

June 2019

MARITIME REPORTER AND ENGINEERING NEWS

S I N C E 1 9 3 9

THE 2019 YEARBOOK

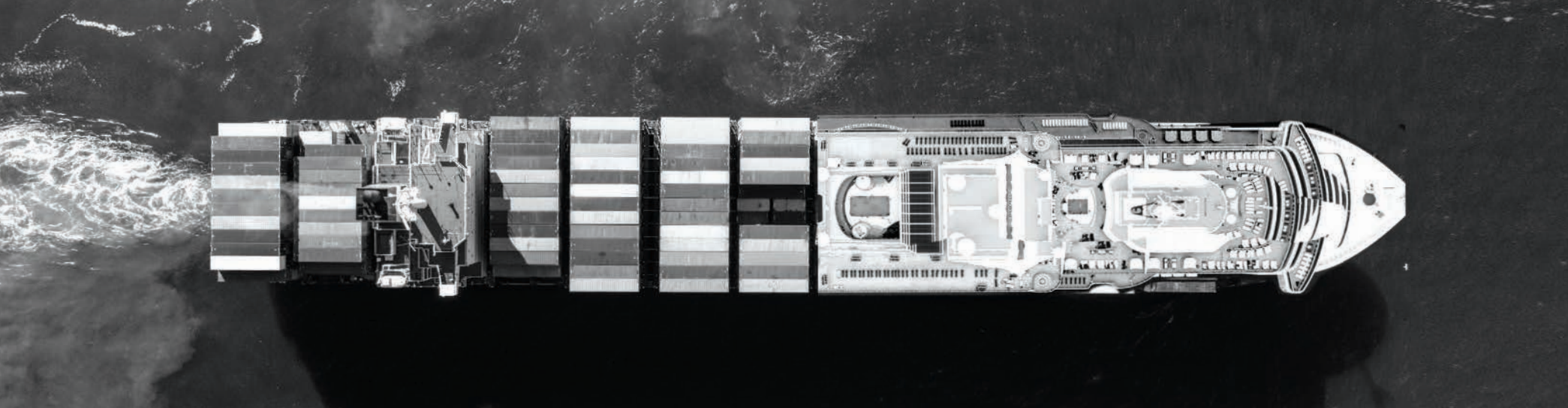
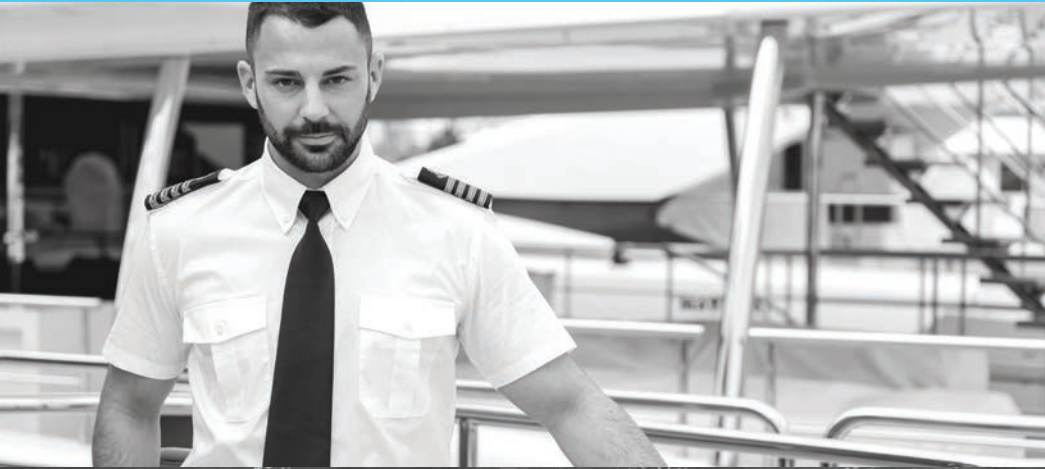
IMO2020
Cyber Security
Workboats • Bulkers
Tankers • Gas Ships
Containerships
Offshore Energy

+

MarTID 2019:
The 2nd Annual
Report on Global
Maritime Training
& Education Trends



You Move Cargo and People.
We Move Money.



Maritime Payment Solutions. Simplified.

CREW PAYMENTS



Solutions for payroll, cash to master and wire payments sent to crew member bank accounts.

CORPORATE PAYMENTS



Solutions for international transfers to pay suppliers, vendors, and agencies.

www.ShipMoneyCorporate.com
+1 954 990 5429

Glosten's depth and breadth of experience spans every sector of the marine industry.

Meet the HT-60 — the newest member of our harbor tug series. From barge handling and construction support to vessel and shipyard assist work, this versatile ASD tug can do it all.

Contact Glosten to learn more about how the HT-60 can work for you.



Glosten



Contact us at info@glosten.com

Features

Cover Image Credit:
© alexmlx/Adobe Stock



14 Cyber Security “101”

What shipowners need to know now before IMO 2021 deadline

By Captain Andrew Kinsey



16 Offshore Wind

Offshore wind should pump up the U.S. maritime market

By Joan Bondareff



42 Top 10 Shipowners

Is bigger better in the shipowning business?

By Barry Parker

46 MarTID 2019

The survey of global maritime training practices, year two

By Greg Trauthwein

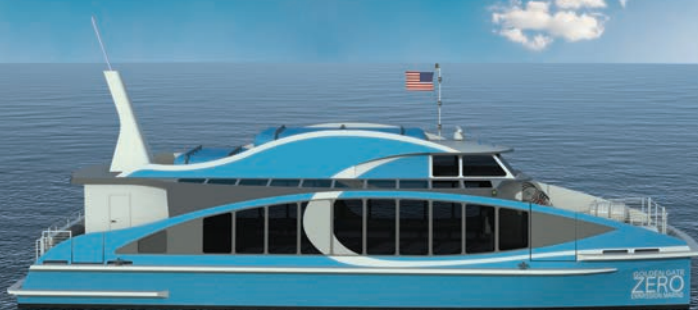


50 Hydrogen Rules

The future of hydrogen as a maritime fuel

By Joseph DiRenzo, PE

Incat Crowther





AgilePlans[®] by KVH

Global Connectivity without Commitment

“ We see the very nature and flexibility of KVH’s AgilePlans program as a great benefit to our business. ”

– Christoph Werner
Director of Marine & Quality
Zeaborn Ship Management



Global HTS Broadband
as Fast as 20 Mbps*



Rugged
VSAT Hardware



Free Shipping &
Free Installation†



Daily Print & TV News
& Training Content



Zero Maintenance
Costs



Critical Operations
Content



AgilePlans features TracPhone[®] HTS-series Systems

With a monthly, no-commitment subscription, get data speeds as fast as 20/3 Mbps* (down/up), expanded global coverage & affordable airtime plans with dual channel configuration (high-speed and unlimited).

Upgrade your fleet. Schedule a consultation today at kvh.com/getagile.

†Select ports; up to \$2000 per vessel installation credit in other ports *Data rates are rate plan maximums and may vary in different regions and under different conditions
©2019 KVH Industries, Inc. KVH, TracPhone, AgilePlans, and the unique light-colored dome with dark contrasting baseplate are registered trademarks of KVH Industries, Inc.

Authors & Contributors



Bryant



Bondareff



Bonvento



DiRenzo



Ewing



Keefe



Kinsey



Mulligan



Parker



Stoichevski

Bryant

Dennis Bryant is with Bryant's Maritime Consulting, and a regular contributor to Maritime Reporter & Engineering News.

Bondareff

Joan Bondareff is of counsel in Blank Rome's Washington, D.C., office who focuses her practice on marine transportation, environmental, regulatory, renewable energy and legislative issues.

Bonvento

Matthew Bonvento is a Maritime Safety and Regulatory Consultant, owner of Good Wind Maritime Services and an Assistant Professor of Nautical Science.

DiRenzo

Joseph DiRenzo is a technical project manager and professional engineer with close to 10 years of maritime experience in the US Coast Guard. His last tour was at the Coast Guard Research and Development Center in New London, Conn. where, among other projects, he led a feasibility study on the use of liquefied natural gas (LNG) for the Coast Guard's new fleet of Inland River Tenders.

Ewing

Tom Ewing is a freelance writer specializing in energy and environmental topics. He has been a regular contributor to Marine-

Link publications for the past two years. He has extensive experience working on legislative and public policy issues, both at the state and federal levels.

Keefe

Joseph Keefe is a 1980 (Deck) graduate of the Massachusetts Maritime Academy and lead commentator of MaritimeProfessional.com. Additionally, he is Editor of both Maritime Logistics Professional and MarineNews magazines.

Kinsey

Captain Andrew Kinsey is Senior Marine Risk Consultant at Allianz Global Corporate & Specialty.

Mulligan

Tom Mulligan is Maritime Reporter's science and technology writer based in Ireland. Mulligan earned a Master Degree in Industrial Chemistry from the University of Limerick in 1986.

Parker

Barry Parker, bdp1 Consulting Ltd provides strategic and tactical support, including analytics and communications, to businesses across the maritime spectrum.

Stoichevski

William Stoichevski is MR's correspondent in Norway.

**MARITIME
REPORTER
AND
ENGINEERING NEWS**

MARINELINK.COM

ISSN-0025-3448

USPS-016-750

No. 6 Vol. 81

Maritime Reporter/Engineering News (ISSN # 0025-3448) is published monthly (twelve issues) by Maritime Activity Reports, Inc., 118 East 25th St., New York, NY 10010-1062. Periodicals Postage Paid at New York, NY and additional mailing offices.

POSTMASTER: Send all UAA to CFS. NON-POSTAL AND MILITARY FACILITIES send address corrections to Maritime Reporter, 850 Montauk Hwy., #867, Bayport, NY 11705.

The publisher assumes no responsibility for any misprints or claims or actions taken by advertisers. The publisher reserves the right to refuse any advertising. Contents of the publication either in whole or part may not be produced without the express permission of the publisher. Copyright © 2019 Maritime Activity Reports, Inc.

SUBSCRIPTION INFORMATION

In U.S.:

One full year (12 issues) \$110.00;
two years (24 issues) \$190.00

Rest of the World:

One full year (12 issues) \$189.00;
two years \$228.00 (24 issues)
including postage and handling.

Email: mrcirc@marinelink.com

Web: www.marinelink.com

t: (212) 477-6700

f: (212) 254-6271

Departments

- 6 **EDITORIAL**
- 8 **TRAINING TIPS FOR SHIPS**
- 10 **INSIGHTS** Government Update
- 14 **INSIGHTS** Cyber Risk Management
- 16 **INSIGHTS** Offshore Wind
- 20 **TECH** Offshore Wave Energy
- 24 **FUEL** Benchmarking IMO 2020
- 46 **TRAINING** MarTID 2019
- 50 **TECH FILES** Marine Fuels
- 54 **TECH FILES** Marine Electronics
- 56 Buyer's Guide
- 59 Classified
- 64 Advertiser's Index



The 2019 Yearbook

- 26 **THE U.S. WORKBOAT MARKET**
- 30 **THE TANKER MARKET**
- 32 **THE CONTAINERSHIP MARKET**
- 34 **THE BULKER MARKET**
- 36 **THE GAS SHIP MARKET**
- 38 **THE OFFSHORE MARKET**
- 40 **THE PORT MARKET**
- 42 **'TOP 10' SHIPOWNERS**

46 MarTID 2019

Results from the second annual Maritime Training Insights Database (MarTID) report have been released.



Business Publications Audit
of Circulation, Inc.

THIS IS JOE CARGNELLI, CTO OF HYDROGENICS. AND HE'D LIKE TO INTRODUCE YOU TO THE WORLD'S MOST COMPACT HYDROGEN ELECTROLYZER.



Joe is feeling a strong sense of accomplishment. Our Chief Technology Officer has led a big advance in hydrogen technology. At 3 Megawatts, we have the world's most power-dense electrolyzer stack. It's a technological achievement that is capable of producing enough hydrogen to fuel over 300 fuel cell cars each and every day. And it's changing the world of grid-scale energy storage and hydrogen

fueling for a cleaner, carbon reduced environment. While our leadership comes from our technology, our success is the result of one essential ingredient – the human one. Our experts, our engineers, our researchers and our day-to-day people are focused on advancing hydrogen technology for a better, earth-friendly energy source. Learn how the human factor is changing the world at [Hydrogenics.com](https://hydrogenics.com)

HYDROGENICS

The **human** factor. The most advanced part of our technology.

Editorial

The more things change ...

Birthdays are always a good time to reflect, and as *Maritime Reporter & Engineering News* celebrates its 80th anniversary under our current ownership, I think it is appropriate, in this our Annual Yearbook edition, to look at both the evolution of the maritime industry and our titles.

What's the same? The maritime industry remains the most cost-efficient and effective means to move masses of cargo from point A to point B around the globe, and in many cases, it is the only way. While the industry often gets categorized as slow to innovate, I think that's a misconception as ingenuity in operating in the world's harshest environment is all around us.

In the case of *Maritime Reporter & Engineering News*, and in fact our entire family of print and electronic titles, our mission is unwavering: to be *your* trusted source, providing information, analysis and insight on the markets we serve, delivering information in print and in various forms electronically, how, where and when you, the reader, wants to receive it.

What has changed? Everything else!

I write this on the eve of NorShipping 2019 in Oslo, personally my 14th edition of this biennial event since starting in this post in 1992. More than 25 years ago this exhibition, and all like it, were about the equipment, the heavy machinery, the "stuff" that went into the design, build, outfit and lifecycle maintenance of ships and boats. Make no mistake, modern marine equipment is still a feature focus, but today the buzz and focus is on autonomy, sustainability, environmental footprint and the health, welfare and future of the maritime "road" ... the oceans and supporting waterways.

It is not business as usual in the global maritime sector, far from it. 'Being Green' has evolved from a marketing slogan to regulatory mandate to business imperative. Companies that are not aggressively taking a hard look at their particular market segment and envisioning the size, shape, future direction and outfit requirements of their fleets could find themselves gobbled up or out of business. To be sure, there is nothing simple or certain about decisions driving the coming generation, but decisions are to be made, nonetheless.

This goes for the marine b2b publishing sector, and when I look back at the way things were done when I joined *Maritime Reporter & Engineering News* in 1992, it seems almost comical. The staff for just this one magazine was triple in size, and the process to produce each month's edition was decidedly manual. The rapid communication mode of the time was the telephone and the fax machine, and producing each page of each edition was done via a rudimentary computing system and any army of suppliers and sub-suppliers, consuming weeks instead of hours and more overnight mailing services and fees than I care to remember.

Today our single title has evolved into a family of five print magazines, 10 websites



and a dozen eNews that delivers the information when and where you want it. We have a staff of more than 20 editors and contributors situated in key locales globally, reporting 24/7/365 on the news and topics you need to know. Our presence extends across video and social media, including our Maritime Network on LinkedIn which is the largest maritime group on that platform by a factor of two. This is not to boast but rather inform, though I surely am proud of our achievements through the years, including adding last year to our 'family' with the addition of AtCo-media and the relaunch of its flagship title, *Offshore Engineer*.

While I physically have only been here for 35% of our history, I can say in earnest that none of this would have been possible without you, our loyal readers, advertisers and friends. We are grateful for your interest and support, we welcome your praise and constructive criticism, and we look forward to serving you for many years to come.

Gregory R. Trauthwein
Editor & Associate Publisher
trauthwein@marinelink.com

**MARITIME
REPORTER
AND
ENGINEERING NEWS**

MARINELINK.COM

HO
118 E. 25th St., 2nd Floor
New York, NY 10010 USA
Tel +1 212 477 6700
Fax +1 212 254 6271
www.marinelink.com

FL Office
215 NW 3rd St
Boynton Beach, FL 33435-4009
Tel +1 561 732 4368
Fax +1 561 732 6984

Publisher
John C. O'Malley
jomalley@marinelink.com

Associate Publisher/Editorial Director
Greg Trauthwein trauthwein@marinelink.com

Vice President, Sales
Rob Howard howard@marinelink.com

Web Contributor
Michelle Howard mhoward@marinelink.com

Editorial Contributors
Tom Mulligan - UK
Lisa Overing - Florida
Claudio Paschoa - Brazil
Peter Pospiech - Germany
William Stoichevski - Scandinavia

Production
Irina Vasilets vasilets@marinelink.com
Nicole Ventimiglia nicole@marinelink.com

Corporate Staff
Mark O'Malley, Marketing Manager
Esther Rothenberger, Accounting

Information Technology
Vladimir Bibik

Subscription
Kathleen Hickey k.hickey@marinelink.com

Sales
Lucia Annunziata annunziata@marinelink.com
+1 212 477 6700 ext 6240

Terry Breese breese@marinelink.com
+1 561 732 1185

John Cagni cagni@marinelink.com
+1 631-472-2715

Frank Covella covella@marinelink.com
+1 561 732 1659

Mitch Engel engel@marinelink.com
+1 561 732 0312

Mike Kozlowski kozlowski@marinelink.com
+1 561 733 2477

**International Sales
Scandinavia & Germany**
Roland Persson
Orn Marketing AB, Box 184, S-271 24
Ystad, Sweden
t: +46 411-184 00
roland@orn.nu

Germany
Brenda Homewood
Tel: +44 1622 297123
brenda@offshore-engineer.com

United Kingdom
Paul Barrett
Hallmark House, 25 Downham Road, Ramsden
Health, Essex CM11 1PU UK
t: +44 1268 711560
m: +44 7778 357722
ieaco@aol.com

Classified Sales +1 212 477 6700

Founder:
John J. O'Malley 1905 - 1980
Charles P. O'Malley 1928 - 2000
John E. O'Malley 1930 - 2019

Watch us



Download our Apps



Follow us on Social Media



@ShipNews



Check out our websites:

MarineLink.com
MaritimeProfessional.com
MaritimePropulsion.com
MaritimeJobs.com
MarineTechnologyNews.com
MaritimeEquipment.com

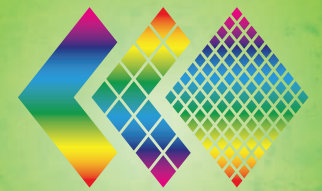
MarineElectronics.com
OEDigital.com
YachtingJournal.com
MaritimeToday.com
TheMaritimeNetwork.com

SIMPLE ISN'T ALWAYS EASY...

BUT FURUNO RADARS ARE A SIMPLE CHOICE

Your objective is simple...Deliver your vessel and its contents safely and on time. While it might sound simple, we know it's not easy!

Whether you're navigating the open ocean, busy harbors, or through congested inland waterways, being aware of your surroundings is paramount. Your number one line of defense is a Radar you can rely on, from a company you can depend on. Furuno's award winning Radar technology is built to perform and withstand the harshest environments, keeping you, your crew and your precious cargo safe. With unique application features like ACE (Automatic Clutter Elimination), Target Analyzer, and Fast Target Tracking, Furuno Radars will help make that simple objective easier to achieve.



UHD
Ultra High Definition Radar



FAR22x8BB Series

FAR19x8VBB Series

FAR15x8 Series

FURUNO
www.furunousa.com



Murray Goldberg is CEO of Marine Learning Systems which provides software and services to optimize knowledge, skills and behavior in maritime operators. In his former life he was a computer science faculty member at the University of BC researching online learning and assessment delivery models and their effectiveness. This led to him develop WebCT, a learning management system that was used by 14 million students in 80 countries.

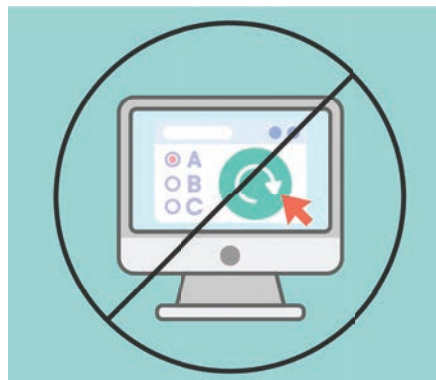
Training Tips for Ships

*Tip #1. Immediate exam retakes should **never** be allowed.*

It is very common practice, especially in eLearning environments, to allow trainees to immediately retake an exam they just failed. Worse, sometimes training is set up to allow the trainee to take the exam repeatedly until they pass.

Never do this. It will ensure that your learners are not learning what you want them to learn.

For most people, this raises two im-



mediate questions. First, why not allow immediate retakes? And second, what shall we do instead?

To answer these two questions, it is important to understand that for any non-trivial training program, exams can never be comprehensive assessments of what a trainee knows. Instead, we test only a subset of items to avoid an impossibly long exam. If the trainee does well on those items, then it is likely the case

that they have a similar level of knowledge for those questions we did not ask. This is completely sound logic only if (and this is a really important “only if”) trainees don’t have prior knowledge of what is going to be on the exam. If the trainee knows what will be covered on the exam, they will only study enough to learn the answers to those specific questions and ignore the rest. Without prior knowledge of the exam questions, the

Lessons Learned: Merchant Marine & the Navy

By Matthew Bonvento

The U.S. Navy has received a lot of bad press for the lack of knowledge in to the Navigation Rules and the ordinary practice of good seamanship. The Navy can learn a lot from how we train Merchant Mariners, and despite the recent mishaps, we cannot overlook the fact that there is much that can be learned from how the U.S. Navy trains its officers and crew.

I had the opportunity to speak with John Kinkela, experienced waterjet handler and instructor. The USN has a fantastic program training its officers in the finer points of handling high speed vessels with waterjet propulsion at the Naval Surface Warfare Officer School, Littoral Combat Ship OOD class. On the surface, that does not sound like much. But the reality is that any traditional ship handler will rapidly humble themselves upon the realization that everything they ever learned about ship handling does not apply when utilizing a water jet propulsion

system. Kinkela, is fond of saying, “It is easier to train a poor ship-handler water jet theory as they have less habits to break.” This may seem counterintuitive, but the way that waterjet vessels operate is so drastically different from traditional seagoing vessels that our mindset must change. For the curious ship-handler, according to Kinkela, “The key concept to understand is the relationship between the Pivot Point (PP) and the intersection of the ahead/astern vector angles, defined as the Intersection Point (IP). The PP is said to be at the geographic center of the water plane for a ship at rest. The IP is imagined as the spot where extensions of the jet vectors cross, irrespective of the vector direction. The IP is also imagined to be where the resultant vector (sum of the ahead vector and the astern vector) acts on the ship. (In reality all of the force from the jets is imparted in to the hull at the transom where the jets are mounted.) When the IP is at or very near to the PP walking is

possible. As the IP moves away from the PP a lever arm develops. The length of this lever arm combined with the direction and strength of the resultant vector will cause the ship to start rotating as it is walking. Eventually the lever arm is at a length where walking is no longer possible, from there the ship will twist at an increasing rate until maximum steering angle is reached. Matching the length of the two vectors is key to maintaining an even lateral walk. While keeping the vectors matched will cause an even walk increasing the length of these vectors together will cause increased lateral speed. Varying the length of the ahead vector will control motion in line with the ship. An ahead vector longer than the astern will cause headway, conversely an ahead vector shorter than the astern will cause sternway.”

At the LCS training school, prospective LCS officers are taken on a six week training program which begins what with what many of us take for granted,

undocking. Hours are spent undocking the simulated vessel with the goal of demonstrating the use of the maneuvering lever applied through the stern waterjets and forward azipod.

One of the fundamental lessons taught is that of constant communication bridge team management, and awareness of what your partner is occupied with. Water jet vessels operate on a two person navigation team, much like the airline industry. In both industries it is imperative that at least one person has eyes out the window at all times. On a vessel travelling at speeds of up to 40 knots, distances can close quickly and if no one is looking out the window, so can collisions. The rate of closure with an object can be to the tune of approximately 2/3 of a mile travelled per minute, leaving not much time for error.

Travelling at these speeds, bridge teams are required to sit in seats and even harness themselves in. The navigation systems on these vessels are mounted as

trainee is forced to study all the material equally thoroughly in order to be able to pass the exam, regardless of which material it covers. Assessments exist not only to assess knowledge, but also, perhaps even more importantly, to motivate comprehensive learning.

So, why must we never allow immediate exam retakes? If an assessment is configured to allow learners to take an exam over and over until they pass, we have allowed them to gain knowledge of what is on the exam through repeated retakes. After four or five failed exam attempts the trainee will have learned enough about the exam to pass it without having to comprehensively study the material, even if the questions are randomized. Analysis of existing systems set up this way shows that it is not uncommon for the average trainee to write an online exam five or more times before they pass. Some of the most enterprising (though misguided) trainees write exams 30 or more times before passing. The ability to repeatedly retake exams disincentivizes studying. While they are eventually passing the exam, these people are absolutely not learning the course material well.

