after the support period ends in order to be able to operate on market conditions. One of the projects includes establishing a 10MW methanol plant and a 12MW electrolysis plant with battery storage. Electricity will be provided by a local 80MW combined wind and solar power plant and green hydrogen is produced and converted to methanol by adding CO<sub>2</sub> from purified biogas.

I find it very encouraging that we are now moving from talks and ideas to concrete action - however small the scale. It goes to prove that change is indeed coming and, as stated by many others, the greatest change in the transition to new sustainable alternative fuels will most likely happen on land. Apart from establishing production facilities there will be a need for new infrastructure or transition of existing fossil fuel infrastructure to support new fuel types.

But Denmark, despite being a large shipping nation, cannot make this transition on its own. We need action at global level and we need knowledge from hands-on practical experience to identify barriers hindering the further deployment of new sustainable alternative fuels for the shipping sector. We also need to identify whether current regulation is standing in the way of bunkering and burning the new fuels or if regulation to support the safe use of the fuels is missing. To this end we need strong commitment from IMO member states to provide the industry with a consistent and solid legal framework that will maintain the necessary level playing field.

Just before Christmas a united international shipping industry jointly tabled a proposal to the

We need action at global level and we need knowledge from hands-on practical experience to identify barriers hindering the further deployment of new sustainable alternative fuels for the shipping sector.

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IMO to establish a so-called R&D fund. In this way, we have proposed a way to further speed up the work to transition to new sustainable alternative fuels and pave the way for gathering practical experience.

The suggested R&D contribution mechanism of US\$2 per tonne of fuel oil purchased for consumption will generate about US\$5Bn dollars over a 10-year period, based on total fuel consumption by the world fleet of about 250M tonnes per year. This will ramp up the massive development effort we have ahead of us to make sure that transoceanic routes can be covered by carbon-neutral vessels in a commercially-viable manner.

So there are several encouraging initiatives going on. I hope that 2020 will provide more steps in the right direction on the course for a carbon-neutral future.



# Emotional connections can bridge the communication gap



**By Kami Paulson**  
Head of communications  
Wake Media

Our clients often ask “Is this newsworthy? Can we write a press release on this?” My first response is simple: will the reader benefit from this content? Once that is established, we work out how to make it engaging.

When I started my communications career in a busy National Health Service (NHS) press office, every day we had to produce responses to critical stories. Amidst the firefighting of handling national tabloid and broadcast requests, we also needed to promote the amazing work of the hospital. There were too many success stories to

ever cover, but the NHS’s largely negative relationship with the press meant it was no simple task to get good coverage.

That environment was a completely different beast to the maritime sector. As is going to be the case when you are in the business of saving lives, the media work was primarily reactive. But when it comes to the need to present engaging stories, was it really that different from the commercial world? My answer would be no.

I was trained not to just seek out a new service, initiative or technique we were providing our





patients. In order to be newsworthy, we also needed a human-interest element. I believe it is this that is missing in most maritime industry communications. We forget that we are speaking to people – human beings. Adopting a human-interest approach in maritime marketing will deliver big benefits.

The sheer volume of content being thrust upon us today means we are even more selective about what we choose to read. Focusing on what a product is and how it does what it does is just not enough to cut through the noise; content needs to be relatable to the reader. And who are the readers? First and foremost, people! Bringing in a human element – looking at the people behind the story or the people who will directly benefit – is what helps make content relevant to us and, more importantly, stand out.

This approach can be taken too far and balancing commercial and human interest is a skill. To do this, we need to go back to the fundamentals of marketing. When we develop a marketing strategy, we must keep asking: so what? Yes, you have this all-singing, all-dancing product or service, but ... so what? What is this going to do for me? For my business? How are you improving my life? And, in this instance, my work life specifically? But knowing this is just the first step.

Having determined the 'so what', how do we deliver this message? We should not limit ourselves to the written word. There are some excellent examples within maritime marketing of content-rich articles being delivered in new and creative ways but truly ground-breaking communications are few and far between.

Let's look at social media as an example. Cited in an article in the Chartered Institute of Public Relations (CIPR) publication *Influence Online*, the use of social platforms and the creation of content, notably video, are both up year-on-year. New video-sharing social media platform TikTok is driving user engagement with its fresh and entertaining content that isn't focused on a hard sell. Growing focus on video means that such platforms will continue to grow in popularity, especially among young users. Could this type of user engagement drive brand reputation or even sales?

Many brands are leaping on to the video social media bandwagon. Not just because it is popular,

but because video is arguably one of the best forms of media for making an emotional connection, given its ability to convey the authentic human experience. But where is the maritime market when it comes to generating marketing video content, let alone using video-sharing social media platforms to engage with the seafarers and maritime leaders of tomorrow?

The maritime industry has convinced itself that it is traditional, old fashioned and different from other industries, and that well-established marketing rules or trends do not apply. Not true. Just like consumer-focused brands and even other b2b industries, our customers are people. Why is the maritime sector stuck in a marketing time-warp?

We must progress from the mindset that marketing – including communications and PR – is all about sales and that an activity should have a direct, instant impact on a transaction. The overload of content and the scepticism towards traditional advertising and marketing means a new approach is needed. Such methods still have a place, but they need to evolve. Indeed, they are adapting and the maritime industry need to keep up. If your business is doing this already then you have an advantage over your competitors from which you will reap benefits.

Returning to my original point about the gap within maritime communications: we are not making human connections with our content and are assuming that, because it is work related, we need not process it in the same way. There may be some truth in this – the old ways of direct selling through friendship networks and one-to-one meetings may not be as prevalent as they once were – but decisions will always be influenced by emotions to some degree.