Now onto “what do we do instead”? The answer is to return to an assess-

ment configuration that motivates learning. There are many ways to do this but one of the simplest is to enforce a waiting period between exam retakes. That is, configure your LMS such that when someone fails an exam, they cannot take that exam again for a day or two. This solves the problem by turning exam at-

tempts into a scarce resource that must be used wisely by the trainee. It incentivizes studying and greatly reduces the opportunity to “learn to the exam”. Knowing there is a waiting period encourages them to study the material to some degree before their first attempt. Then, if they do fail, the wait will be best

spent doing further studying so as not to squander another scarce exam-writing opportunity.

Simply said, it will make comprehensive studying their preferable option and the path of least resistance, which is exactly the goal of a sound assessment methodology.

to be controlled from the chair. According to Kinkela, the stress of standing and bracing oneself for even a brief period of time during a high speed transit is enough to exhaust someone in great physical shape. Sitting allows great control over the computer and reduces the level of distraction since the navigator is not concentrating on remaining on their feet.

Just like with the airline industry the pilot and the co-pilot will alert the other when their eyes must look at an instrument. This level of communication and situational awareness is not practiced normally on board the average vessel. This level of bridge communications applies to even larger, slower ships, which still generate significant momentum.

Increasingly, police vessels, patrol craft, high speed ferries and other types of vessels are using lightweight composites or aluminum in their construction. That trend points to an increasing ability to use water jets as a means propulsion. Although as the maritime community has the High Speed Vessel Code for guidance, we will need more in the way of training. This will necessitate a need for mariners with experience to conduct the training. This may be when we begin to ask the Navy for expertise.

Chevron

Taro® Ultra cylinder oils

join the performance team

2020 lubrication solutions

**Taro®
Ultra 25**

**Taro®
Ultra 40**

**Taro®
Ultra 70**

**Taro®
Ultra 100**

**Taro®
Ultra 140**

Choose Taro® Ultra and join a high-performance team of regulation-ready solutions, backed by an expert family of experienced specialists and collaborating Chevron businesses — always learning, always sharing, always improving.

chevronmarineproducts.com

© 2019 Chevron U.S.A. Inc. All rights reserved. All trademarks are the property of Chevron Intellectual Property LLC.


Dennis L. Bryant

Dennis Bryant is with Bryant's Maritime Consulting, and a regular contributor to Maritime Reporter & Engineering News as well as online at MaritimeLogisticsProfessional.com. dennis.l.bryant@gmail.com

Measles & Quarantine

Measles is a highly contagious infectious disease. It is so contagious that 90% of non-immune persons will become infected if an infected person is in the immediate vicinity. It is an airborne disease spread through coughs, sneezes, and contact with saliva or nasal secretions. The virus can live for up to two hours in infected airspace or on infected surfaces. Individuals are infectious from four days before symptoms appear until four days after the patient is symptom-free. Symptoms include fever, cough, runny nose, inflamed eyes, and a red, flat rash. Complications may include diarrhea, middle ear infection, and pneumonia. Measles may be fatal to persons with compromised immune symptoms.

Measles vaccine is highly effective at preventing the disease. Modern vaccine provides lifetime immunity in the vast majority of cases. Individuals who received an older vaccine and persons planning international travel should consider getting a booster shot.

The disease is still prevalent in lesser developed parts of Asia and Africa. Recent outbreaks of measles also have been reported in Brazil, Israel, Japan, the Philippines, and Ukraine, as well as some localities in the United States.

Recently, a cruise ship was quarantined in Saint Lucia after a crew member was diagnosed with measles. The ship soon transited to its homeport of Curaçao, where it was again placed under quarantine for a period of time until those who had not been vaccinated were shown to be symptom-free.

Because commercial vessels tend to have crew members from a variety of nations and the crew members rotate regularly, such vessels are at an increased,



© pomogayev/Adobe Stock

albeit low, likelihood of having someone on board who is infected with measles. The likelihood is further increased on passenger ships, which have a rapid turnover of numerous persons on board. These persons may board the ship in an infectious condition, but currently exhibiting no symptoms.

Quarantine

The concept of quarantine lies at the

juncture of medicine, law, and public safety. When these concepts intersect with the maritime community, things quickly get both interesting and complicated.

Quarantine, as well as isolation, has been invoked in cases of communicable diseases throughout human history. Special treatment of lepers is mentioned in the Bible. During the Middle Ages, the Venetians required ships arriving from

suspect areas to anchor out of port for 40 days, based on the assumption that any disease on board would run its course during that time. Modern quarantine and isolation are more sophisticated, but only slightly. The outbreak of severe acute respiratory syndrome (SARS) in 2002 revealed the difficulty of instituting efficient and effective quarantine and isolation protocols in an interconnected world village. Ebola, with its isolated occurrence in the United States and Western Europe, provoked fresh reactions. Other illnesses, such as avian flu and Middle East respiratory syndrome (MERS), presented their own challenges. Now measles must be added to the mix.

United States approach

In the United States, quarantine and isolation are generally matters for state and local health authorities and law enforcement agencies. Only when the problems involve interstate and international movement and exceed the ability of local control do the federal authorities normally step in.

At the federal level, quarantine and isolation are primarily the responsibility of the Centers for Disease Control and Prevention (CDC). The CDC is empowered to detain, medically examine, or conditionally release individuals reasonably believed to be carrying a communicable disease. The list of quarantinable diseases is established by a 2003 Executive Order, which was amended in 2005 to include "influenza caused by novel or reemergent influenza viruses that are causing, or have the potential to cause, a pandemic" and in 2014 to redefine severe acute respiratory syndromes.

In recent years, the quarantine and isolation regulations have been amend-



Series 9100 Digital Communication System installed on Multi-Mission Interceptor (MMI) from SAFE Boats International



Rob Goley - Coast Guard veteran and currently Business Development Director for Federal Programs, SAFE Boats International

The David Clark Series 9100 Digital Marine Communication System

“Operators require comfortable equipment when they are underway...missions are long, with many hours on the boat. The David Clark [digital communication] system is comfortable, reliable and it works...and it's easy to use. That's critical for our operators that are out using this equipment.”

-Rob Goley

The Series 9100 Digital Communication System is ideal for crew members on board patrol and interdiction/interception craft, workboats, off-shore service vessels, tug and salvage boats, fire/rescue boats and more.

For more information visit www.davidclark.com or call **800-900-3434** to **arrange a system demonstration**.

View Video



Scalability



Versatility



Simplicity



David
Clark

WWW.DAVIDCLARK.COM



An Employee Owned
American Company

ed several times. The changes, among other things, make it easier for the CDC to require a ship clearing or departing a foreign port bound for the United States to obtain a bill of health from the US consular officer for that port setting forth the sanitary history of the vessel. The CDC can also suspend, in whole or in part, entries and imports from designated foreign countries or places.

This would be done when the CDC Director determines that the risk of introduction of a disease into the United States is increased by the introduction of persons or property from such foreign

countries or places.

Operators of ships on international voyages are required to report deaths or illnesses prior to arrival. Operators are required to report not just persons on board with a designated communicable disease, but persons defined as ill, meaning a person who: (1) has a temperature of 100.4°F (38°C) or greater accompanied by one or more of the following: rash, swelling of lymph nodes or glands, headache with neck stiffness, or changes in level of consciousness or cognitive function; (2) has a temperature of 100.4°F (38°C) or greater that has per-

sisted for at least 48 hours; (3) has more than common diarrhea; (4) has severe bleeding, jaundice, or severe persistent cough accompanied by bloody sputum, respiratory distress, or a temperature of 100.4°F (38°C) or greater; or (5) displays other symptoms or factors that are suggestive of communicable disease. As demonstrated in the recent situations in Saint Lucia and Curaçao, local health authorities are ready to impose quarantine in appropriate circumstances.

Inspections and sanitary measures of arriving vessels may be directed if there is evidence that the ship or something on

board is or may be contaminated with a communicable disease.

The ship may be detained until satisfactory sanitary measures have been completed. The owner of the ship normally would bear any expenses relating to sanitary measures and detention. In the case of animals, articles, or things on board the ship, any expenses relating to detention would be borne by the owner thereof.

The CDC may conduct screenings of arrivals to detect the presence of ill persons. Any person reasonably believed to be infected with or exposed to a quar-



Curt Cultice

Curt Cultice, U.S. Commercial Service, U.S. Department of Commerce

Export Licensing Tips

Some Items U.S. Exporters Shouldn't Overlook; Export Control Lists Include Key Marine Tech Categories

Each year, the U.S. Department of Commerce receives thousands of inquiries from businesses looking to export, many of which involve licensing questions. The Commerce Department's Bureau of Industry and Security (BIS), together with other USG agencies, is responsible for export licensing and controls. BIS export licenses may be required for items (commodities, software, or technology) with proliferation, military, or terrorist uses, or which warrant control for other reasons. Export licensing requirements can apply to a wide array

of products, including marine technologies. A license may also be required because of the end use or end user. Items not licensed by BIS may still require a license from other agencies, including the State Department for defense articles and services subject to the International Traffic in Arms Regulations which are listed on the United States Munitions List (USML). When it comes to determining whether your export might need a license, there are a few sometimes overlooked aspects that U.S. businesses should be aware of before they export. After reading, go to our video web page

to find out more about export licensing.

- **Don't make any assumptions.** For example, just because you are exporting a small amount of a commodity, sending it to a friendly country or e-mailing software doesn't mean you shouldn't check to see if an export license is needed. Screen all the parties to your transaction.
- **Review the control lists carefully.** The USML and the BIS-administered Commerce Control List (CCL) include not only complete systems and key parts and components, but also raw materials,

production equipment, and other related items. For marine technology exporters, key entries can be found in USML categories VI (surface vessels of war), XI (underwater electronics and acoustic systems), XII (optical and inertial sensors) and XX (submersible vessels); and CCL categories 5 (telecommunications), 6 (acoustic sensors), 7 (inertial sensors and navigation), and 8 (marine).

- **Different levels of technology can affect where you can export.** The level of a product's technology and market destination can be important factors as

antinable disease may be provisionally quarantined.

If evidence (such as diagnostic tests) indicates that an arrival is infected with or has been exposed to a quarantinable disease, the CDC may issue a quarantine order to that person. A person for whom a quarantine order has been served may not be required to undergo medical treatment, but may be subject to movement restrictions throughout the period of incubation and communicability of the disease.

Persons violating the quarantine laws and regulations would be subject to a

fine of up to \$250,000 or one year in jail or both. Violations by organizations could result in a criminal fine of up to \$500,000.

Port state measures

Various port state administrations, including the US Coast Guard, have adopted measures intended to reduce the risk of introduction of communicable diseases via maritime vectors. The Coast Guard considers an ill person on board an arriving vessel displaying symptoms of a serious disease such as ebola (and possibly measles) to constitute a report-

able hazardous condition. The agency also monitors advance notices of arrival to determine if a vessel has visited a CDC-designated country within the previous five port calls. Other port administrations, including France, the Netherlands, Singapore, Spain, and the United Kingdom, have adopted similar measures.

Summary

The real penalty regarding communicable diseases is not government-imposed financial sanctions but the potential disruption in maritime trade. Many

ships could be without cargoes (and possibly crews, support personnel, and bunkers).

Ships could end up delayed in departure ports because the arrival ports are not accepting ships therefrom. Alternatively, the ship could be required to anchor out for an extended period awaiting clearance – recalling the ancient quaranta giorni or 40 day delay imposed by Venice. All of this would add fresh meaning to the concept of “restraint of princes.” The onus is on crewing procedures and masters to minimize the likelihood of a serious communicable disease onboard.

to whether an export license might be needed. For example, BIS authorized one U.S. exporter of high-end infrared technology to sell a certain level of its technology to Country A, but denied the company’s request for a license to export the same level of technology to Country B. The company received authorization to export a less technologically sophisticated product to Country B instead.

- **Be aware of “deemed” export licensing requirements.** Transferring technology to a foreign person in the U.S. is just like exporting to a foreign country. If an export license is required to export that technology to a specific country, a license requirement will also apply to transfer the technology to a citizen of that country while that person is in the United States. Persons with U.S. permanent residence, and persons granted status as “protected individuals” are exempt from the “deemed” export rules.

- **Don’t forget about re-exports.** For U.S.-origin items, U.S. export regulations extend beyond the initial export out of the United States. A re-export of a U.S.-origin item from one foreign destination to another, including use aboard a vessel in multiple territorial waters, can also trigger a license requirement. Such scenarios can be built into an export license, so when applying for export licenses, remember to keep the larger picture in mind, rather than only the initial export.

- **Protect your items against transfer and transshipment.** Foreign buyers are not allowed to resell a controlled item without prior authorization, so protect your company by filling out the destination control statement on your commercial invoice. This legal statement signifies the exports are destined to the end-user indicated in all the shipping documents, and cannot be transferred or

transshipped by the foreign buyer without permission from the U.S. government agency with jurisdiction over the licensed item. If you find out that the item has been resold, you should report that fact to the U.S. government agency with jurisdiction over the item.

- **Be aware of criteria for transactions agreed upon under the Incoterm “Ex Works.”** Under Ex Works, the foreign buyer only becomes responsible for determining licensing requirements and obtaining any required licenses when a specific writing has been obtained first by the U.S. seller from the foreign buyer stating they (the foreign buyer) assume this responsibility. Keep in mind that simply stating the sale is being completed under “Ex Works” does not comply with this requirement. See Section 758.3(b) of the Export Administration Regulations for more details on this requirement.

- **Remember that help is available.** BIS has counseling desks, located in Washington, DC and California, which are staffed Monday through Friday during business hours by BIS personnel. The Desks’ contact information is as follows:

Washington, DC: (202) 482-4811

Irvine, CA: (949) 660-0144

Santa Clara, CA: (408) 998-8806

You can also email your question to ECDOEXS@bis.doc.gov

Does your U.S. product or service require an export license? Learn more about the export licensing process by viewing our export regulations video and web page which links to the Bureau of Industry and Security, U.S. Commercial Service worldwide network of export assistance, and other key resources.



Captain Andrew Kinsey

Captain Andrew Kinsey, Senior Marine Risk Consultant, Allianz Global Corporate & Specialty

Cyber Risk Management:

What Maritime Professionals Need to Know Before the IMO 2021 Deadline

The IMO January 2021 deadline for shipping interests to incorporate cyber risk management into their existing Safety Management Systems is fast approaching. It is critical that stakeholders understand their vulnerabilities. The IMO has issued MSC-FAL.1/Circ.3 guidelines on maritime cyber risk management that does a good job of outlining the many vulnerable systems within marine operations, including:

1. **Bridge systems**
2. **Cargo handling and management systems**
3. **Propulsion and machinery management and power control systems**
4. **Access control systems**
5. **Passenger servicing and management systems**
6. **Passenger facing public networks**
7. **Administrative and crew welfare systems, and ...**
8. **Communication systems.**

The IMO Guidelines also raise an important point on understanding the distinction between information technology (IT) and operational technology system (OT). In short, IT focuses on the use of data as information while OT focuses on the use of data to control or monitor physical processes. These distinctions become important when it comes time to conduct a risk assessment of your operations.

Risk assessments should be the first

I often tell my clients that **cyber security is a race without a finish.** The IMO has given the maritime industry a deadline to get their cyber risk practices in order by January 2021. It is clear that the work will not end there.



© pickup/Adobe Stock

step when examining your company, terminal or vessel's cyber exposure. All parts of your business that are controlled or supported by computer systems need to be identified, and there are likely more than you realize.

The United States Coast Guard has very good guidance on how to start understanding and identifying your cybersecurity exposure (<https://homeport.uscg.mil>). This guidance includes information from the Department of Homeland Security's Industrial Control Systems Cyber Emergency Response Team (ICSCERT), which provides a wide range of information, tools, and services that can help companies assess their security, identify recommended practices, and improve their cyber security. (<http://ics-cert.us-cert.gov/>)

This brings up a very important point regarding cyber and the maritime environment. Often we are faced with unique risks in the maritime field, and while the cyber threat at sea does have some unique characteristics, most threats are the same as those faced by shore-side

enterprises. The cyber threat does not care if you are in port or at sea. As long as you are connected to the internet, you are at risk. The Department on Homeland Security has numerous cyber tips and resources to help you educate your crews and shore-side support staff. This includes the Stop. Think. Connect. Campaign. Simple information such as this should be included as a regular part of onboard crew training.

A more comprehensive program has been developed by the National Cybersecurity and Communications Integration Center Industrial Control Systems (NCCIC). Its industrial controls system (ICS) team has developed guidance to assist owners in preparing their business, and networks, to handle and analyze a cyber incident. (https://ics-cert.us-cert.gov/sites/default/files/FactSheets/NCCIC%20ICS_FactSheet_Cyber_Incident_Analysis_S508C.pdf) Guidance such as this should be incorporated in the Cyber Risk Management sections of Safety Management Systems as required by the IMO.

Preparations to prevent or minimize a cyber incident are your first line of defense, however, companies still need to have a response plan in place that outlines how to respond when a cyber incident occurs. An important part of this plan is to work with your insurance broker and underwriters to understand how to properly manage your risk with adequate insurance coverage.

The key here is to identify what is and is not presently covered. The big unknowns are so-called "silent" cyber exposures in most traditional insurance policies, which were designed when cyber was not yet a major risk and do not explicitly consider it. This can create uncertainty for businesses, brokers and insurers about which loss scenarios are covered. Group-wide, Allianz is reviewing cyber risks in property and casualty (P/C) policies in its commercial, corporate and specialty insurance segments and has developed a new underwriting strategy to address "silent" cyber exposures, ensuring that all P/C policies will be updated and clarified in regard to cyber risks. We want to remove the uncertainty of coverage for our business customers. I often tell my clients that cyber security is a race without a finish. The IMO has given the maritime industry a deadline to get their cyber risk practices in order by January 2021. It is clear that the work will not end there. Cyber threats will continue to evolve in frequency and severity as we become more reliant on the technology. The Technology will be a positive for both increasing vessel safety and reducing risk, however, it requires staying vigilant for new and emerging threats. This vigilance is essential for the future of the industry because complacency is not an option.

Naval Dome CEO

“A Maritime Disaster Waiting to Happen”

Since the founding in 2016, Naval Dome and its Endpoint cyber defense system has helped to protect merchant ships and yachts from cyber-attack. In 2019, it optimized Endpoint with a “Dashboard” app, providing maritime users with a clear picture of the cyber status of all critical systems onboard the ship, designed to allow users to quickly determine which systems are protected and those that are susceptible to unauthorized penetration.

“The maritime industry is just not prepared for terrorists to use ships in the same way that they were able to infiltrate the civil aviation sector,” said Itai Sela, Naval Dome’s CEO. “As a \$4 trillion industry responsible for transporting 80% of the world’s energy, commodities and goods, any activity that disrupts global trade will have far reaching consequences.” There have already been well documented incidents where shipping companies have been hacked but it is less known that the navigational equipment aboard a fleet of 15 tankers has also been hacked. Once ship systems have been infected, it’s open season for the criminal/activist terrorist, with everything from navigational systems to machinery systems at their disposal.

“Cruises hips are an especially attractive target,” said Sela. “We have already seen the global response to the Viking Sky’s engine failure, which resulted in complete loss of power and the ship drifting in harsh Norwegian seas. While I am not suggesting in anyway that this was a cyber event, imagine the consequences and the global response if it was.”

Naval Dome has demonstrated the maritime industry’s nightmare security scenario with a series of cyber penetration tests on systems in common use aboard tankers, containerships and cruise ships, test results which revealed with startling simplicity the ease with which terrorists can access and override ship critical systems.

While the test ships and their systems were not in any danger, Naval Dome was able to shift the vessel’s reported position and mislead the radar display. Another attack resulted in machinery being disabled, signals to fuel and ballast pumps being overridden and steering gear controls manipulated.

Commenting on the first wave of pen-



etration tests, on the ship’s Electronic Chart Display and Information System (ECDIS), Asaf Shefi, Naval Dome’s CTO, the former Head of the Israeli Naval C4I and Cyber Defense Unit, said “We designed the attack to alter the vessel’s position at a critical point during an intended voyage, during night-time passage through a narrow canal. During the attack, the system’s display looked normal, but it was deceiving the Officer of the Watch. The actual situation was completely different to the one on screen.”

According to Shefi, the Naval Dome

hack was able to alter draft/water depth details in line with the spurious position data displayed on screen. In a second wave, the test ship’s radar was hit. While the radar is widely considered an impregnable, standalone system, Naval Dome’s team used the local Ethernet Switch Interface – which connects the radar to the ECDIS, Bridge Alert System and Voyage Data Recorder – to hack the system. “As manufacturers themselves can be targeted, when they take control of onboard computers to carry out diagnostics or perform software upgrades,

“The maritime industry is just not prepared for terrorists to use ships in the same way that they were able to infiltrate the civil aviation sector.”

Itai Sela, CEO, Naval Dome

they can inadvertently open the gate to a cyber-attack and infect other PC-based systems onboard the ship. Our solution prevents this from happening.”

One company that has been quick to respond to the threat is bridge systems supplier Totem Plus. Under an agreement inked in February, Naval Dome licensed the OEM to integrate its software with their hard drives across several hundred systems in the Totem Plus portfolio. The arrangement provides cyber protection at the system build stage, prior to shipment to end-users.

ABS Advanced Solutions

**DON'T BE A TARGET.
KNOW YOUR CYBER RISK.**

Visit us at:
www.eagle.org/cybersecurity

**SAFETY LEADERSHIP
DRIVING SUSTAINABILITY**



Joan Bondareff is of counsel in Blank Rome's Washington, D.C., office who focuses her practice on marine transportation, environmental, regulatory, renewable energy, and legislative issues. She currently serves as Chair of the Virginia Offshore Wind Development Authority (VOWDA), an appointment by Virginia Governors Terry McAuliffe and Ralph Northam, where she promotes offshore wind and renewable energy for the Commonwealth of Virginia.

Favorable Winds for Maritime

Offshore Wind Off the Atlantic Could Be Good for Maritime Interests

Now that the United States finally can envision steady winds blowing from the Atlantic Seaboard due to a pipeline of offshore wind farms on the horizon, the maritime industry can finally step up and earn some of the benefits. This includes shipbuilding, port construction, and worker training. This article reviews the key developments and forecasts the growth in maritime jobs.

The federal and state governments share responsibility for developing offshore wind farms and bringing the wind into the power grid and, ultimately, to consumers.

This shared responsibility arises from the fact that the federal government, through the secretary of the interior, leases areas of the Outer Continental Shelf (OCS) to developers, and the states are responsible for setting terms for the wind to be brought into the state power grids and ultimately sold to consumers. Winds blow the strongest farther from shore — hence the rush to lease Wind Energy Areas (WEAs) on the OCS. These locations also have the advantage of the turbines not being seen by local beachgoers.

To date, the Bureau of Ocean Energy Management (BOEM), part of the Interior Department, has awarded 16 leases to a variety of U.S. and European developers. And more leases are due to be auctioned off Long Island, NY, later this year. European developers such as Ørsted, Equinor, Copenhagen Infrastructure Partners, and Avangrid Renewables have brought their extensive European experience with them, enabling them to bid on and manage U.S. wind farms at competitive rates. These leases range in value from \$1.5M to \$135M at the lat-

est auction. Prices for the wind have declined to a levelized price of 6.5 cents per kilowatt hour in the case of the Vineyard Wind project off Massachusetts.

Once BOEM awards the lease to the highest qualified bidder, the agency starts the National Environmental Policy Act (NEPA) and other environmental review processes and lessees have to meet BOEM deadlines for site assessment plans and construction and operation plans and financial commitments. (30 CFR Part 585.)

The states have a major role to play because they have to allow the wind to come ashore through a series of pipelines and cables as well as approve the terms of the sale to public and private off-takers, including utilities and state regulatory agencies. States can also incentivize the wind through Ocean Renewable Energy Certificates (ORECs) and other subsidies.

The states along the Eastern Seaboard are also competing for the anticipated high-skilled jobs and, in some cases, funding for new port projects that accompany the offshore wind farms. These states acting through their governors and state legislatures are setting very high goals for renewable energy generally and offshore wind in particular. For example, the governor of New York's goal is for 9,000 megawatts (MW) of OSW by 2035; the governor of Rhode Island has set a goal of 1,000 MW of clean energy projects by the end of 2020; and the Massachusetts legislature has created a goal of 3,200 MW of OSW by 2035. Finally, in Virginia, the state legislature declared 3,000 MW of OSW to be in the public interest, allowing (some say requiring) the State Corporation Commission to approve the two-turbine Coastal

Virginia Offshore Wind (CVOW) project owned by Dominion Virginia Energy and managed by Ørsted. This project is expected to come online in 2020.

Next Steps: Compliance with Environmental Laws

We are at a critical stage for the development of these offshore wind farms. The developers have established operational dates ranging from the end of 2019 to 2023 for bringing the wind ashore. Some developers are racing to meet the 2019 deadline for compliance with the Production Tax Credit (PTC) that, unless extended by Congress, expires at the end of the year. Ways and Means Chairman Richard Neal (D-MA) recently announced he would support such an extension.

The developers also have to face permit and environmental law restrictions, including NEPA and the Marine Mammal Protection Act. In most cases, BOEM is the lead agency for compliance with these environmental laws, but other agencies are consulting in the NEPA process.

For example, BOEM and the National Marine Fisheries Service (NMFS) have almost completed an extensive review of the 100-turbine Vineyard Wind project off the coast of Massachusetts. A Draft Environmental Impact Statement is completed; the Final Environmental Impact Statement will be issued shortly; and NMFS has proposed to issue a one-year extension of an Incidental Harassment Authorization (IHA) to Vineyard Wind, LLC, allowing Vineyard to harass certain marine mammals pursuant to the Marine Mammal Protection Act due to the presence of migrating whales, seals, and dolphins near the project site that

could affect the hearing of these species during the pile-driving phase for installation of the generators and electrical service platforms. In an April 30, 2019, Federal Register notice (the comment period closed on May 30, 2019), NMFS proposed extending a year-long IHA to Vineyard for this project, assuming it complies with an extensive series of mitigation measures, including seasonal restrictions on pile driving, expansive clearance zones around the pile-driving equipment (especially for North Atlantic Rights Whales), and sound attenuation devices. (84 Federal Register 18346-18381, April 30, 2019.)

Delays in completing environmental reviews and compliance with species laws could hamper current wind farm progress.

Money & Jobs to Local Communities

European developers, who learned the hard lessons of Cape Wind and its NIMBY problems, have worked closely with states and communities to share the benefits of offshore wind. For example, Ørsted and Eversource committed \$4.5M to Rhode Island, \$3.5M of which will be used for higher education for OSW programs at the University of Rhode Island, and \$1.5M will support the development of Rhode Island's offshore wind supply chain and workforce. (See <https://nawindpower.com/Orsted-us-offshore-wind-eversource-pledge-4-5m-for-rhode-island>.) Ørsted and Eversource also worked with the Connecticut Port Authority to commit \$225M to upgrade a state pier in New London, Connecticut, making it usable for assembly and installation of wind turbines.

State legislatures also provide funds for workforce and supply chain develop-

ment grants. This is especially true in the cases of Maryland and Massachusetts. (See for example in Maryland: <https://energy.maryland.gov/Pages/Info/renewable/offshorewindworkforce.aspx>.)

Other states like New York and Virginia have developed extensive directories of businesses who can meet the needs of wind farm developers. Maritime suppliers should work with state agencies to make sure they are included. (See www.nyseda.ny.gov/All-Programs/Programs/Offshore-Wind/Economic-Opportunities/Supply-Chain-Database and www.vaoffshorewind.org/supply-chain.)

State laws (e.g., in MD and NY) often require a certain percentage of local content before approving the wind project. But at the end of the day, they are primarily looking for the lowest price so that consumers are not harmed by the price of the wind in their next energy bill. And, prices are coming down to levels competitive with natural gas. (See statistic above for the Vineyard Wind project off MA.)

The Jones Act & OSW

For the most part, we have found the Jones Act is not an impediment to the construction and operation of OSW farms. In fact, U.S. shipyards are taking advantage of the law to build crew transfer and supply vessels.

Just recently, Ørsted, in conjunction with WindServe Marine, LLC, announced that it has selected two U.S. companies to construct new Jones Act qualified crew transfer vessels (CTVs). The first CTV will be built in Hubert, NC, at U.S. Workboats, and the second by Senesco Marine in North Kingstown, Rhode Island. The first CTV will be deployed to the Virginia CVOW project; the next will be used in the Ørsted/Eversource Revolution Wind project off southern New England. (See www.offshorewindus.org/2019/05/08/Ørsted-awards-windserve-marine-first-u-s-offs.)

Forward-thinking yards like Blount Boats in Warren, Rhode Island, have already stepped up to the plate and built a UK-designed offshore support vessel, which was used in the Deepwater

Wind project in Rhode Island, the first commercial offshore wind farm in the United States. (Deepwater Wind has subsequently been acquired by Ørsted, the Danish wind company involved in numerous U.S. projects, as noted above.)

At the same time, the United States has not committed to building a heavy-lift vessel to lift the huge turbines aboard the platforms once they are in place, and foreign-flag vessels used in worldwide trades are used for this stage of development. Since they stay outside the territorial limits of the United States, they can continue to do this work.

What Remains to Be Resolved

OSW development is, unfortunately, not subject to one-stop shop permitting. And, various agencies have taken different positions on how the federal OCS Lands Act applies to a wind farm project as compared to an oil and gas project. This is leading to confusion and potentially stopping progress for OSW farms. This is also the case for what type of visa should be issued to specialists serving

aboard OSW support vessels. (This will be addressed in the next issue of *Maritime Reporter & Engineering News*).

The current end of the PTC is also discouraging to developers who have to finance their own projects—albeit with some state support. The Department of Energy loan guarantee program and port infrastructure grants are other finance options.

Conclusions

Offshore wind is coming to the United States and a maritime community near you, accompanied by good jobs and clean renewable energy. Join the bandwagon and support these exciting new farms just over the horizon. Take advantage of the dollars being contributed by developers to jobs and training and make sure your company is on the state supply list. Finally, encourage Congress to support an extension of the PTC or Investment Tax Credit and to resolve some of the knotty jurisdictional issues faced by too many agencies in the OSW permitting stew.



PRINT AND DIGITAL FEATURED CONTENT

A MULTI-PLATFORM MARKETING SOLUTION

LEVERAGE THE FULL POWER OF THE MARITIME MEDIA NETWORK WITH A FEATURED CONTENT PACKAGE

A multi-platform featured content package is a great way to build brand awareness to the industry's largest verified circulation - in print and digital! With this powerful marketing tool, a professional marine industry writer will help you to create an effective message and communicate it to the global maritime industry. Your message will be seen by decision-makers, purchasers and buyers through various media platforms and websites.

For pricing or to learn how *Maritime Reporter & Engineering News* and the *Maritime Network* can help build brand awareness across multiple platforms, contact your sales representative today, or call **+1-212-477-6700**.



Tom Ewing

Tom Ewing is a freelance writer specializing in energy and environmental topics. He has been a regular contributor to New Wave Media publications for the past two years. He has extensive experience working on legislative and public policy issues, both at the state and federal levels.

Offshore Wind: A Brief History

Happy 80th birthday *Maritime Reporter & Engineering News*! Eighty years is a significant publishing and business accomplishment!

Birthdays always cause a look back. An 80-year review starts in 1939, the close of one very challenging decade, the start of events still reverberating today. History's most important history is contained in the last 80 years.

Energy dominated every one of those decades. Consider energy use, say, starting after World War II, from 1950 to 1975. There was power for everything, from seemingly endless sources of oil, gas and coal, and nuclear power was standing by.

Next, recall energy from 1975 to 2000. Not so happy. Most shocking – actual energy shortages, and skyrocketing costs. Just as shocking: social and environmental disasters that could no longer be pushed aside, from Exxon Valdez to ruinous strip mines to Three Mile Island to urban smog.

Now, think of the last 19 years. The Bakken Field. The Permian Basin. Deepwater ocean extraction. And a sophisticated industry ready for any play anywhere, operating at peak scientific and technical prowess.

But there were huge changes in the last 19 years. Oil and gas and coal are no longer the whole story. Renewables – solar and wind – have moved closer to center stage, where they will stay, and increase, as social activism on environmental issues rises and costs per kw/hr decrease. Make no mistake, in the next 80 years the world is fortunate that it will have plentiful quantities of oil and gas – responsibly recovered and produced but in the future sipped, not guzzled, in highly efficient engines.

In the next 80 years the world is doubly fortunate that it has the chance to mainstream electricity generation from



Credit: Used with permission of Worldsfairchicago1893.com

renewables, again, primarily wind and solar. These aren't random, disconnected opportunities. Like all progress, these choices are evolutionary, enabled by decisions made, and work started, years ago.

In the spirit of looking back, here's a brief review of offshore wind and how its development has tracked concurrent to *Maritime Reporter's* 80 years of success.

Comparably, offshore wind is a newbie (okay, not counting wind power for ships and boats). The first commercial offshore windfarm was built in 1991, in Denmark. The first US project at Block Island, RI, in 2016!

To set a timeline within a modern context this review draws on a fascinating wind energy history developed by the US Department of Energy. On the land-side, DOE's history starts in 1850 when the US Wind Engine Company was established by Daniel Halladay and John Burnham.

In 1890, steel windmill blades were in-

vented, leading to the development of an iconic western symbol.

Important lesson: technological developments, then as now, are critical across all energy advancements.

In 1893, 15 windmill companies showcased wind power at the Chicago World's Fair. Different models, wood, steel and iron, were adaptable to specific localities and conditions.

After 1893, DOE's timeline jumps 48 years to 1941, recording that the largest wind turbine of the time delivered 1.25 megawatts to a Vermont utility. But there's a lesson in that almost half-century gap. America's electric utilities had developed rapidly, but without wind. Electrical systems, and new demands placed on systems, needed constant, steady power – think coal and hydro. Intermittent wind was fine for remote, singular places, but insufficient for new electrified urban railways, for example.

Then the timeline jumps another 29 years to 1970. It records: "The price of oil skyrockets and so does interest and

research in wind turbines and the power they generate."

Then, events quicken:

- **1978** – President Carter signed the Public Utility Regulatory Act, requiring companies to buy a certain amount of electricity from renewable energy sources, including wind.

- **1980** – The first utility-scale wind farms are installed in California.

- **1981** – NASA scientists Larry Viterna and Bob Corrigan develop "The Viterna Method," which becomes the most common method used for predicting wind turbine performance, increasing the efficiency of turbine output to this day.

- **1991** – Denmark – Dong Energy (now Orsted) commissioned Windby, the first offshore wind farm, constructed in water between two and five meters deep. Windby's 11 turbines provided power for almost 2,200 households. It lasted for 25 years, longer than expected, dismantled in 2017. Windby was invaluable as a working laboratory, helping Danish

companies to gain expertise, both technically and learning how to export this new offshore business. Perhaps the most important lesson: Windby served as a power station, adding to and complementing an overall electrical system.

- **1992** – President Bush signed the Energy Policy Act, authorizing a production tax credit of 1.5 cents per kilowatt hour of wind-power-generated electricity and re-establishing a focus on renewable energy use.
- **1993** – The National Wind Technology Center is established.
- **2011** – A critical document: DOE's National Offshore Wind Strategy, a partnership project with the Department of the Interior. The goal: to reduce the cost of energy through technology development and reducing deployment timelines.

Gary Norton is a Senior Renewable Energy Technologies Advisor within DOE's Wind Energy Technologies Office. Norton was a contributing author of the 2011 Strategy and the 2016 Strategy update. He was asked: How is offshore wind doing – moving too slowly or where we need to be?

"I think we're doing really well," Norton replied. He cited interagency collaboration as particularly important and productive, with DOE focusing on technical advances that would lower the cost of offshore wind power while the Bureau of Ocean Energy Management (BOEM) worked on best ways to speed up the complex regulatory process for ocean-based projects.

Norton said the original projections in the 2011 Strategy were "pretty aspirational." Now, however, "things are really taking off in many states with many project developers and committed financial support."

When this work started, he noted, uncertainty dominated. "Now it's happening," he said, referencing, for example, the huge increases in site valuations. "In Massachusetts," Norton points out, "recent BOEM wind energy area lease bids jumped to \$135 million, up from \$42 million a few years earlier and just \$1.5 million in an earlier round of bidding."

Another critical Strategy outcome: the National Research and Development Consortium, currently comprised of most major offshore wind developers and four Atlantic coast state agencies

from Massachusetts to Virginia. In 2018, DOE chose the New York State Energy Research and Development Authority (NYERDA) as consortium administrator. DOE contributed \$20.5 million for competitively solicited R&D projects, and NYERDA matched that amount.

Finally, Norton emphasized the importance of DOE's economic analyses pertaining to offshore wind and how it can best fit into the overall energy marketplace, maximizing its value. Also critical: the emerging, and increasing, reevaluation of many east coast ports as they prepare and position themselves to play leading roles in the maritime logistics required to build out an entirely new energy industry.

- **2013** – A critical project: construction of the first floating offshore wind turbine connected to the grid. This was a DOE partnership with the University of Maine, deploying a 1:8 scale, 20-kw concrete-composite floating platform wind turbine – the first in the world. This project will inform design and construction of two full-scale floating offshore wind turbines, work underway now, set for completion in 2021.

The project utilizes patented Voltur-nUS platform technology, a floating concrete hull that can support wind turbines in water depths of 45 meters or more (recall Windby's 2-5 meter depth).

Habib Dagher, PhD, PE is the Executive Director at the University of Maine's Advanced Structures and Composites Center. Dagher explained that Maine has been buffeted by high energy costs. Maine's initial interest in offshore wind started with a big question: How much power do we need for everything from heat pumps to electric vehicles? In Maine, offshore wind has an estimated potential of 160 gigawatts. Dagher said the entire state uses about 2.4 GW. Just 3% of potential ocean wind energy would meet all of the state's needs!

Deep water, though, prevents fixed-bottom turbines. Hence the research into floating technology. The University of Maine focused on key problems: stability, storms, design. Dagher said the scaled-down model passed all tests, from its grid interconnection to withstanding a 500-year storm.

But the biggest payoff? Modeling. Dagher said the University of Maine energy

models will allow easier, faster and more accurate evaluations and assessments for matching project site with equipment, materials and positioning. All of that means cheaper energy from offshore wind.

- **2016** – Block Island Wind Farm in Rhode Island, starts up, the first commercial offshore wind project in the US. It's relatively small – 30 megawatts, a project developed by Deepwater Wind.

- **2018** – DOE reports (2017 data) that the U.S. has a total of 25,434 MW of offshore wind energy in the pipeline, with projects in development in New York, New Jersey, Massachusetts and Virginia.

Globally, (2017 data) 3,387 MW of offshore wind capacity was commissioned, resulting in a cumulative installed global capacity of 16.3 GW. The United Kingdom is the largest offshore wind market with 5,824 MW of cumulative installed capacity, followed by Germany (4,667 MW), China (1,823 MW), Denmark (1,399 MW), and the Netherlands (1,124 MW). DOE reports that globally, auction prices continue to fall. In 2017, developers placed four bids that were termed as "zero-subsidy."

FIRE SUPPRESSION & FIRE DETECTION SYSTEMS

For USCG Compliance

FIREBOY - XINTEX
A Darley Company

Clean Agent Fixed Fire Suppression Systems up to 17,500 cu. ft.

Elite RSM

Alarm Strobe

Smoke Detector

fireboy-xintex.com

Efficient Wave Power ... Really!

Wave-generated power could be considered the Rodney Dangerfield of offshore renewable energy sources; it gets no respect. There have been a number of high-profile, expensive failures that have conspired to give the sector a poor reputation despite a number of engineering advances. A new entrant is SurfWEC offering a patented “surf-making” Wave Energy Converter which has been in development since 2007. Its developers promise it will stand out from the field and perform where others have failed. How? The SurfWEC design improves upon a generation of ‘lessons learned,’ and more importantly it makes its own surf.

By Greg Trauthwein

Renewable energy production is officially ‘hot’, as a number of engineering advances and government subsidies have conspired to help deploy, test, and prove in real-world conditions the viability of various systems. While solar and wind power have jumped out as early leaders, there is a renewed push to turn ocean wave power into a viable, renewable source of power and stored energy. A new entrant is SurfWEC LLC, which is aiming to become the ‘go to’ in the wave energy category, both as a stand-alone system and as added power

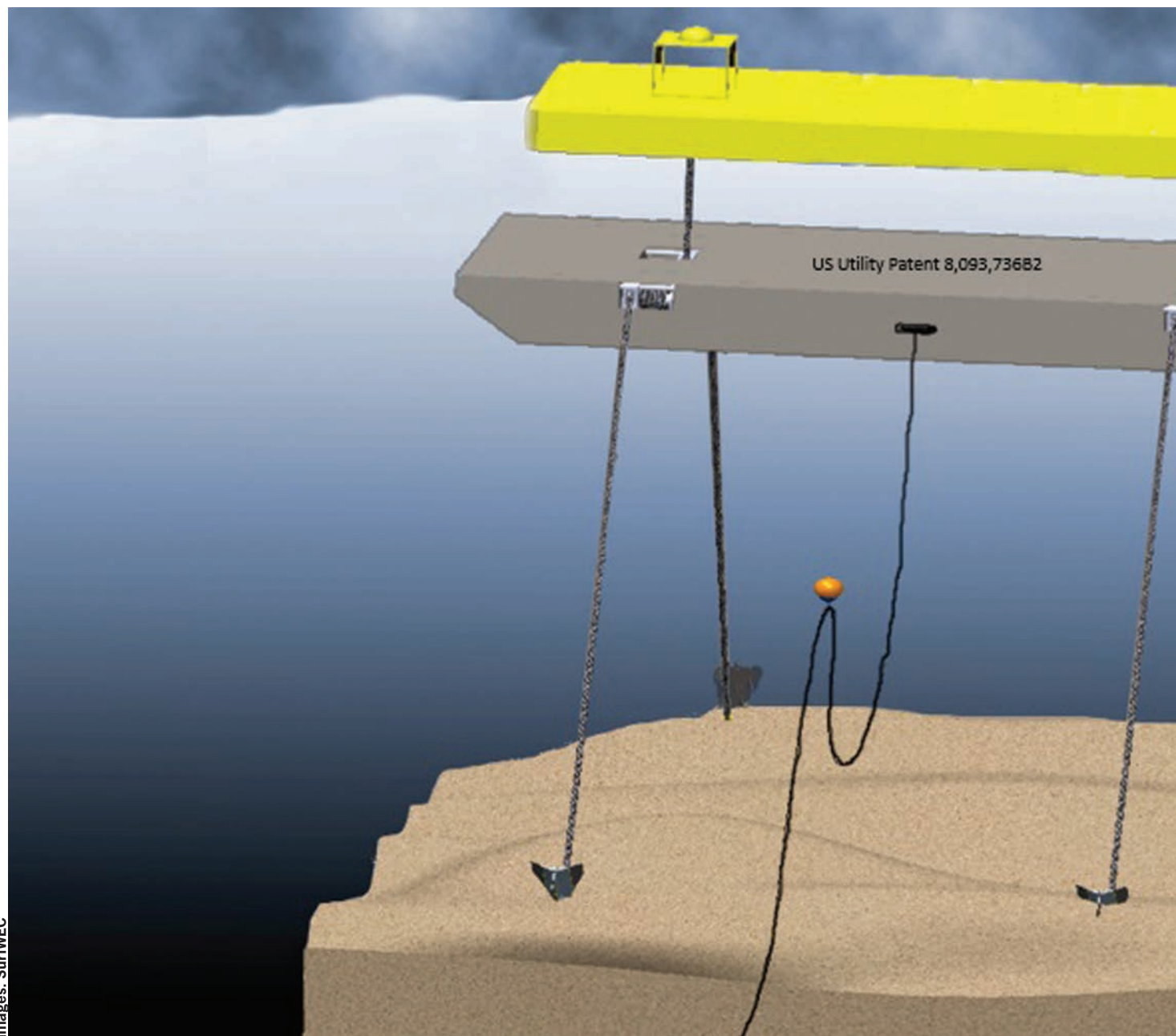
source, energy storage, and wave damping units co-located with existing or future offshore wind farms.

Meet the “Old New” Company

A driving force behind the new performance projections for Wave Energy Converters (WECs) is Martin & Ottaway, a New Jersey-based marine engineering firm that has been in continuous operation since 1875 which incubated SurfWEC LLC in December of 2018. SurfWEC, with university and industry partners – Stevens Institute of Technology, ABB, Airline

Hydraulics, Bosch-Rexroth, Deeptek, HYDAC, ISCO Pipe, Wire Co./Lankhorst Ropes, and others – is working to develop WECs using patented features that are expected to increase energy recovery rates by an order of magnitude as standalone units or integrated with legacy WEC systems.

The SurfWEC system is also designed to avoid wave damage associated with hurricanes, equipment located in surf zones, and stationary mooring systems offshore via technology that conquers the challenge of highly variable wave sizes. To put it simply, it does this with



Images: SurfWEC

a patented variable-depth shoaling feature, invented by Michael Raftery, SurfWEC Chief Technology Officer (CTO) while performing research at Stevens Institute of Technology from 2004 to 2012. The technology essentially allows offshore waves to be converted to surging surf waves, allowing much more effective wave energy recovery.

Meeting with Raftery in Martin & Ottaway's Tinton Falls, New Jersey office, it becomes immediately clear that this system and its development are a labor of love for the inventor who's long-term goal is to end human dependence on fos-

sil fuels. The patent was submitted in 2007 and issued in 2012. It is was created while Raftery worked at Stevens Institute of Technology, the renowned engineering school, which paid for and owns the patent rights to the system, while SurfWEC has an exclusive license option agreement in place to use this technology.