We need to make those emotional connections through our marketing efforts. Content is king and if we consider our audience fully, as people, in the use of our language, tone, message and the delivery, we can bridge that gap.

Could we even become innovators in the world of marketing?

# Listen to the sea



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# Global collaboration is the key to building better engines



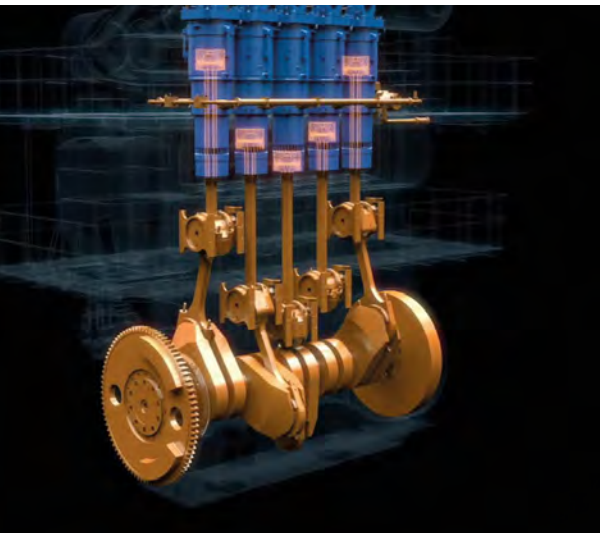
**By Monika Damani**  
Head of manufacturing engineering  
and supply management  
WinGD

Shipowners are faced with a growing number of increasingly challenging regulations. Combined with uncertainty both in the global economic outlook and the shipping market, it is clear that whole-vessel efficiency – in capital cost, as well as operational outlay and environmental performance – is more important than ever. For engine makers, the journey to optimum efficiency is no longer confined to engine output but it is a critical consideration in all aspects of production.

As engine designers we put great focus on how to make engines as fuel-efficient as possible but we also carefully consider their cost. In our continuous efforts to reduce the costs for our customers we are supporting cost-down projects across the board. Through consistent and constructive dialogue with engine builders and suppliers, we have been able to identify where savings can be made.

For example, we have been able to cut the number of materials used on our new Generation





X-engines by approx. 70% compared to RT-Flex engines, resulting in a considerable production cost reduction. In order to help grow market share we also focused our energy during 2019 on manufacturing efficiencies, introducing a new strategic programme with ambitious targets to optimise total product cost for existing and future products.

Our two-stroke engines have been and continue to be developed and designed in Winterthur, Switzerland for over a century. But the last commercial engine to be built in Winterthur left the works in 1986 and since then, all our two-stroke engines are built in Asia, closer to the shipyards. Over the past 30 years there has also been a shift in engine technology from mechanical to electronic controls which has dramatically increased the complexity of the systems and components required.

Many engine components – notably electronics – have traditionally been sourced in Europe, but over time companies closer to the engine builders have developed the specialist engineering and technology capabilities required to produce these components locally. To cut the cost of components further, we are working closely with partners in China, South Korea and Japan to shift their supply and development to highly-skilled vendors within the region.

We are also looking beyond construction and



materials and are working hard to collaborate with engine builders and suppliers to optimise costs for testing and inspection requirements taking into account the latest International Association of Classification Societies rules while still ensuring the highest standards of quality, safety and sustainability.

### **Digital operation and design**

The future of engine technology will be strongly influenced by digitalisation, not only in how engines are operated but also how they are designed. All our engines ordered since 2018 have been fitted with data collection monitoring hardware that provides exceptional insight into the function and performance of engine systems and components. These insights assist ship operators but also allow us to improve the design of future engines, helping identify possible enhancements of reliability, sustainability and efficiency. Moreover, our advancements in digital innovation influence all future engine design ensuring the smartest technology for our future.

Although the way engines are being designed and built is changing, we believe the key to success will remain the same: close dialogue and co-operation between all parties across the process, from the initial design phase through to development and commissioning. The result of combining new processes with existing best practice will optimise



manufacturing costs, bringing new opportunities and increased flexibility throughout our product portfolio and enabling us to offer economical, tailor-made solutions for ship owners and operators.

Our X-DF engine provides one vision of this future. Over the past two years the X-DF series has been the fastest selling dual-fuel two-stroke engine type on the market, with a total of more than 300 orders. This success has been down to its low-pressure design, unique to WinGD among low-speed engines, which makes the X-DF series very competitive on capital cost.

However, the clear market approval for low-pressure dual-fuel engines means that other designers are now also developing their own versions. The X-DF success story will only continue if we carry on building engines at a competitive cost. With the X-DF, as with our other engines, we will continue to focus on cost efficient, reliable and sustainable solutions that will help us transform from a challenger to market leader.

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Over the course of the last few decades, Shipowners and Operators have been faced with a tsunami of new regulations and at the same time have needed to make their vessels more efficient. This is a situation that is becoming more intense and shows no sign of abating. Keeping abreast of these changes and ensuring compliance places a considerable burden on hard-pressed staff, a burden that ShipInsight is aimed at reducing.





# THINKING OUTSIDE THE BOX

To succeed in today's market, you need to think differently. That's why our experts around the world think outside the box to support you from design approval to smart shipbuilding and seamlessly into operation. With a dedicated rule set, state-of-the-art digital solutions, and full service for the entire ship lifecycle, DNV GL is one of the leading classification societies. Can you afford to choose anything less?

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