"I think the biggest perceptions to overcome are the perceptions that wave energy conversion is inefficient, and that WEC units cannot be designed and fab-

ricated with buoyant integrity similar to Boston Whaler boats, these are the design criteria specifically required to bring wave energy

conversion to the utility level," said Raftery. "There have been four major failures in the industry that really put investors off. The sinking of the Advanced Research Technologies/Wavegen "Osprey" in 1995, the sinking of the Finavera "Aquabuoy" in 2007, the sinking of the Trident "DECM" in 2009, and the recent sinking of the Wello OY "Penguin"

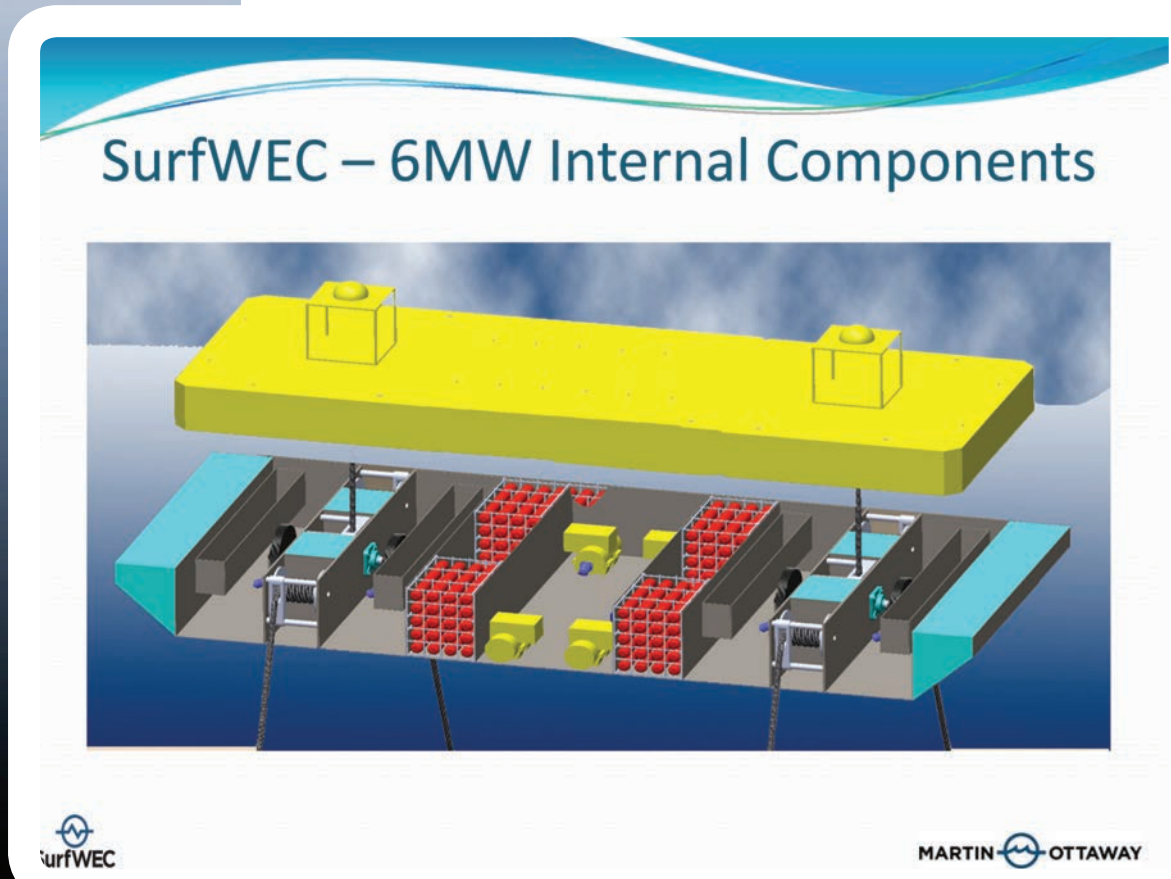
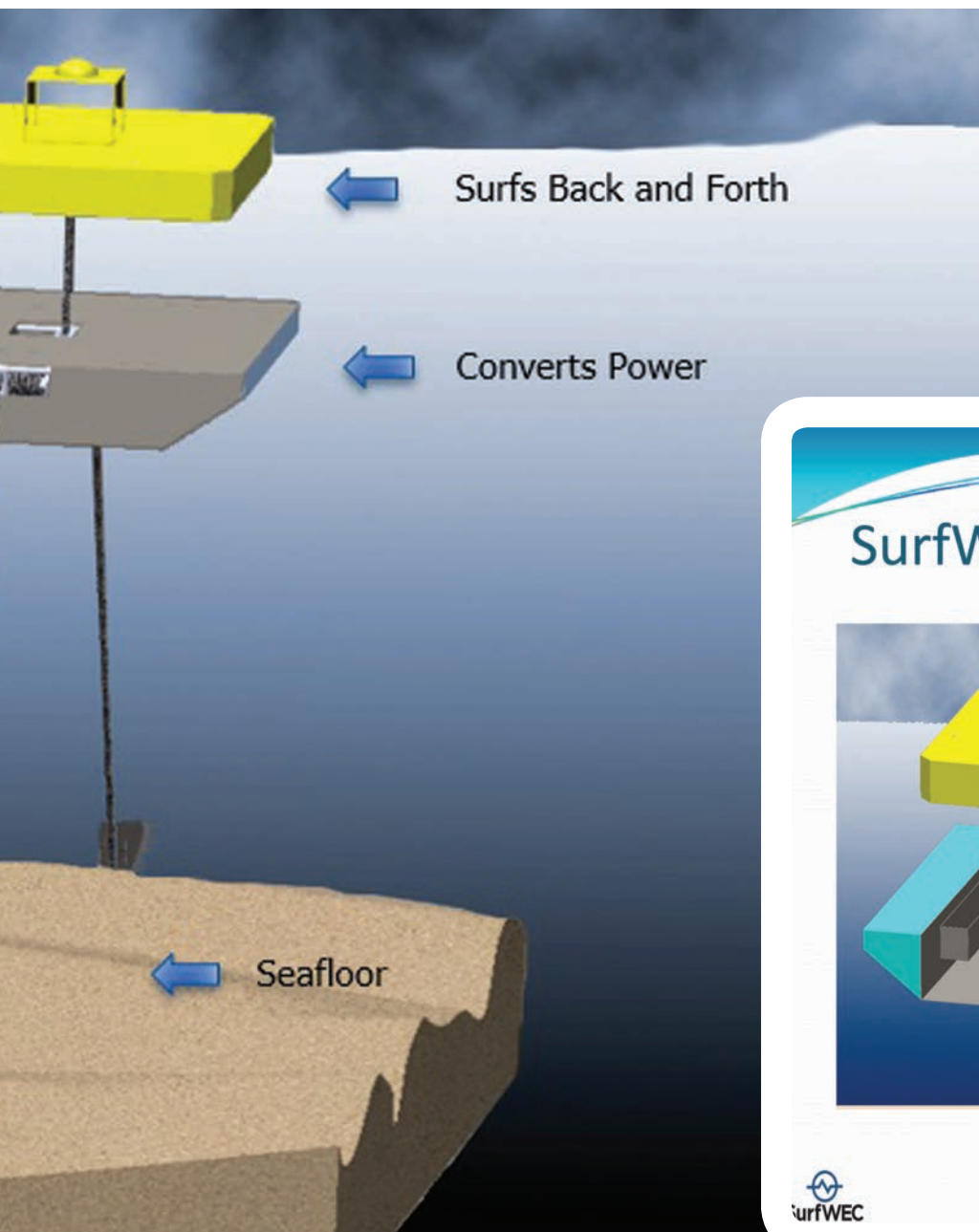
in 2019."

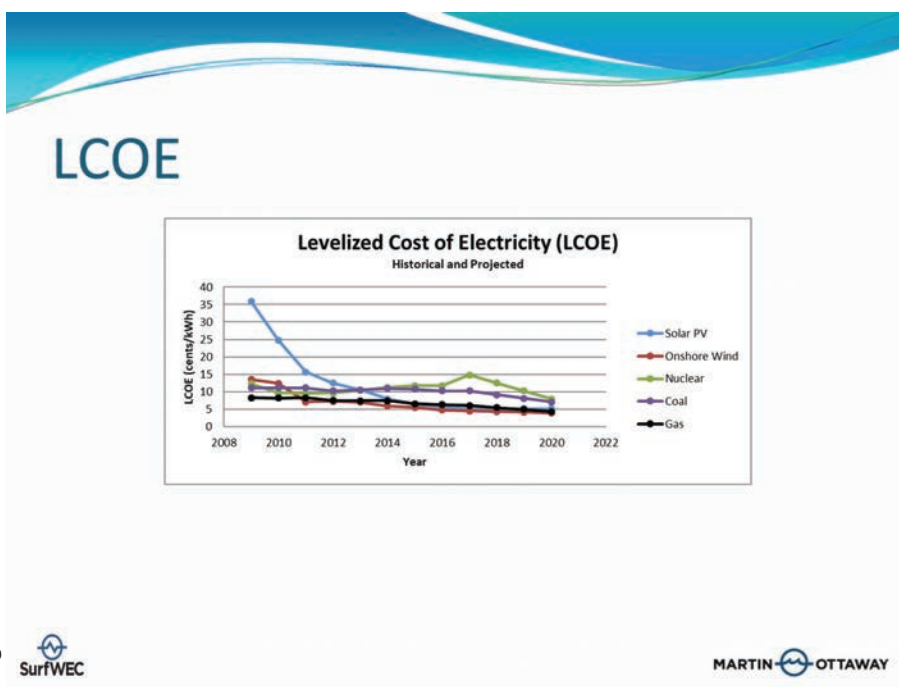
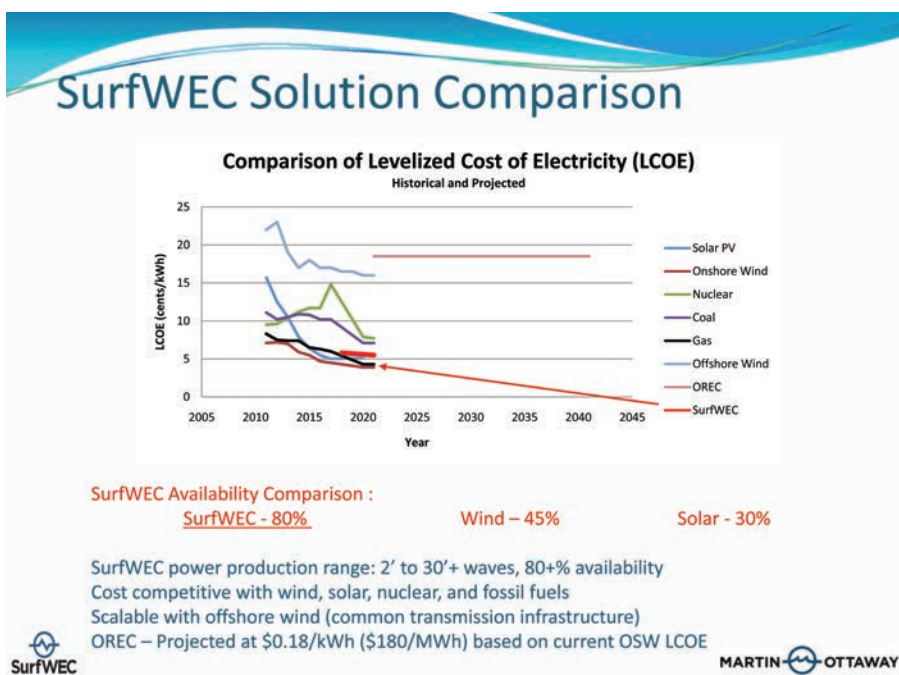
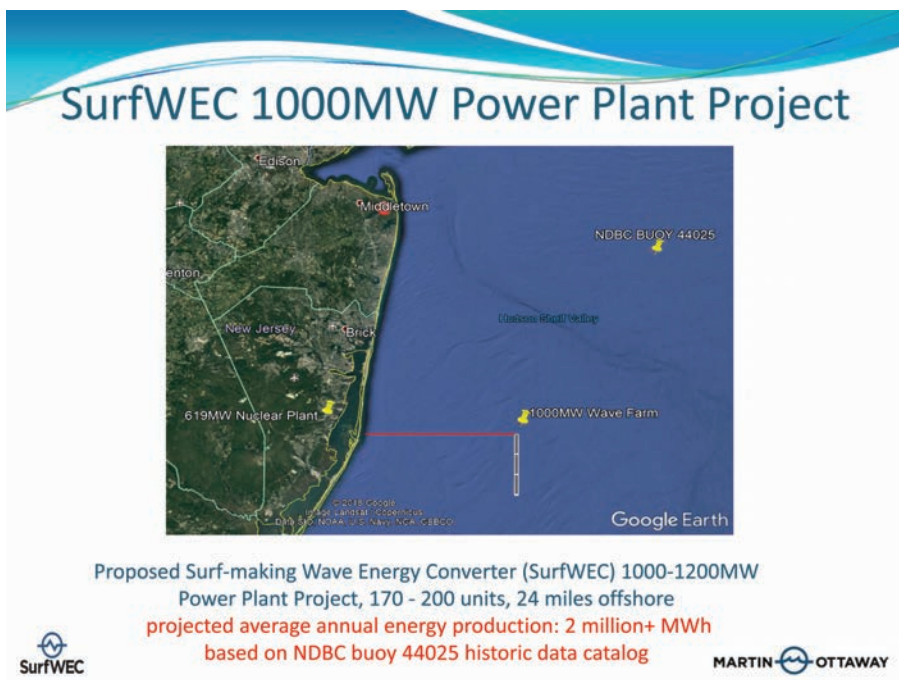
Raftery said that those failures collectively cost many millions of dollars while earning the WEC industry a bad reputation. He said early investor reactions to SurfWEC have been "you're probably just like those other systems."

But Raftery contends that SurfWEC has learned from past incidents, and he said that creating a system with "buoyant integrity" was number one on his list. To this end the wave energy system features foam-filled compartments making it virtually unsinkable. "We've addressed all of the failures in the industry with this

SurfWEC @ a Glance

Company	SurfWEC LLC
Tech	Wave Energy Harnessing Device
Start of Design	2007
Patented	2012
Patent Owner	Stevens Institute of Technology
License Holder	SurfWEC LLC
Web	www.surfwec.com





one design.”

Also, creating a system that is ‘smart’, a system able to adjust itself continually to maximize and efficiently convert the ocean’s motion into power, was central to success. For this, the SurfWEC team relies on a neural network.

“Neural networks are a way to respond to things that are not clearly, easily defined,” said van Hemmen. “If I have a perfect sine wave, I can calculate and design something that will respond to this perfect sine wave as the wave length and wave height changes. But ocean waves are messy. Neural networks take input from different sensors that go together helps the system ‘learn’. It is simply a response mechanism.”

The system is designed to be flexible too, and in principle the SurfWEC system can be placed anywhere where there are ocean waves and water depths are from 135 to 1000 ft. It is, in fact, a major design feather in SurfWEC’s cap that the system need not be placed directly in the surf zone to work. “You don’t have to design different devices for different locations. We can put them anywhere, and it’s a one-size-fits all solution, and the neural network will keep the variable-depth platform at the optimal depth at all times.” said van Hemmen.

The Path Ahead

Anyone who has worked in the field of renewable energy knows that the path from inventor’s workbench to utility level performance is neither straight, short or cheap. The SurfWEC platform has already been under development for a dozen years, and Raftery reckons it will be another four to five years to bring it through sea trials.

“The next step is to get a scale model tested at the Ohmsett facility in Leonardo, New Jersey, at approximately 15:1 scale,” said Raftery. “We’ll take those performance numbers, then we’ll build a skid platform for the power take-off system, and we will bench test. After that we’ll make adjustments to the designs based on those two datasets, to be followed by a full-scale prototype and sea trials.”

While time is one element, money is another, and Rik F. van Hemmen, P.E., owner of Martin & Ottaway has put the price tag today at \$20 million to bring the system through sea trials, with (approximately) \$2m for bench testing, \$1m for computer modeling, \$1m for a scale model, about \$12m for the final prototype unit, and \$4m for two-year sea tri-

als. “I’ve just submitted a White Paper to the Office of Naval Research for that full budget,” said van Hemmen. “On the commercial side we will approach venture capital sources for funding, too. Then we have DOE applications in for subsystem development.”

Think Global, Act (NJ) Local

“Certain projects are so big that they need a national or a global view and presence. This particular technology does not require that huge amount of investment,” said van Hemmen. “This makes it inherently more efficient to build and run a local project, and if you can do that your chance of success inherently goes up.”

According to van Hemmen the stars are seemingly aligned for this project, as New Jersey offers “this weird hotbed for technological innovation. New Jersey has the waterfront, it has the transportation capacity, it has the education ... the project size is right for it to be developed in New Jersey.”

One of the key players is Ohmsett in Leonardo, New Jersey, situated on Raritan Bay. This is a world-class tank testing facility situated directly in an area that could prove ideal for real-world testing, as van Hemmen reasons that the waves in the protected portions of Raritan bay are right on scale with the 15:1 model as the ocean waves would be for the full-scale model. While political (to get the permitting to moor the system for real-world trials) and funding issues are rarely easy to navigate, van Hemmen, who went to Harvard Business School, said that he would be shocked if the organization can’t build support among the utilities and the politicians. “The numbers (cost per kWh) are there, and they are convincing.” (See charts left).

In fact van Hemmen, always the engineer first, sees the biggest challenge of delivering the system to utility scale as quite simple: Rope. “If the money exists, the biggest challenge will be the reliability of the rope yanking system. That is the challenge that my mind will be around day and night,” he said. “I’m convinced that we can get it to work, but this is the one technical challenge that gives me the cold sweat of the engineer. Rope technology has advanced tremendously, but that is the point where a lot of energy will go in. Fortunately the rope issue is not an end-all as flapper/surge type devices mounted to the top deck of the variable-depth platform may be commercially viable as well.”

Shoaling Wave Effect From SurfWEC Base in Wave Tank

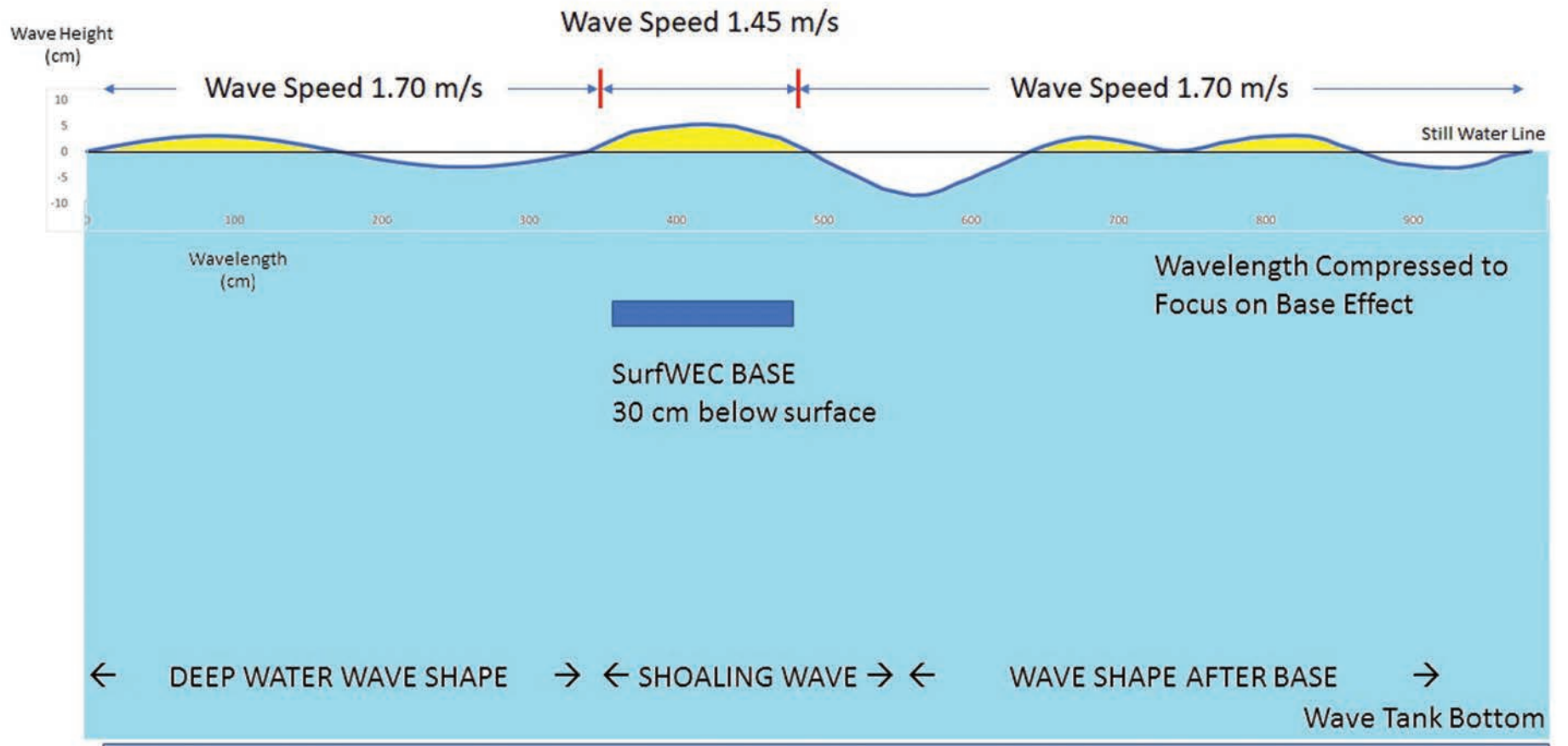


Image: SurfWEC

Ship Repair | Conversions | Drydocking

by people who care about returning your vessel to service on time and in budget

detyens.com
drydock@detyens.com

Detyens
Shipyards, Inc.
Charleston, South Carolina

f in t i

THE MARSHALL ISLANDS REGISTRY

STEADFAST QUALITY UNMATCHED SERVICE

The Marshall Islands Registry consistently performs. The record speaks for itself.

Choose to fly the world's local flag.

blog.register-iri.com www.register-iri.com info@register-iri.com

International Registries, Inc.
in affiliation with the Marshall Islands Maritime & Corporate Administrators



Benchmarking IMO 2020

By Barry Parker

“One of the biggest shake-ups in the product markets is right around the corner — the IMO 2020 regulation bans high sulfur fuel oil (HSFO) from the bunker pool. Although the shipping and refining industries have been preparing for the new rules for several years, there have been fears of shortfalls when the rules come into effect.” So says the International Energy Agency (IEA – a part of Organization for Economic Cooperation and Development), in its just-released Oil 2019 report.

There are multiple ways for ship operators to cope with the new rules which push down maximum permitted sulfur levels in fuels from the current 3.5% (in effect in most geographical regions) down to 0.5%. They can install “scrubbers” and continue to purchase high sulfur fuel, they can consume very expensive marine gasoil (with typical sulfur levels at or below the 0.5%), or they can consume low sulfur blends – a new category of fuels emerging now. LNG is another low sulfur alternative – though uptake by shipowners has been limited.

The uncertainties about fuel availability are focused on the short-term, meaning 2020 and perhaps further out into next year. The IEA, in their report, suggest that “Demand for HSFO (high-sulphur marine fuel oil), the main vessel fuel since the 1960s, will fall from 3.5 mb/d to 1.4 mb/d in just one year.” The IEA also calculated that by end 2020, scrubber fitted vessels (approximately 4,000 units, mainly on larger ships) will be consuming 700 kb/d of HSFO.

Follow the Money

From a financial standpoint, the voyage has already been treacherous. Chris Hudson, from commodities specialist Freight Investor Services (FIS), wrote that, “It’s fair to conclude that the market is still unsure of how to prepare financially for the changes.”

In late March, 2019, less than 10 months until the new rules came into effect, FIS wrote, “The market is pricing the difference between the HSFO and VLSFO at around \$185-200/ton, yet these values can change like the wind

and are current prices for future dates.” These wind currents will depend on actual availabilities.

The oil majors, though mum on their specific refinery configurations in the face of changed requirements, are now beginning to assuage the concerns about actual availability of VLSFO. Like any new product roll-out, supplies will be available at major bunkering hubs and the invariable discussions of haves and have-nots will place outports in the “might have” basket.

‘Refining’ the Supply Outlook

Consultants EnSys, based in Houston (which, along with Boston-based Navigistics, has been a leading investigator of the IMO 2020 related issues) explained, “We analyze marine fuels supply and the impacts of the IMO 2020 Rule by simulating and projecting the total global petroleum ‘liquids’ supply/refining/transport/demand system. This approach captures all the interactions in the system and means all the numbers have to add up.” EnSys President, Martin Tallett, explained, “What has become apparent in a series of recent assessments is that the IMO Rule will have a major impact on regional marine fuels supply/demand balances. Under the 3.5% sulfur standard, IFO was the lowest quality liquid fuel produced by refineries and so was the easiest to supply and could be pro-

duced essentially anywhere. Tightening the standard to 0.5% sulfur dramatically changes the picture.

Scrubber uptake will mean some of the supplied IFO can stay as 3.5% but the majority of fuel will need to be 0.5% from 2020 on, unless and until scrubbers become widely accepted. EnSys and marine partner Navigistics project at least 3.5 mb/d of HS IFO will need to be switched to 0.5% fuel to achieve full compliance in 2020. We project supply will be a mix of 0.5% distillate and HFO products, potentially more distillate initially because of fuel incompatibility concerns trending to more IFO over time as this is lower cost.”

Separately, an early March 2019 announcement from BP, quoting the Global Head of BP Marine, Eddie Gauci, said, “We have undertaken a comprehensive test campaign, conducting shipboard trials of our new very low sulfur fuel oil. Following the success of these sea trials, and working closely with our customers, we believe we now have a robust commercial offer.”

To that end, BP will have their new low sulfur blend available at ARA, Panama, Seattle (on the USWC), Singapore (the world’s largest bunkering entrepôt), Hong Kong, China, Australia/ New Zealand and Oman.

Meanwhile, ExxonMobil announced in 2018 that it would be supplying com-

pliant VLSFO in Asia – Singapore, Thailand and Hong Kong – and in continental Europe (ARA) and the Mediterranean. They expect that sales of compliant fuels would begin in Q3 2019. Supporting that projection, ExxonMobil also announced a massive upgrade of its Singapore refinery complex, predicated heavily on the needs to produce low sulfur fuels for the maritime industry.

For its part, Shell was projecting that VLSFO supplies would be available in the U.S. Gulf (New Orleans and Houston), Freeport, Bahamas, and in North Europe (ARA and Danish Strait) as well as in the Med. Farther to the east, locations are set to include Fujairah, Hong Kong and of course, Singapore.

Tallett described regional implications of shipping’s interaction with the refinery system, “From a refining perspective, 0.5% marine fuel, be it distillate or IFO, requires low sulfur blendstocks which must come from either low sulfur crude streams and/or significant refinery processing centered on ‘cracking’, such as via the coking process, plus desulfurization. EnSys projects the effects of this will be to substantially concentrate 0.5% fuel supply geographically. Two thirds of the total low-sulfur marine fuel supply (0.1% ECA fuel plus 0.5% marine distillate and IFO) will come from just eleven countries and much of the balance from a further twenty-five or so.” Tallett continued, “The USA is expected to have the largest supply surplus and export potential, followed by China and Russia. Conversely, we – and other analysts – project Europe will be in deficit on 0.1%/0.5% supply; also, and critically, the Pacific region that includes Singapore, although increasing intake into Asia of US low sulfur crude plus new refining projects should limit the deficit there. For bunkers markets, these changes have significant implications for setting up supply arrangements and for substantial changes in the logistics of supplying 0.1 and 0.5% marine fuels into the 800+ coastal ports worldwide that will need them.”

A Look Ahead: Uncharted Waters

There are many uncertainties about

Ocean Freight Exchange

A slightly different take on fuel availability, with a decidedly info-centric approach, comes from Ocean Freight Exchange, a vessel chartering platform, utilizing advanced statistical modeling, online at www.theofe.com. Its CEO, John Hahn, said, “Right Bunker is our bunker delivery optimization platform which increases turns for the bunker tanker and reduces waiting time for both the bunker tanker and the vessel. We don’t do procurement, but only focus on the delivery.”

When asked about port selections, he said, “We believe that the desired fuels will be available in all of the major bunkering ports, including Singapore, Fujairah, Rotterdam, Antwerp, Shanghai, Ningbo-Zhoushan, Hong Kong, Gibraltar, Panama, Houston and LA/Long Beach. For more niche routes, vessel operators may adjust where they bunker, but it won’t be a big deal.”

He acknowledged some of the difficulties that may lie ahead: “By adding more grades, less tankers in service due to tank cleaning, ‘spec’ problems like water content, quantity shortages and other complexities, the logistics and delivery of bunkers will become more difficult than it already is. We hear that maritime lawyers are excited for the many claims to come.”

the days following January 1, 2020. The IEA, in its report, comments, "The quantity of VLSFO produced will initially be limited to 1 mb/d because of reduced availability of low sulphur blending materials. Some shipping companies may also be reluctant to adopt a new fuel immediately, and would prefer to use MGO until they have confidence that VLSFO will be easily available in ports and stable and compatible with similar grades." The compatibility issue looms large; there is a concern that VLSFO fuel blends produced at different facilities will be in congruity. Another set of issues concern a proposal to extend the European Emissions Control Area (ECA) to include the Mediterranean is currently being considered at the IMO. Such a

measure that would bring about an even tougher 0.1% marine fuels sulfur limit in European waters, with a likely additional tightening of middle distillate supplies.

Over time, after the IMO 2020 issues are sorted out, there are further mile-


stones to consider. In 2023, the IMO will be implementing a Revised Strategy on Greenhouse Gas Emissions (following up on the Initial Strategies launched in 2018, which include deepsea vessels' reporting of fuel consumed). As the IMO

begins to look out to 2030, and then to still more distant horizons to 2050, talk will turn increasingly to new types of fuels. Hence, and at that point, the potential dislocations of 2020 may seem inconsequential, in comparison.

New Strategies for Fuel Availability

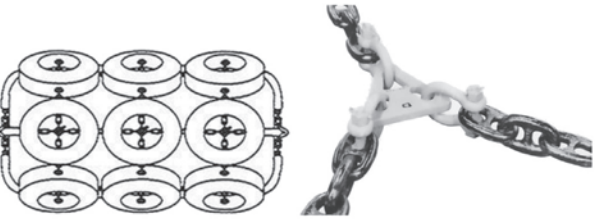
In March 2019, EURONAV, one of the largest public shipping companies with a fleet of mainly VLCC and Suezmax tankers, provided a different take on fuel sourcing. It announced that its 442,000 ton Ultra Large Crude Carrier Oceania (acquired in 2018), anchored in the Mediterranean, would be used as a storage vessel for EURN's low sulfur fuel needs. Tanker tracking sources noted that a 30,000 shipment, presumably of low sulfur fuel oil, had moved on a smaller tanker from ARA to Oceania, parked near Malta.

Maersk, a large vessel operator across multiple sectors, has taken a different approach; that is to say, securing long term physical supplies from a refiner in the northeastern United States. In January, A.P. Moller-Maersk and PBF Logistics LP (PBFX) jointly announced that PBF would process crude oil at a terminal facility in New Jersey and supply it to an oil trading company within Maersk. Specifically, "The agreement enables Maersk Oil Trading to supply IMO 2020-compliant 0.5% marine fuel to its customers on the US East Coast. Annual production will be around 1.25 million metric tonnes, the equivalent of approximately 10% of A.P. Moller-Maersk's annual fuel demand." In late 2018, Maersk also announced that had entered into a leasing agreement for storage of 2.3 Million mt of 0.5% compliant fuel (equivalent to roughly 20% of Maersk's annual fuel demand), at the Vopak Europoort Terminal in Rotterdam. Meantime, COCSO Shipping announced that it would be working with fuel supplier Double Rich Ltd (an affiliated company) to secure suitable low Sulphur fuel supplies.

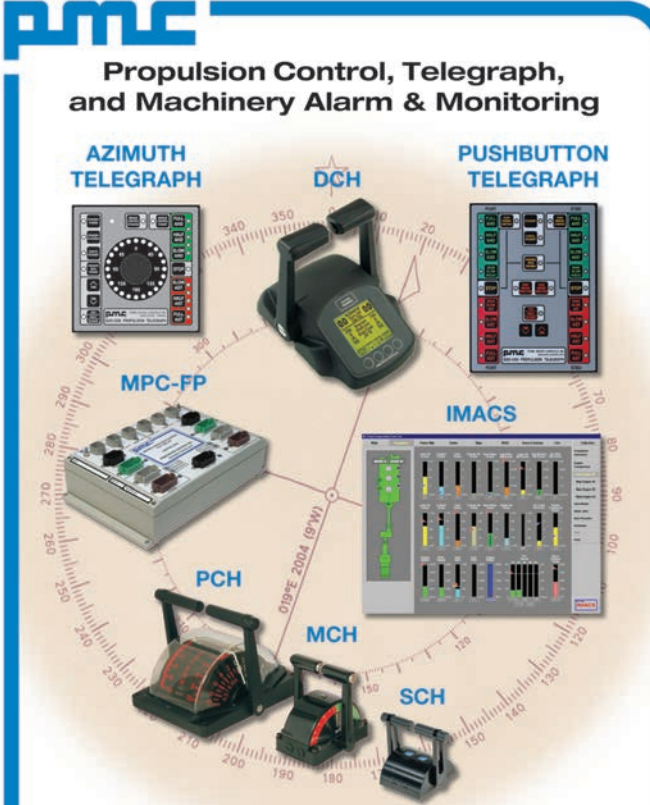


STOCK (Purchase and Rental):

- Anchors (All Types)
- Anchor Chain and Fittings (New and Used) Grades 2, 3, R4 and R5
- Marine Fenders (Pneumatic and Foam Filled)
- Smit Towing Brackets, Tow Plates, Towing Shackles, Towing Chains and Towing Wires
- LBNO Towing Shackles (Oval Pin), Anchor Line Hooks, "Pee Wee" Sockets, Hawser Thimbles (MADE IN THE USA)
- Heavy Lift Slings, Lift Design and Engineering Services



www.dcl-usa.com
Email: sales@dcl-usa.com
Ph: 800-228-7660 • Fx: 504-947-8557
Available 24/7/365



Propulsion Control, Telegraph, and Machinery Alarm & Monitoring

AZIMUTH TELEGRAPH **DCH** **PUSHBUTTON TELEGRAPH**

MPC-FP **IMACS**

PCH **MCH** **SCH**

A World Leader in Propulsion Controls
PRIME MOVER CONTROLS INC.
 3600 GILMORE WAY, BURNABY B.C. CANADA V5G 4R8
 TEL 604 433 4644 FAX 604 433 5570 www.pmc-controls.com

EVERYWHERE THERE'S WEATHER

Sensors to Measure:

- Relative Humidity
- Pressure
- Precipitation
- Visibility
- Temperature
- Wind



WWW.YOUNGUSA.COM

YOUNG

45 Years of Experience In Humidity Control

- Rusting & Corrosion - Prevention Is Better Than Repair !

Refrigerant & Adsorption Models Capacities From 17 ppd to 3,173 ppd



Refurbishing, Mothballing or General Environmental Control - EIPL Have The Solutions.

Experts In Humidity Management !

Ebac Industrial Products Inc

East Coast Office **West Coast Office**
 700 Thimble Shoals Blvd, Suite 109, Newport News, VA 23606-2575 2060 Chicago Ave, Suite C7, Riverside, CA 92507

Toll Free 1-855-873-6800 www.ebacusa.com

THE U.S. WORK

A ‘work in progress,’ the North American brown water, shallow draft sectors have experienced a tumultuous year of evolution, changing market conditions, a rapidly shifting regulatory environment and new opportunities. Anything but boring; and within the pages of Maritime Reporter & Engineering News’ Annual Yearbook, Joseph Keefe, editor of sister-publication MarineNews, takes a deep dive into the issues driving the domestic waterfront.

WORKBOAT EMISSIONS

More than one year ago, Volkswagen learned the ultimate (and painful) meaning of the iconic U.S. adage of “Don’t do the crime if you can’t do the time – or at least pay the staggering fine.” And pay it forward, Volkswagen did. The auto manufacturer got caught using software to trick emissions control software during testing on hundreds of thousands of vehicles in order to get a passing grade, after which the cars operated in violation of the Clean Air Act.

As part of a series of three settlements with the U.S. Environmental Protection Agency (EPA) totaling close to \$14.7 billion, Volkswagen was required to fund two mitigation trusts to the tune of \$2.925 billion, which is now being used to clean up diesel emissions in the United States. The money is slated for projects with “eligible mitigation actions,” such as upgrading tugboat or ferry engines, to reduce the excess emissions that were produced by the illegal cars. Engines change outs can only be repowered to EPA levels Tier 3 or Tier 4. Other eligible options include the increasingly popular hybrid or all-electric option.

As it happens, the top 10 recipients of trust funds are also the states with the largest marine sectors. The beneficiaries have 10 years to request their funding and implement approved mitigation actions. Applications must include projected NOx reductions and impact on air and community health. Project priority will be based on the emissions reduction or offset per dollar spent, as well as factors such as health benefits and impact on wild areas. Suffice it to say that, when it comes to financing engine upgrades and replacements using other people’s money – this is as good as it will ever get.

Unfortunately, not everyone has gotten on board the clean and green train. It turns out that commercial workboat engines are staying in service more than two times longer than predicted by the U.S. Environmental Protection Agency (EPA), according to new research from the Diesel Technology Forum (DTF) and Environmental Defense Fund (EDF). That says a lot for the quality of marine engines, but at the same time isn’t necessarily a good thing. But, the news provides clues to a new path

for clean air improvements in large port cities.

The new report, entitled “Impact of Updated Service Life Estimates on Harbor Craft and Switcher Locomotive Emission Forecasts and Cost-Effectiveness,” found the average Category 2 workboat remains in service for 50 years, instead of the 23-year lifespan estimated by the EPA in the 2008 Heavy Duty Locomotive and Marine Rule. A longer service life reduces the fleet’s turnover rate to cleaner, lower-emitting engines, therefore increasing future-year emission estimates.

Commercial marine and locomotive source categories should be a primary focus of future emission reduction efforts for retrofit/repower programs based on cost effectiveness. In other words: this is a great opportunity for operators to get green cheaply, and a terrific way to keep our shipyards humming along.

OFFSHORE ENERGY WORKBOATS

By autumn of 2018, a glimmer of hope in the offshore energy markets – especially in the Gulf of Mexico – had oil support operators looking to a better tomorrow. It had been a long time since anyone could say that. Multiple bankruptcies dogged offshore service firms as low oil prices dampened the economics of deepwater drilling. The emergence of slimmer, hopefully more profitable offshore companies and some interesting developments on the merger side foretell – if nothing else – excitement in the months to come.

All that said; the hottest news in the last twelve months probably was the merger of Tidewater and GulfMark, eclipsed only perhaps by Harvey Gulf’s (attempted) party crashing at the 11th hour. New Tidewater is the largest OSV owner on the planet by sheer number of OSVs owned, but Edison Chouest Offshore remains in the pole position by fleet value. According to Vessels-

Value.com, if this downturn has taught us anything, big companies survive.

Fast forward to November, however, and global consulting firm AlixPartners, in a report entitled, “Too many ships, too few rigs: why recovery is still a distant dream for the OSV sector,” warned that companies counting on a quick return to stability in the OSV sector were in for a rude awakening. The September report went on to say that OSV companies continue to face pressure due to a radically changed oil industry and must take quick and decisive action in order to survive in what should be considered the ‘new normal.’

The AlixPartners report insists that the global OSV market is oversupplied by about 1,150 vessels. About 900 vessels are 15 years or older which will have difficulty finding work and could be retired. But there are real factors preventing a reduction in the overall supply of vessels. The sector is fragmented, with the largest operators controlling 30% of the fleet and the remaining 70% controlled by 400 smaller operators with fleets of six or fewer vessels. Small operators have little incentive to retire any of their own fleets and are loathe to take action that would benefit the larger companies or the sector overall.

Moreover, a high proportion of these vessels are out of class and worth less than what it would cost to get them back to operating condition. So why aren’t owners sending them to the scrap yard? This is often to do with age. At the same time, the scrapping option is not as economically attractive for offshore supply vessels as it would be for tankers or bulk carriers. The low steel content of offshore supply vessels leaves them with a scrap value of less than 1 to \$2 million, with transport costs also weighing on that difficult decision. And, OSV demand is lower than it was five years ago. Indeed, VesselValue’s Charlie Hockless summed up the situation in late November, “These leaner times have forced drillers to reduce costs, and they have done so with great success. So much so that in some areas, a USD 40/bbl oil price environment has been made profitable. If vessel owners accept scrapping losses now, the rewards/recovery will come sooner.”

Tidewater, Harvey Gulf and GulfMark Fleets			
Owner	#	Avg. Age	Value
Tidewater Marine	208	10.2	\$1.05B
GulfMark Offshore	66	11.2	\$342M
Tidewater and GulfMark	274	10.7	\$1.4B

TOWBOAT MARKET

SAFETY: USCG, AWO WEIGH IN

In late July 2018, the American Waterway Operators (AWO) and the U.S. Coast Guard (USCG) issued their annual benchmarks on safety for the domestic towing industry. It came at a particularly timely moment, just on the heels of the deadline for the so-called ‘subchapter M’ towboat rules. With subchapter M codified as a means to bring (better) safety to more than 5,000 previously uninspected vessels, it will be interesting to see what the future brings in that regard. Arguably, the industry has done a pretty good job of policing itself over time. To that end, the rate of fatalities aboard U.S. towboats continues to trend downwards. For 2016, the towing industry fatality rate is approximately half the transportation sector and double the rate for all fatal work injuries.

On the environmental front, the USCG reported 84,319 gallons of oil were spilled as a result of 49 tank barge pollution incidents in 2017. The largest spill was the result of an explosion and fire aboard a barge at an Aransas Pass anchorage. This incident accounted for 95% of the total oil spilled in 2017, and had it not occurred, the continued downward trend of the collective inland towboat sector would have been obvious. Indeed, and while even one barrel spilled is one too many, three spills accounted for 99% of the total volume of oil spilled from tank barges in 2017. To say that the industry, over the past 20 years, has exponentially cleaned up its environmental signature would not give nearly enough credit to those firms providing service in this sector.

From 2014 through 2017, there has been a 45% reduction in ALL Reportable Marine Casualties reported to the Coast Guard. Over those same years, the towing vessel industry has experienced a 48% reduction in reported incidents, or slightly better than the industry mean. With notable and rare caveats, in terms of safety and environmental performance, the towboat industry continues to get better. The advent of the Subchapter M towboat rules should accelerate that pace. Time will tell.

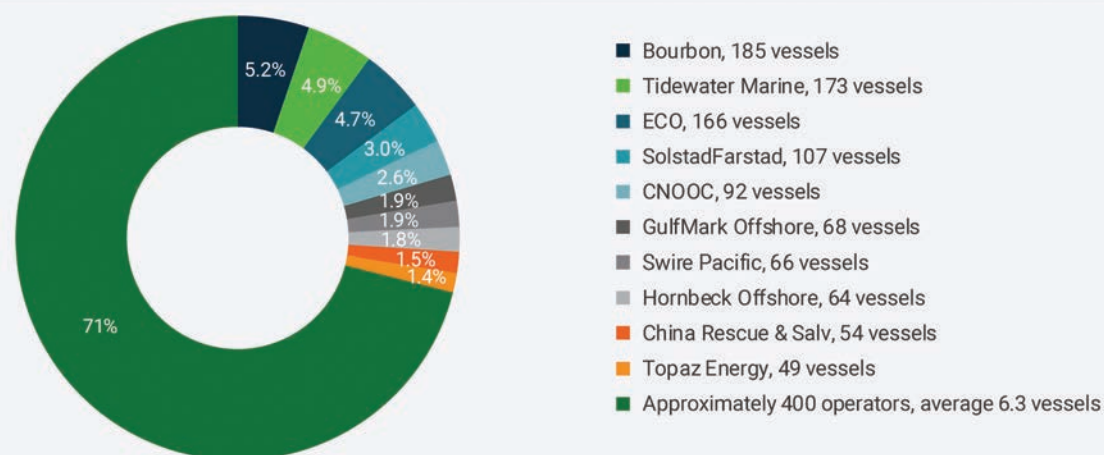
Read the AWO/USCG report by visiting: www.americanwaterways.com/sites/default/files/2017USCG-AWOAnnualSafetyReport31Jul2018.pdf

THE WORKBOAT FLEET: SIZE MATTERS

There are many ways to measure the U.S. workboat fleet and various stakeholders have their own slant on the process. As a general statement, the commercial fleet as a whole is getting older, and this is good news for domestic shipyards who would like to see a bit more

A GLOBAL VIEW

HIGHLY FRAGMENTED MARKET (70% OF SUPPLY IN THE HANDS OF APPROXIMATELY 400 OPERATORS) ACTS AS BARRIER FOR REMOVING SUPPLY OVERHANG



Note: OSV include AHS over 4,000 BHP and PSV over 1,000 DWT. About 400 operators control 2,500 vessels of which 28%, or approximately 700 vessels, are 15+ years old. Vessel totals as of July 2018. Source: Clarksons Offshore Intelligence Network; AlixPartners analysis

U.S. Flagged Vessels as of December 31, 2017

TYPE / AGE	TOTALS	<= 5	6-10	11-15	16-20	21-25	>25
Self-Propelled	9,410	837	925	652	814	446	5,740
Dry Cargo	832	48	60	104	93	67	460
Tanker	79	21	22	14	7	3	12
Pushboat	3,382	421	353	169	196	106	2,137
Tugboat	2,462	128	243	139	185	84	1,683
Passenger	881	27	31	54	87	102	580
Offshore Supply	1,774	191	215	172	246	84	866
Barge (Total)	33,128	6,044	6,140	3,549	5,926	3,797	7,613
Barge (Dry / Covered)	11,452	1,835	2,090	998	3,210	1,695	1,623
Barge (Dry / Open)	8,281	747	1,019	1,416	1,529	1,322	2,245
Deck Barge	8,050	2,000	2,023	463	688	366	2,455
Dry Cargo	163	7	13	10	21	11	101
DH Tank Barge	4,991	1,453	993	660	476	393	1,016
Other Tanker	191	2	2	2	2	10	173
TOTALS	42,542	6,881	7,065	4,201	6,740	4,243	13,353

Source: USACE

sunshine in their bottom lines. They may get their wish. In fact, as much as 41 percent – a whopping 17,596 vessels – of the domestic commercial fleet is now older than 21 years, some of it (13,353; 31%) 25 years or older (or in other words, far older than what the rest of the world deems ready for the breakers). More significantly, 61% of all U.S. flag self-propelled vessels are older than 25 years. Our fleets need to be renewed and they need to be renewed now. Virtually 99% of those vessels can be considered workboats.

Alarming, the fleet of large U.S.-flag vessels engaged in international trade has declined from approximately 199 vessels at the end of 1990 to 82 vessels at the end of 2017. In February 2018, the number of U.S.-flag vessels dropped again, to 81 vessels. The heart of the U.S. merchant fleet, therefore, is its workboat, brown water sector. That won't change any time soon.

TUGBOAT & TOWBOAT MANUFACTURING

A recent report from Amadee+Company provides a unique, first-time market and competitive analysis of the size, segmentation, competition, trends and outlook in the manufacture and supply of tugboats and towboats in the United States. Products analyzed include harbor/escort, ocean, ATB, inland and multipurpose tugboats and towboats. The report, "tugboat and towboat Manufacturing in the United States from 2017-2023," provides a detailed look at a segment of one of the oldest industries in the United States: shipbuilding.

According to the report, currently there are approximately 125 shipyards operating in the United States, spread across 26 states, which are classified as active shipbuilders, and capable of building tugboats and towboats. Of these, only 39 manufacturers manufacture tugboats and towboats, and of these, only eight made tugboats exclusively, in the most recent year analyzed. The report identifies Eastern Shipbuilding Group, Diversified Marine and Conrad Shipyard/Conrad Orange as the biggest players in terms of shipment value.

U.S. tugboat and towboat production has ranged between 105 and 122 units annually, worth \$600-\$900 million. Although small compared to U.S. government shipbuilding, tugboat and towboat production is absolutely necessary for U.S. waterborne transportation, which is estimated at \$16.9 billion in 2019, is of strategic importance, and is protected by the Jones Act.

Towboats represented more than two-thirds of the market in terms of volume but less than 40% in terms of value for the last year that was analyzed. That is because the average selling price for a tugboat was more than \$13 million, compared to a towboat ASP of almost \$4 million. After towboats, harbor/escort tugs are the second largest market segment in both volume and value, followed by ATBs, ocean tugs and multipurpose tugs.

The report identifies C&C Marine as the largest towboat builder in terms of production value, followed by John Bludworth, Eymard Marine, Metal Shark (Alabama), and Progressive Industrial. Together, these five firms accounted for only 36% of towboat production value. This low cumulative share indicates how frag-

mented the market for towboats is. By comparison, the Harbor/Escort market is dominated by two companies, Diversified Marine and Washburn & Doughty, who together accounted for more than 50% of production, both in terms of units and value.

In terms of volume, tugboats production is forecast to grow almost 3% annually to 2023 and towboats more than 6%. Towboat production will grow faster because 2018 production was far below its historical average. The major demand drivers for tugboats and towboats over the next five years will include black oil and refined petroleum products, petrochemicals and agricultural chemicals.

For example, since 2010, 333 chemical industry projects cumulatively valued at more than \$200 billion have been announced, with 53% of the investment completed or under construction and 41% in the planning phase.

Further, 71% of chemical investment from shale gas is bulk petrochemicals and plastic resins. Of that, 52% of total investment (around \$105 billion) is petrochemicals and 19% of total investment (around \$37.5 billion) is plastic resins. U.S. petrochemical investment has largely focused on agricultural chemicals, methanol, ethylene and ethylene derivatives, especially polyethylene.

Nearly 20 facilities, or crackers, are being built or expanded in the U.S. to convert natural gas liquids (NGL) such as ethane and propane into ethylene. Ethylene is the most used petrochemical globally currently and the main ingredient in polyethylene plastic. Nine of these crackers are expected to come online in the U.S. by 2020, representing 10.7 million metric tons/year of new ethylene capacity. As much as 9.2 million metric tons of that will be online by the end of 2019 in the U.S. Gulf alone.

Many of the natural resources used as inputs for these plants, as well as the petrochemicals and refinery products produced, will be shipped by water for domestic consumption and exports. Without towboats and tugboats these products could not be moved.

A negative for the industry is tariffs. Steel represent approximately 25% of a typical tug's production costs. The Trump Administration's imposition of a 25% tariff on imported steel and aluminum in 2018 is expected

to drive up production costs by 2%-3% annually. This in turn will have a negative effect on tug producers net operating margins, which typically are less than 5%. Tariffs also will increase the cost of imported products such as deck gear.

USCG DOMESTIC FLAG STATE REPORT

The U.S. Coast Guard's 2018 Domestic Annual Report contains statistics regarding inspections and enforcement of regulations on U.S. flagged vessels. For the first time, the Coast Guard presented information reflecting the entire U.S. Flag fleet, including barges, cargo vessels, passenger vessels, vessels operating on the Outer Continental Shelf, research and school ships, fishing vessels, and the newest members of the inspected fleet, towing vessels. With the addition of towing vessels, which started getting inspected under 46 CFR Subchapter M in July of 2018, the size of the U.S. inspected fleet grew by approximately 6,500 vessels to a total fleet size of nearly 20,000 vessels, an increase of 50%. Unclear in all of that is why, if the U.S. commercial fleet numbers as many as 42,500 vessels, why ALL of these hulls aren't being inspected.

In comparison to last year, which was the first year the Coast Guard published their annual report, the number of vessel inspections increased by 1,624 and the average number of deficiencies identified per inspection increased from 1.17 to 1.26, rising nearly 8%. That may have something to do with the introduction of all those previously uninspected subM hulls. Or, not. 2019 will show a clearer trend.

It is important to note that since this report covers the 2018 calendar year and the compliance date for implementation of towing vessels was July 20, 2018, only five months of data for inspected towing vessels is included in this report. Hence, the numbers may actually be far worse on an annualized basis, looking ahead. Interestingly enough, passenger vessels accounted for 72.3% of those deficiencies. However, based on vessel population, Cargo vessels received a higher ratio of deficiencies per vessel, with an average of 4.17. To be fair, the passenger vessel sector is one of the most highly regulated and closely watched – as perhaps it should be, given the millions of lives at stake – in the U.S. flag fleet.

2018 Fleet Performance / By the Numbers (#)

TYPE / # US Flag	Inspections (No.)	Deficiencies (No.)	Deficiencies (ratio)/vessel	% of All Inspections	% of All Deficiencies
Barges (4,735)	5,469	1,857	0.39	27.3%	7.3%
Cargo Vessels (549)	1,485	2,287	4.17	7.1%	9.0%
Pass. Vessels (6,389)	11,018	18,311	2.87	55%	72.3%
Towing (7,403) (*)	1,278	1,915	0.26	6.4%	7.6%
OCS / OSV (548)	736	779	1.42	3.7%	3.1%
Schoolship/Research (55)	121	175	3.18	0.6%	0.7%

(*) only 5 months of data available / (#) USCG inspections ONLY

See the entire U.S. Coast Guard 2018 Domestic Flag State Report by visiting: <http://mlnk.co/uscg2108>

Images courtesy Glosten/ALDOT



FERRY FIRST

Alabama's Gee's Bend Ferry recently entered service after being converted from geared-diesel to become the first zero-emission, electric-powered passenger/car ferry in the U.S. Owned by the Alabama Department of Transportation (ALDOT) and operated by HMS Ferries, Seattle-based Glosten provided concept through contract design and shipyard technical support of the vessel conversion to all-electric.

New ATB for VANE

In 2018, Vane Brothers took delivery of the first of three new articulated tug/barge (ATB) units ordered through Conrad Shipyard: the 4,400-horsepower tug Assateague (designed by Castleman Maritime and built at Conrad's Orange, Texas, facility) and 80,000-barrel barge Double Skin 801 (designed by Bristol Harbor Group and built at Conrad's Amelia, La., facility).

Credit : VT Halter Marine and Technology Associates, Inc.

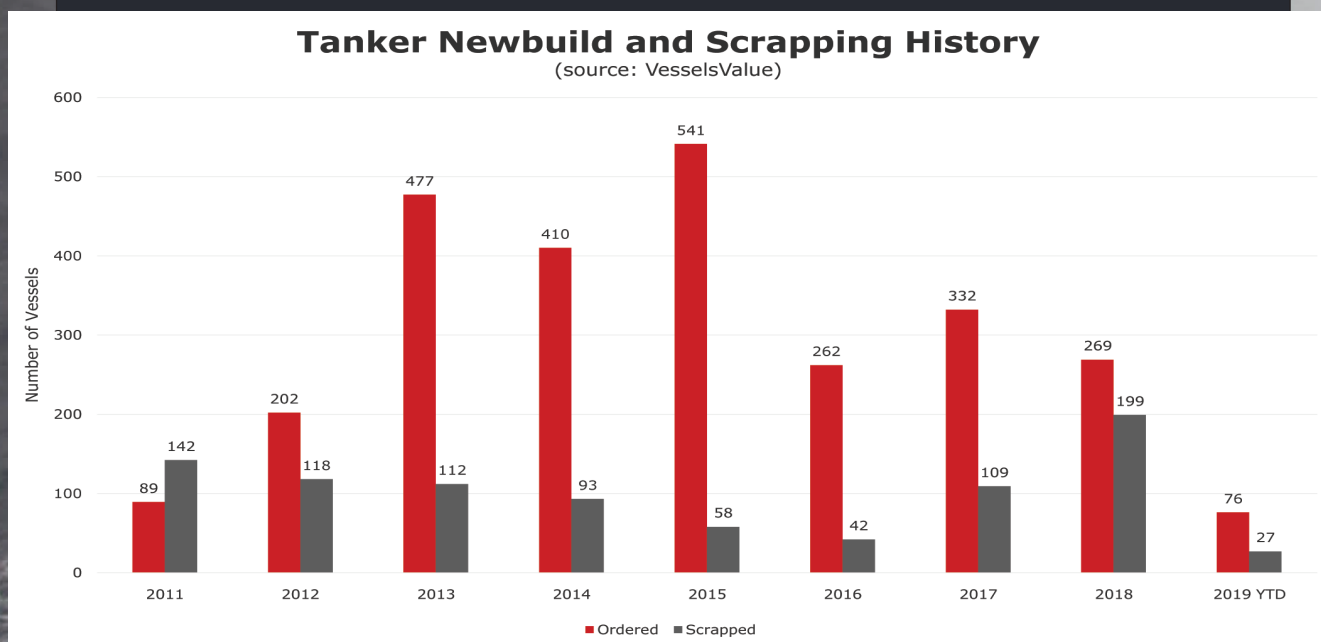
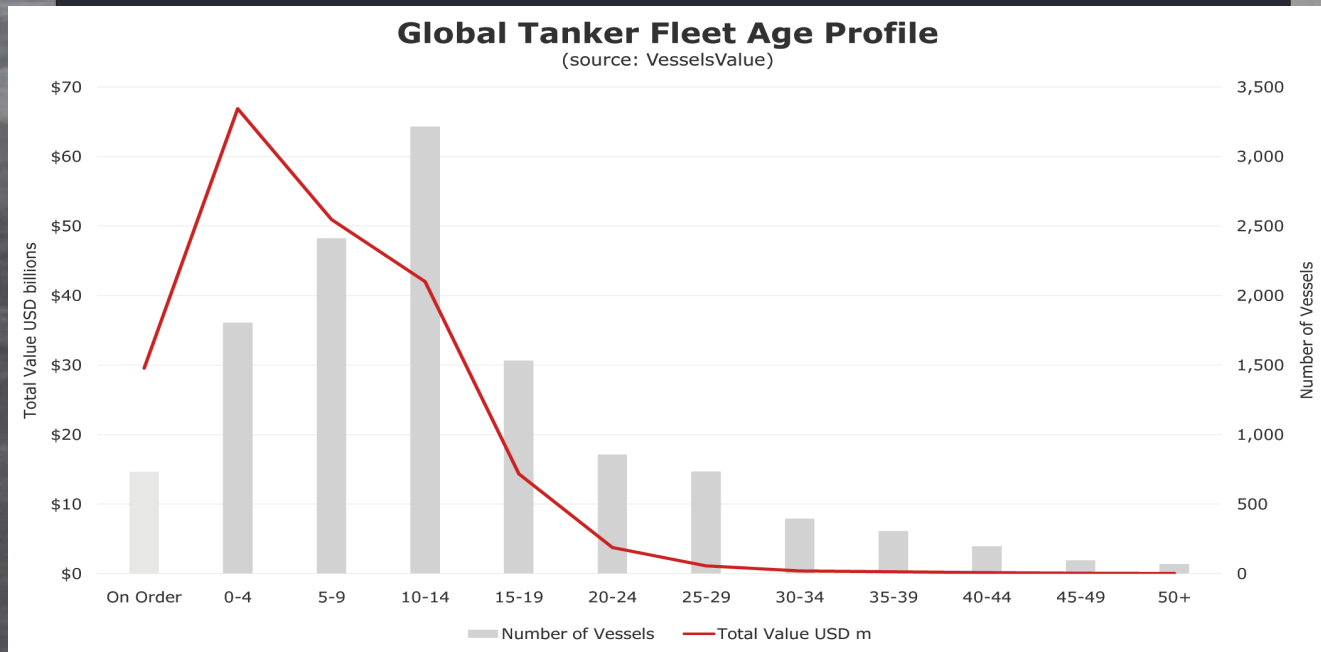
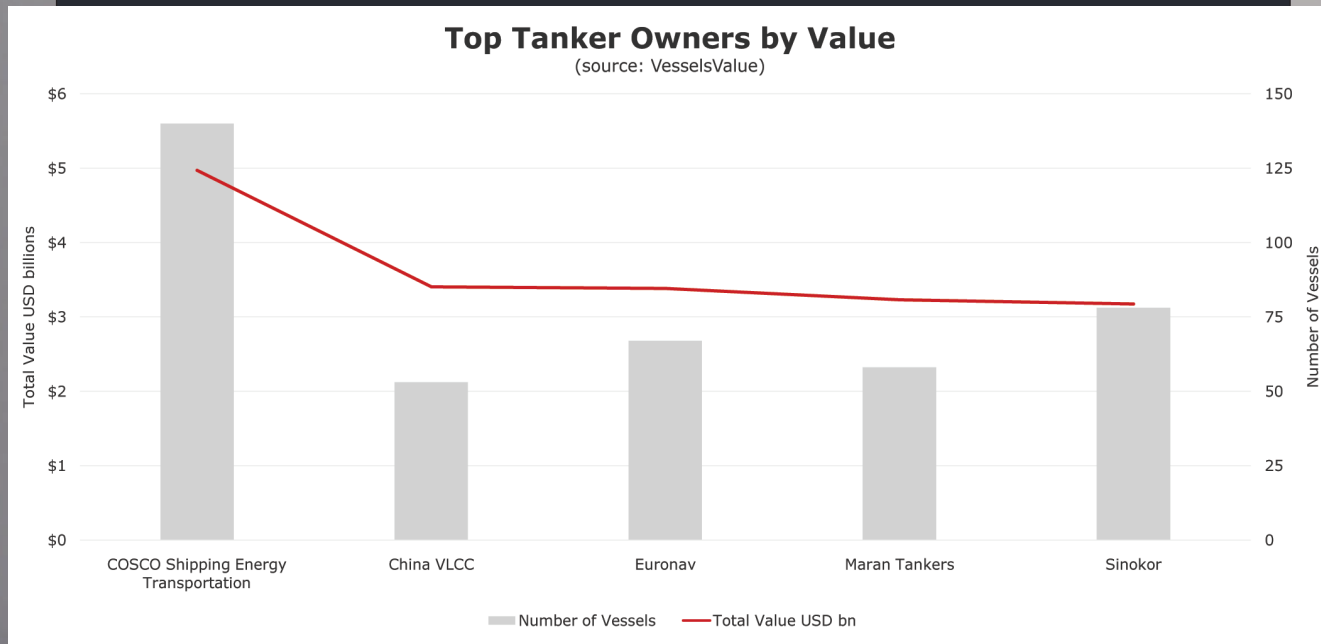


MIRACLE ON ICE

Arguably the most exciting new shipbuilding project in the U.S. is the project to rebuild the USCG icebreaker fleet. A contract won by VT Halter Marine of Pascagoula, Mississippi, as the prime contractor of a \$745,940,860 fixed-price incentive-firm contract for the detail design and construction of the U.S. Coast Guard (USCG) PSC (formerly the Heavy Polar Icebreaker).



Credit : Vane Brothers



Credit: VesselsValue.com

TANKERS

BY OLIVIA WATKINS, HEAD CARGO ANALYST, VESSELS VALUE

NEWBUILD

Since the beginning of the year, 100 newbuild orders have been placed across the tanker sector. This is a considerable amount lower than the same period last year, when 140 vessels were placed. It is no surprise to see the Greeks lead the way with the highest number and largest vessels ordered, but hot on their heels are the likes of Eastern Pacific and Ocean Tankers, the Singaporean owners ordering the clean trading vessels.

Norwegian companies Hunter Group and Knutsen NYK Offshore buy few but spend a lot. Combined, they have spent close to half a billion dollars on only five vessels, ordering three VLCCs for \$93.6 million each and two Suezmax shuttle tankers for \$105 million each.

SECOND HAND

In contrast to the newbuilding market, the sale and purchase market is looking rather strong in recent months,

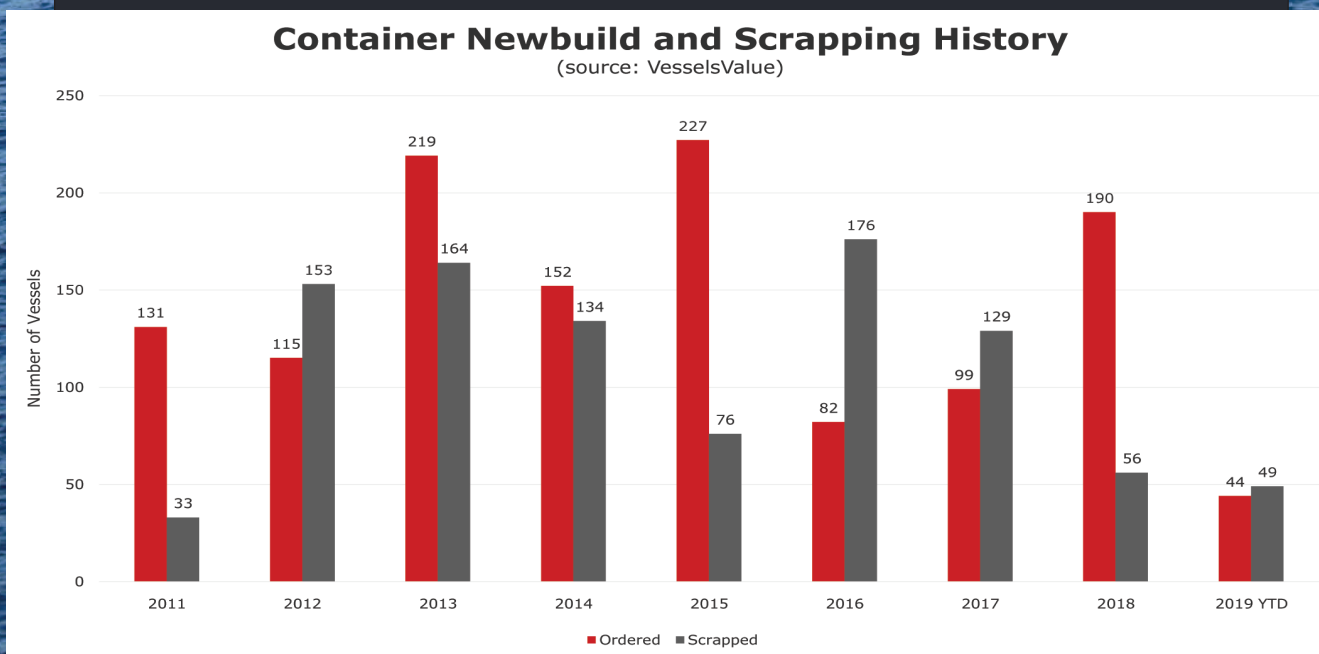
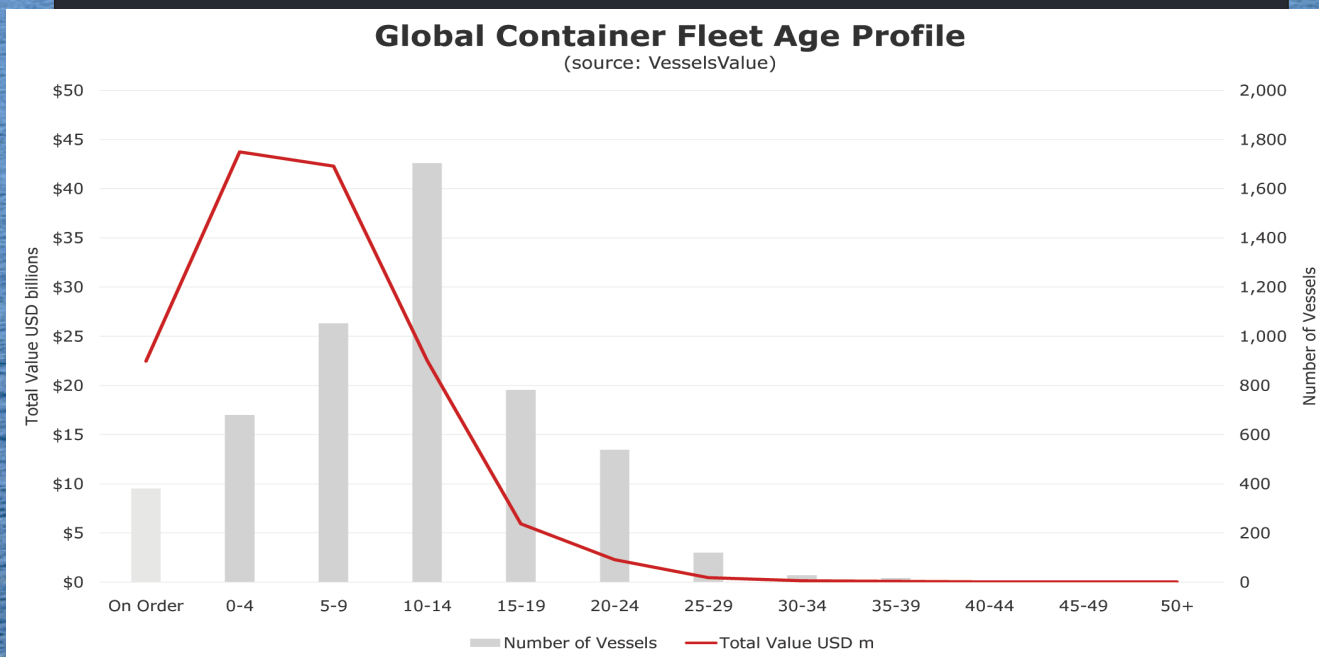
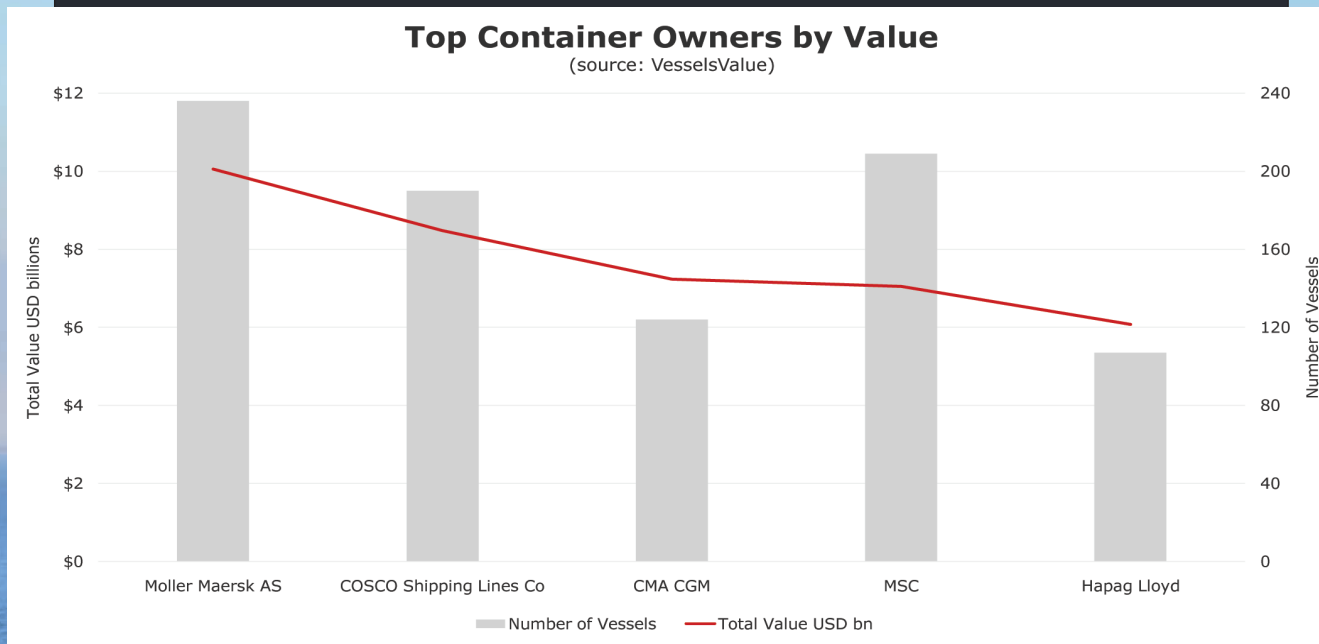
with 500 sales confirmed over the last 12 months averaging over 40 sales a month. Product carriers have been at the forefront of interest with over 50% of the deals consisting of these vessels.

This does not include chemical tankers. It is interesting to note that older VLCC tonnage is being sold for further trading as rates have improved. Since the beginning of 2019, of the 13 total VLCC deals, Sinokor has offloaded three older units.

DEMOLITION

The demolition market for tankers has slowed down with only 30 deals done year to date compared to 105 for the same time last year.

Noticeably, the larger tonnage has taken a step back in terms of demolition deals with a high number of smaller units going for scrap over the past 12 months. Demolition rates have remained high and steady with Bangladesh taking the majority of tonnage.



Credit: VesselsValue.com

CONTAINERSHIPS

BY GUY COOPER, CARGO ANALYST, VESSELS VALUE

NEWBUILD

The highlight for newbuild orders in the last 12 months must certainly be HMM's mammoth order back in September 2018. The S. Korean company placed en bloc orders at three top S. Korean yards for almost \$3B in total, including eight 15,300 TEU ULCVs from Hyundai, seven 23,000 TEU ULCVs from Daewoo and five 23,000 TEU ULCVs from Samsung. These huge orders equate to 20 new ULCVs at nearly 400,000 TEU total. Once live, the 23,000 TEU vessels will take the crown for the largest containerships on the water.

SECOND HAND

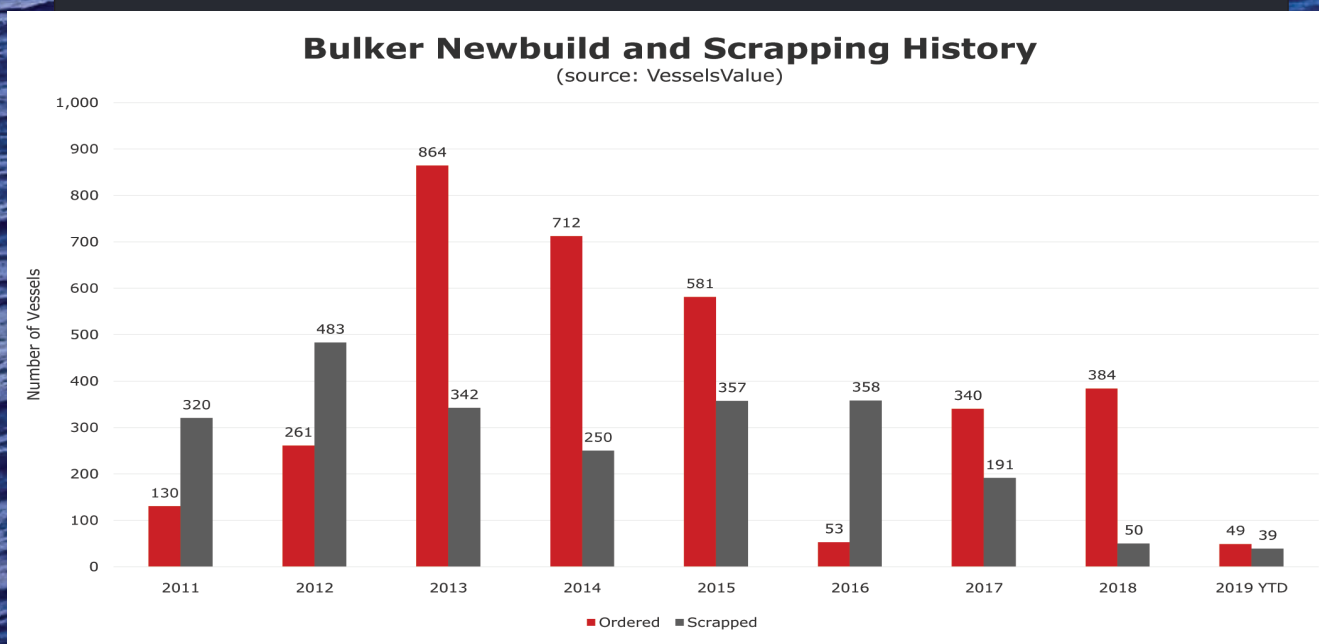
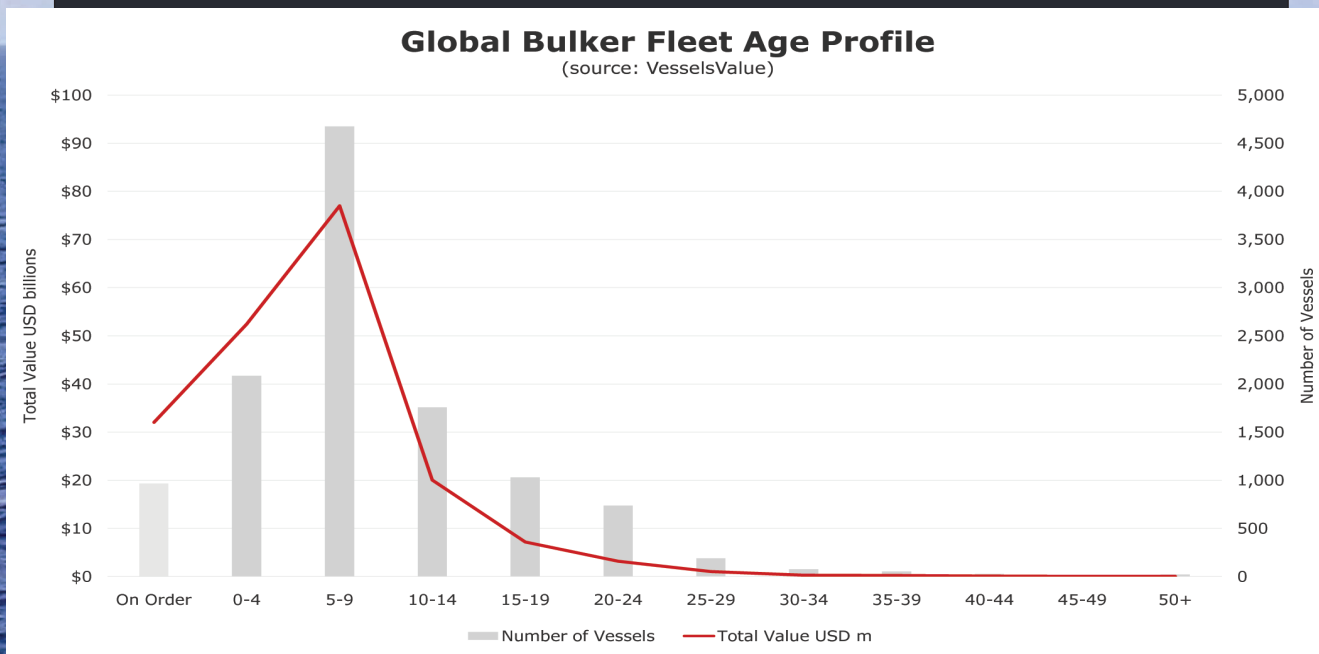
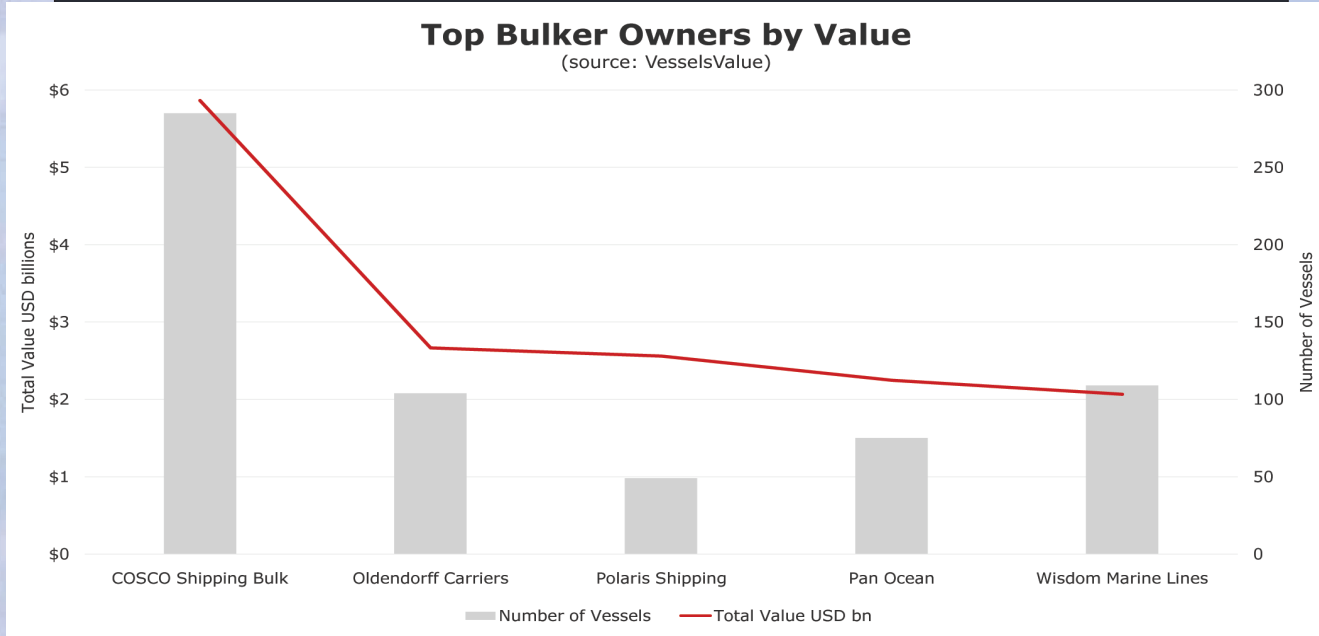
The last 12 months of the second hand container market have been significantly less active, with only 162 transactions compared to 334 in the previous year for the same period. This is a 50% drop in activity. Sales started off strong, but the drop in charter rates which began around July 2018 quickly applied the brakes to the S&P market. The uncertainty that continues to loom over 1,700 TEU and 3,500 TEU vessels only lasted a couple of months for the larger tonnage of 8,500 TEU. Rates bounced back and shot up for

this larger tonnage, peaking in April 2019 at \$25,000 per day, the highest it has been for nearly four years.

DEMOLITION

The demolition market has looked rather promising in the containership sector. In the last 12 months, almost a third of containerships scrapped were owned by Germans or Greeks, which comes as no surprise as Germany continues its scrapping crusade. We recently saw a nine-year-old containership scrapped, which is the youngest scrapped in over a year and the third youngest ever. Aeneas (5,100 TEU, Mar 2010, Jiangnan Shanghai Changxing Heavy Ind) was sold for scrap for \$450 per LDT in Hong Kong. The early retirement was encouraged due to the vessel suffering from main engine problems.





Credit: VesselsValue.com

BULKERS

BY OLIVIA WATKINS, HEAD CARGO ANALYST, VESSELS VALUE

NEWBUILD

Many Chinese companies have been stepping up in the bulker market with COSCO Shipping and Avic leasing placing orders at Chinese yards. Of the total 313 bulk carriers ordered over the past year, nearly 40% have been Panamax vessels, demonstrating the hot market.

SECOND HAND

The bulker market as a whole has shown a softening in values over the past year. The main reason for this is due to the drop off in rates throughout the first quarter of 2019.

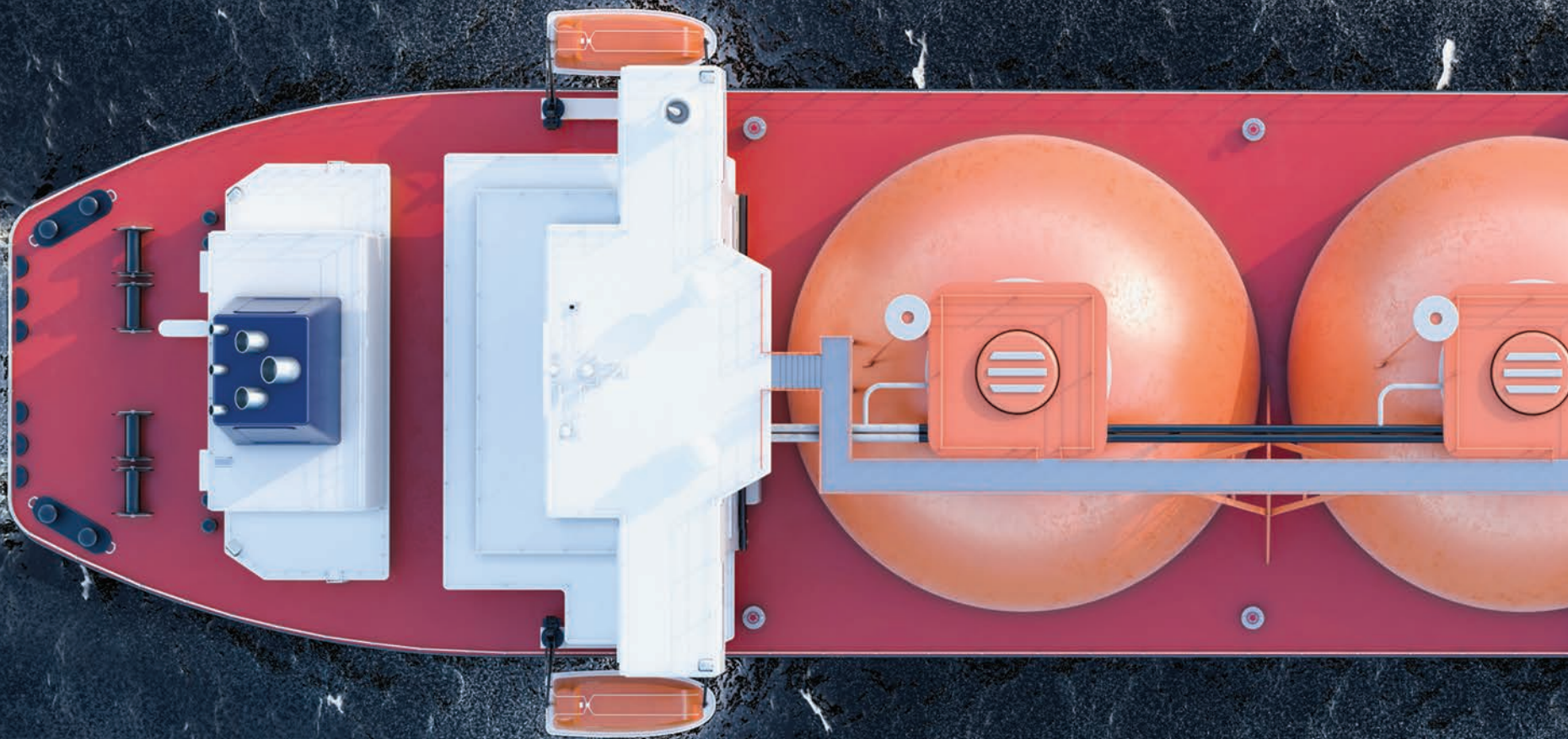
In particular, the Capesize market suffered a substantial amount over the spring months with rates reaching

three-year lows. This was represented in the sale and purchase market with a break of 110 days when no deals were confirmed. A break of this length has never been seen in the market before. Having said this, we have recently seen an unusual sale of an ore carrier, the Pacific Glory, for \$14.6 million offloaded by MOL.

DEMOLITION

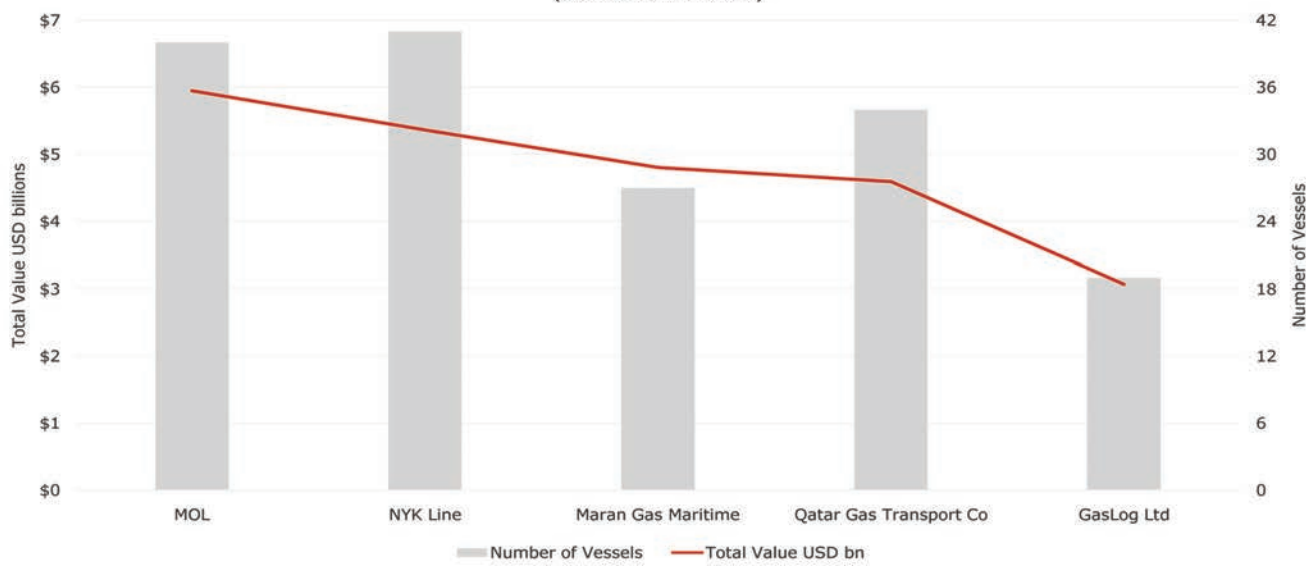
To contrast the limited activity in the S&P market, 20 Capesize vessels have been confirmed for demolition since January 2019, mostly with delivery to Bangladesh. This compares to 17 vessels that were sold for demolition through all of 2018 making them the most popular bulker to be scrapped.

GAS SHIPS



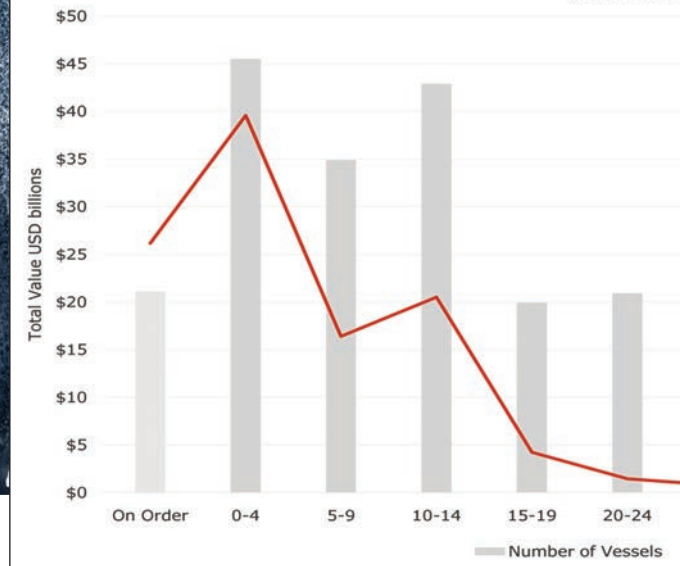
Top Gas (LNG & LPG) Owners by Value

(source: VesselsValue)



Global Gas (LNG & LPG)

(source: VesselsValue)



BY COURT SMITH, SENIOR ANALYST, VESSELS VALUE

Infrastructure continues to expand, and pricing incentives will continue to shift as the market matures. The LNG markets look like they may resemble the clean product tanker market in several years, which is highly arbitrage driven. We look to see an increased number of portfolio players working the spot market, which will drive the commoditization of the space and enable further demand.

The total ton-mile demand for LNG

carriers has increased over the past several years. More than 60 countries have imported LNG cargoes in the past quarter, and 14 of these countries imported no LNG in 2013, highlighting the growing ecosystem available for sellers. Of the 63 countries that imported LNG, 38 have seen a growth in the ton mile demand they drive when compared with 2013 Q1.

The LPG markets gained as well, with ton-mile demand surging across

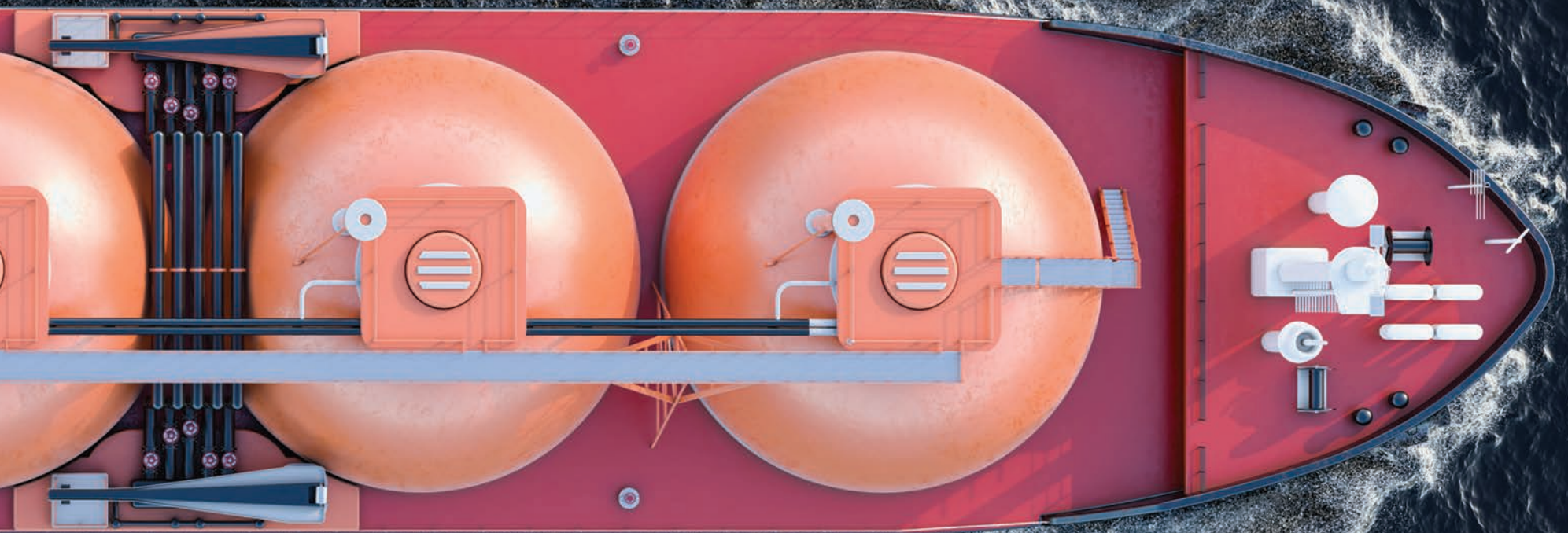
the spectrum and pulling spot rates upwards.

Supply growth across the total gas markets has slowed, but recycling activity has been robust, particularly given the rising sentiment for both LNG and LPG carriers. There are many older vessels such as steam turbine LNG carriers that are at the end of their already prolonged service life.

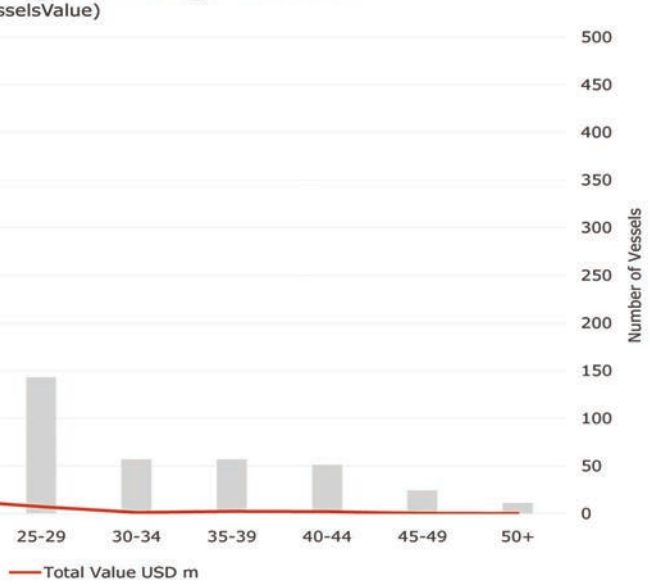
The recent announcement that Saudi Arabia will begin to take a sizable po-

sition in US based LNG projects has ignited a new surge of interest in the future of LNG as a key part of the energy mix going forward.

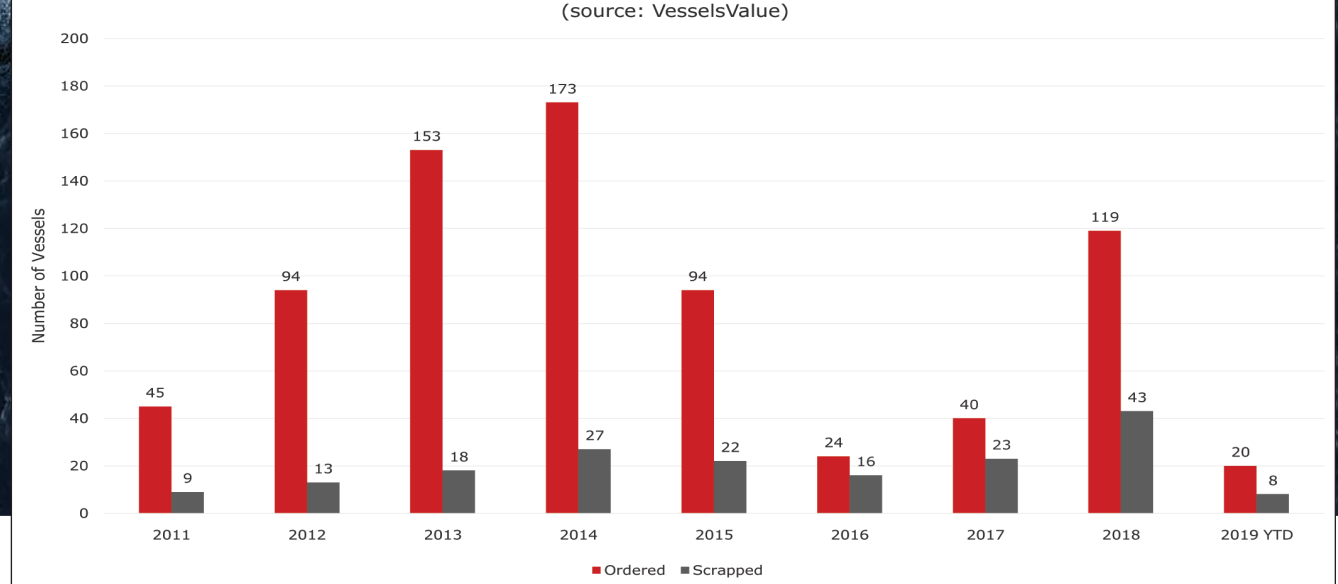
The market is evolving rapidly, as are trade lanes the ships operate on. The rise in spot market activity will move hand in hand with the commoditisation of the fuel. Day rates for large LNG carriers rose in early 2019 after demand in Europe filled the gap left by China after a warm winter.



LPG) Fleet Age Profile



Gas (LNG & LPG) Newbuild and Scrapping History



BY ROBERT DAY, HEAD OF OFFSHORE, VESSELS VALUE

NEWBUILD

Unsurprisingly, across the offshore sectors, newbuild orders have been scarce to none. Oversupply is still a major problem for the industry and due to slippage, ordering vessels now would be counterproductive. Why order brand new vessels from a yard and wait several years for these to be delivered, when you can purchase readily available cheap tonnage direct from the yards ready to go?

SALE & PURCHASE

It has been a bumper year for sale and purchase activity within the OSV and OCV sectors, with 172 second hand transactions in the OSV sector and 23 in the OCV sector. In the OSV sector, the Toisa bankruptcy process

moved into full swing and we saw the market flooded with distressed tonnage. Several companies have managed to acquire good quality vessels at very attractive prices.

NOTABLE TOISA SALES

The Toisa Elan, Toisa Envoy and Toisa Explorer Super Large AHTSs (18,767 BHP, 2013, Wuchang Shipbuilding) were purchased by Eastern Navigation of Singapore for \$6 million each. Subsea 7 purchased the Toisa Pegasus Dive Support Vessel (131 LOA, 2009, IHC Merwede) for \$38.95 million; the vessel was laid up and SS/DD Due.

THE RIG MARKET

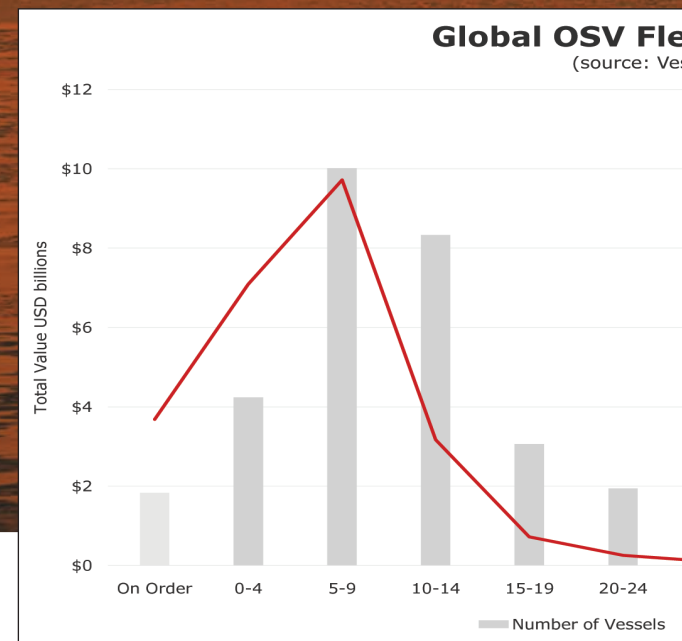
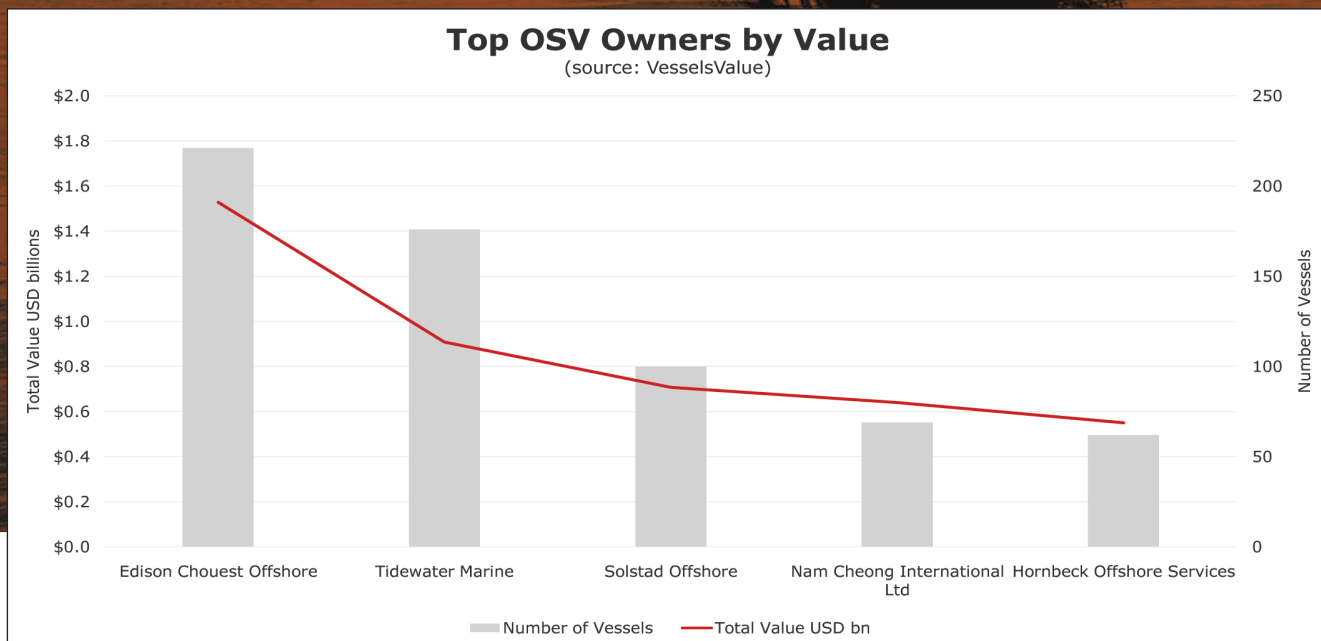
In the rig sector, Borr Drilling has been relatively quiet since its purchase of five rigs at the start of May 2018 from Keppel FELS for \$144 million. Instead, we saw the emergence of rig operators in the sale and purchase market. Players such as Shelf Drilling and Noble Drilling have taken advantage of the current market conditions and acquired quality tonnage from Chinese yards at attractive prices.

However, not to be outdone, Borr emerged last month almost a year after its last purchase and swooped in on the Thor (ex Hakuryu 15, 400 FT, 2019, Keppel FELS) for \$122 million. The rig was contracted to BOT lease in 2014 for \$240 million.

DEMOLITION

Tidewater continues to set the standard when it comes to scrapping. The OSV giant announced their fleet overhaul plan in 2018, which contained competitive vessel specifications, known as Tier 1, to modernize their fleet. Tier 1 states that PSVs require a deck area of greater than 800 sq. m. and AHTSs need a bollard pull of greater than 80 MT, while both need to be under 10 years old with DP 2 to be competitive.

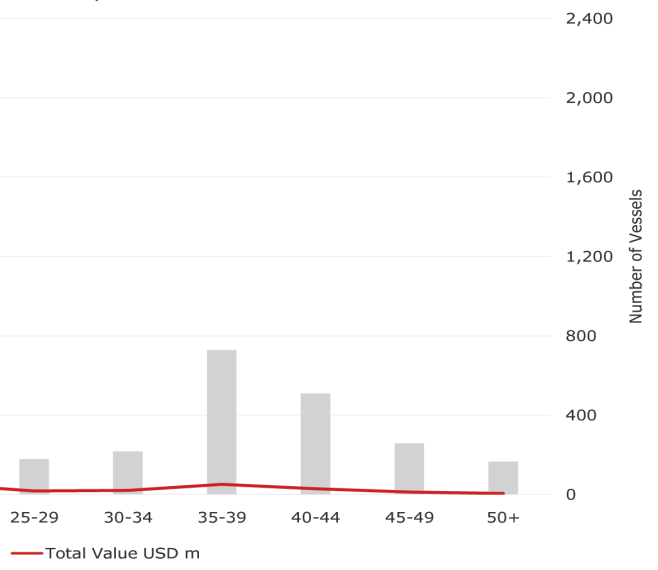
Between January 2018 and May 2019, Tidewater has scrapped a total of 45 vessels. However, following the merger, non-core tonnage (including ex-GulfMark vessels) has quickly been making its way to the breakers' yards in 2018 and Q1 2019.



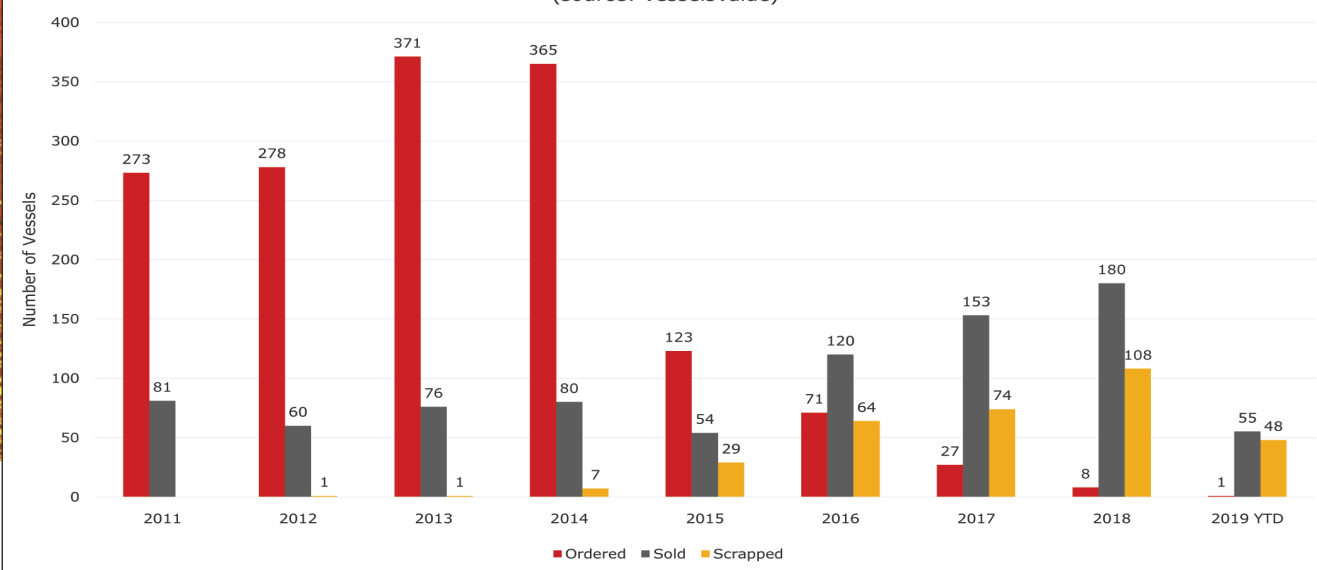
OFFSHORE

© boscorelli/Adobe Stock

Asset Age Profile
(VesselsValue)



OSV Newbuild, Purchasing and Scrapping History
(source: VesselsValue)



2019



EUROPORT 2019
5-8 Nov | Rotterdam Ahoy

**SPECIAL SHIPS
SMART SOLUTIONS**

REGISTER FOR A FREE VISIT
VIA WWW.EUROPORT.NL

TOP U.S. PORTS

Last year at this time we provided a list of the top 10 U.S. Ports by TEUs and value. That information was provided to us by the diligent folks at Descartes Datamine, one of the best maritime data crunchers on the planet. The list showed:

Notably, the top 10 ports are the same for 2018. But the actual numbers for 2018 are larger, just as the numbers for 2017 are vastly larger because Descartes counts only loaded inbound containers, not all containers. So, the number of outbound containers in Los Angeles for 2017 was 1,900,000, and the number of empty containers handled in LA totaled 2,227,200; both were not counted in the Descartes survey. That's just the way they do things.

This is but one reason the exercise of counting containers, TEUs, (Twenty-foot equivalency units) handled by each port each year has become relatively meaningless, except to those ports who wish to, or need to, show some measure of growth. "The Port of New Orleans (Port NOLA) moved more containers in 2018 than at any time in its history, totaling 591,253 TEU, up 12.3 percent compared to one year ago" according to the port's president. "The expansion of the Panama Canal and growth in containerized exports, namely resin and frozen poultry, have buoyed Port NOLA's containerized cargo to record levels. In addition, loaded imported containers rose 7 percent, which continues to be a focus of Port NOLA's marketing efforts," said Brandy D. Christian, Port NOLA President and CEO. Houston, number one in the U.S. in foreign tonnage and just ahead of New Orleans in total foreign tonnage, still aspires to top container port designation. At the end of August last year it could finally and truthfully make the claim: "Houston Jumps To Top 5 U.S. Container Ports." The port of Houston release said, "Due to continued strong growth in loaded containerized cargo, Port Houston has surged higher in the rankings of the top container ports in the United States. Port Houston, which has been expanding rapidly in recent years, has climbed to become the fifth largest container port in the U.S., according to JOC Piers data covering the second quarter of 2018. Port Houston handled 1,057,964 twenty-foot-equivalent-units (TEUs) during that period and catapulted up from the sixth spot."

In the 2018 time period Houston was first in the nation in terms of total cargo tonnage and third in total cargo value, far ahead of second place New Orleans in total tonnage and second place Port of New York, New Jersey in terms of cargo value, according to a study conducted by the Maryland Port Authority.

Another reason we need to be cautious when reading lists of ports by containers is that individual shipping lines or, more so today, the big shipping alliances chose which terminal at which port receives a box of cargo, not the shipper or the port. Any one container carried on any of Ocean Network Express (ONE) carriers, for example, could mean that a shipper's box transported on any one of the alliances members (NYK Line, 'K Line, and MOL)



ROTTERDAM
AHOY

could be delivered to any one of seven terminals in the “Los Angeles–Long Beach complex,” which is another way of saying the two ports at San Pedro Bay. Each of the Japanese carriers had its own terminal at the Southern Californian complex, with ‘K’ Line’s International Transportation Services and NYK’s Yusen operating facilities at Long Beach, and MOL’s TraPac operating the TraPac facility at Los Angeles. And now that they have merged, ONE’s containers could go to either port at any time. The same is true for any of the containers carried on any of the other alliances. The same is also true with the Port of Seattle and the Port of Tacoma, which now do business as a consolidated port: the Northwest Seaport Alliance. To the north, the Northwest Seaport Alliance has nine container terminals between Seattle and Tacoma ports. Alliance CEO John Wolfe said it will eventually reduce the number to four, with two in the North Harbor and two in the South Harbor, the new inside names of Seattle and Tacoma, called locally SeaTac.

The same is true for containers carried to the Port of New York/New Jersey, which offers seven different cargo terminal operators along a coastal area that includes 25 miles and two states. The top 10 global shipping lines control 84 percent of the world’s container capacity, up from 53 percent in 2006. And consolidation is sure to continue. As Maersk CEO Soren Skou said to the Financial Times, “The industry is expected to consolidate further leaving about 5-6 major global carriers in the next decade or so to run the market.” Already, many lists by TEU include Los Angeles/Long Beach together as San Pedro Bay. They include SeaTac or Seattle/Tacoma as one port, the NWSA or Northwest Seaport Alliance. And they count NY/NJ as one giant port. As you can see from the next list that would reduce six ports among the top 10 to three, and move others up.

To portray an accurate picture of TEUs at the ports including import TEUs, export TEUs and empty TEUs we have decided to use the little known Port Performance Freight Statistic Report to Congress 2017 to report the 2017 totals. To report the 2018 totals we have used the ports’ own statistics from 2018 as described in each of their press releases.

Get the Full Report:

The preceding was excerpted, in part, from the March/April 2019 edition of *Maritime Logistics Professional*. Get the full report here: <https://magazines.marinelink.com/nwm/MaritimeProfessional/201903/#page/47>

Top U.S. Ports cargo in value (in Millions)

Rank	U.S. Port	2018	2017
1	Los Angeles	\$ 297,048	\$ 283,940
2	Port of NY/NJ	\$ 206,827	\$ 189,740
3	Houston	\$ 159,249	\$ 131,474
4	Georgia Ports	\$ 119,516	\$ 107,675
5	Long Beach	\$ 109,166	\$ 99,897
6	Virginia Ports	\$ 79,336	\$ 77,757
7	SeaTac	\$ 77,510	\$ 75,245
8	SC Ports	\$ 72,690	\$ 69,754
9	Baltimore	\$ 59,723	\$ 53,962
10	New Orleans	\$ 53,371	\$ 50,171
11	Oakland	\$ 49,203	\$ 47,790
12	Corpus Christi	\$ 29,506	\$ 22,733
13	Jacksonville	\$ 25,678	\$ 25,322
14	Miami	\$ 25,665	\$ 23,894
15	Philadelphia	\$ 24,598	\$ 22,561
16	Port Everglades	\$ 24,404	\$ 23,173
17	Port Arthur	\$ 21,205	\$ 15,338
18	Gramercy	\$ 21,100	\$ 19,203
19	Beaumont	\$ 18,777	\$ 13,240
20	Mobile	\$ 18,703	\$ 16,905
21	Lake Charles	\$ 14,291	\$ 11,178
22	Wilmington, DE	\$ 13,821	\$ 11,367
23	San Juan	\$ 12,218	\$ 9,902
24	Baton Rouge	\$ 11,907	\$ 9,930
25	Portland, OR	\$ 11,843	\$ 10,485
ALL	***	\$ 1,761,609	\$ 1,602,201

Top U.S. Ports Cargo (total tons)

Rank	U.S. Port	2018 Tons	2017 Tons
1	Houston	201,540,173	180,855,210
2	New Orleans	127,643,304	127,795,757
3	Port of NY/NJ	85,170,792	81,626,497
4	Los Angeles	80,378,413	78,551,891
5	Gramercy	80,219,057	75,737,847
6	Virginia Ports	69,827,662	63,156,849
7	Corpus Christi	66,840,666	63,060,655
8	Long Beach	53,709,451	53,571,196
9	Port Arthur	52,920,432	50,534,141
10	Lake Charles	44,050,520	37,874,562
11	Baltimore	42,993,122	38,213,697
12	Georgia Ports	42,939,903	40,077,356
13	Beaumont	41,836,443	34,358,309
14	SeaTac	40,812,658	39,884,751
15	Baton Rouge	37,123,012	33,419,070
16	Mobile	36,589,914	36,178,686
17	Philadelphia	26,240,705	25,543,116
18	Wilmington, DE	25,108,054	25,704,747
19	SC Ports	22,768,642	25,050,692
20	Freeport, TX	21,139,140	19,556,790
21	Texas City	20,463,403	22,336,398
22	Morgan City	18,786,765	23,725,942
23	Richmond, CA	18,187,199	18,877,707
24	Oakland	17,670,989	17,942,979
25	Portland, OR	17,005,087	15,005,087
TOTALS	***	1,600,723,570	1,527,434,07

WHEREVER LIFE TAKES YOU,

TAKE GME.

AUSTRALIAN ENGINEERED

WATER-ACTIVATED GPS EPIRB

The MT603 Series of water-activated, GPS-equipped EPIRBs from GME are the most advanced 406 MHz digital EPIRBs on the market today. Designed, engineered and manufactured in Australia, the MT603 Series of EPIRBs have obtained international Cospas-Sarsat approval. Boasting the latest advances in emergency beacon technology, the MT603 Series ensures the safety of your vessel and crew in emergency situations, regardless of your location.

Exclusive North American Distributor
Whiffletree Corporation • Ph: (207) 647-3300 • www.whiffletech.com

gme.net.au

TOP SHIPOWNERS: IS BIGGER BETTER?

*Like any other business, some shipping companies are bigger than others. This article looks at some of the larger participants in the various sectors. “Big” can be defined in multiple ways. Here, contributing editor **Barry Parker** takes a deep dive into the data revealing the true visage of market dynamics; “controlled” capacity includes not only owned vessels, but also in-chartered tonnage.*

In a conventional sense, two entities stand out as they cut across league tables for the various deepsea sectors; they are AP Moller Maersk (APMM, or, simply, Maersk) and Cosco Shipping, both of which have weighty presences, in terms of sheer vessel owning, in multiple maritime sectors.

However, it’s worth pointing out, right up front, that bigger is not always better. Generally, the rationale for bigger companies cuts across three dimensions, melding internal (operational), external (impact on the market) and financial—where the entities raise funds through established capital markets (see Table 1 below).

Dr. Roar Adland, visiting scholar at MIT Center for Transportation and Logistics and Professor at the Norwegian School of Economics (NHH), told *Maritime Reporter*,

“If consolidation was the solution to all that ails shipping, then container liner companies would be super profitable. They are not. In ‘commoditized’ sectors of the shipping industry, which by now includes pretty much everything apart from very small niche markets, there is hardly any economies of scale at the company level. As long as bigger is not in fact much better, then meaningful consolidation will not happen.”

A different view comes from UK based shipping information provider VesselsValue, with analyst Court Smith, telling *Maritime Reporter*, “The cheap storage of data and ability to access previously unknowable supply and demand fundamentals is allowing for greater visibility into the shipping markets. The older limitations on economies of scale should

start to melt away and we should see further centralization into the market leaders. Not only will barriers on economies of scale melt away, but the recent consolidation trend in shipyards in Korea may force owners to even larger entity size in order to command attention and maintain a stronger negotiating position.”

Smith, who moved to the UK after stints with large New York area tanker brokers, added, “Many large companies still view themselves as price takers in the markets, however consolidation is an effective remedy that can enable a more favorable playing field between ship owners and those trying to move a cargo.”

When the talk turns to finance, investor winds are not static, they can shift over time. At the 2018 Marine Money conference in New York, Todd Wilson, a

banker at Jefferies & Company, said, “I think the goal of companies like Starbulk or Euronav is to grow their business so they become a more investable company ... an easier company for investors to come in and out of.”

Both of these entities have grown through acquisition of competitors’ fleets.

Alexandros Argyros, from shipping bank Axia, had a different vantage point on the advent of shipping mergers: “For smaller companies, sourcing capital has been exponentially harder.”

Another important dimension is whether shipping companies’ decisions to participate in multiple sectors. Where shares are listed on exchanges, an important consideration is the investors’ perceived appetites for “pure plays” versus “diversification.” In recent years, “pure play” has ruled among listed companies. Instead of grouping dry bulk and tanker under one umbrella, for example, there might be multiple separate entities.

TABLE 1

Consolidation Rationale	CONTAINER	DRY BULK	TANKER
Economies of scale	Network effects from geographical presence and vertical integration	Pure competition, internal cost creep up above ~50 vessels	Pure competition, internal cost creep up above ~50 vessels
Market clout	Top five companies own 17% of vessels, 29% of owned TEUs (64% of owned + chartered TEUs)	Top five companies own 6% of owned vessels, 9% of owned dwt.	Top five companies own 4% of vessels, 12% of owned dwt.
Capital raising efficiencies	Larger players have garnered institutional investor following	Most of the listed companies are in “Microcap” category	Most of the listed companies are in “Microcap” category

THE BIG ONES

VesselsValue has provided lists of the largest vessel owners (through early May 2019) grouped by the standard metrics, number of vessels and deadweight (TEUs for the container sector), but also by the market value of their fleets.

Maersk, with a 100-year history in shipping, has gone full circle, returning effectively to its cargo shipping roots after a diversification spree into non-maritime businesses. In its efforts to sharpen

“If consolidation was the solution to all that ails shipping, then container liner companies would be super profitable. They are not.

In ‘commoditized’ sectors of the shipping industry, which by now includes pretty much everything apart from very small niche markets, there is hardly any economies of scale at the company level. As long as bigger is not in fact much better, then meaningful consolidation will not happen.”

**Dr. Roar Adland, visiting scholar at MIT Center for Transportation and Logistics
& Professor at the Norwegian School of Economics (NHH)**



TABLE 2

THE WORLD'S "BIGGEST" SHIPOWNERS

Source: *VesselsValue*

TANKERS

Top Global Tanker Owners by Number of Vessels

Company	# Vessels	DWT (m)
Ocean Tankers Pte	140	8.59
COSCO Shipping Energy Transportation	140	21.82
Maersk Tankers AS	91	4.67
Stolt Tankers	88	2.12
Sovcomflot	84	8.09

Top Global Tanker Owners by DWT

Company	# Vessels	DWT (m)
COSCO Shipping Energy Transportation	140	21.82
Euronav	67	16.78
China VLCC	53	16.38
Maran Tankers	58	15.52
Bahri	50	14.28

BULKERS

Top Global Bulker Owners by Number of Vessels

Company	# Vessels	DWT (m)
COSCO Shipping Bulk	285	32.85
Pacific Basin Shipping	113	4.51
Wisdom Marine Lines	109	6.35
Oldendorff Carriers	104	10.97
Star Bulk Carriers	96	10.42

Top Global Bulker Owners by DWT

Company	# Vessels	DWT (m)
COSCO Shipping Bulk	285	32.85
Polaris Shipping	49	13.78
Berge Bulk	62	12.43
Pan Ocean	75	11.35
Oldendorff Carriers	104	10.97

CONTAINERSHIPS

Top Global Containership Owners by Number of Vessels

Company	# Vessels	TEU (m)
Moller Maersk AS	236	1.9
MSC	210	1.5
COSCO Shipping Lines Co.	190	1.54
CMA CGM	124	1.16
Evergreen Marine Corp.	118	.7

Top Global Containership Owners by DWT

Company	# Vessels	TEU (m)
Moller Maersk AS	236	1.9
COSCO Shipping Lines Co.	190	1.54
MSC	210	1.5
CMA CGM	124	1.16
Hapag Lloyd	107	1.01

its focus on liner cargo and the logistics of delivering boxes, the listed company has recently divested investments in Danish supermarkets, Danske Bank, Maersk Oil, its tanker division, and, most recently, Maersk Drilling. It has added to its liner girth the old-fashioned way – by acquiring other companies that add value to its network. In early 2018, it completed its acquisition of Hamburg Sud and its North/South route system that complemented Maersk's East/West line-haul routes.

Its liner business is at the top of the charts by any measure, as it becomes a container logistics specialist. For now, it has temporized on orders of line-haul megaships (with its second tranche of Triple E vessels having a capacity exceeding 20,000 TEUs). In early 2019, Maersk announced that it would be chartering in a dozen 2,200 TEU feeder vessels from third party lessors as it builds out its intra-Asia service. At the same time it was integrating its logistics offering, with Damco (previously a standalone company in the Maersk group) being integrated into the liner shipping business.

Its APM Terminals division is seeing a similar integration and plans to work much more closely with the core liner shipping business.

The Maersk product tanker business spun off into a separate entity, but with shares in the hands of the non-listed A.P. Møller Holding A/S along with Mitsui & Co Ltd. While the league tables show 91 vessels, the controlled fleet, including vessels held in the holding company, totals more than 160 vessels, including vessels chartered in, and under management.

State-owned Cosco has also pursued growth through mergers, some bringing sheer heft, and others aimed more at strategic niches. In late 2015, Cosco Ocean Shipping merged with China Shipping Container Lines (CSCL), with a new entity, China Cosco Shipping Corp.,

emerging. Three years on, the expanded Cosco completed another merger, acquiring Orient Overseas Container Line (OOCL). Unlike other mergers, the well-known OOCL brand has remained; after a protracted sales process, the OOCL container terminal in Long Beach, California has been sold to an investor group assembled by Macquarie Infrastructure Partners, subject to a divestment agreement with the U.S. Department of Homeland Security. Most recently, Cosco has been circling around Pacific International Lines (PIL), based in Singapore (with a presence having synergies with China's Belt and Road initiative), having taken a stake in PIL's container manufacturing arm last year.

The quest for integration, when it comes to logistics, is not unique to Maersk or Cosco, with rival CMA CGM also integrating a logistics provider (CEVA) into its fold. Earlier in 2019, MSC attained a majority investment stake in Terminal Investment Ltd. (an infrastructure fund originally set up by MSC, with growth fueled by financial investors along the way). On the vessel side, CMA CGM is also noteworthy with its commitment to LNG propulsion, with nine 22,000 TEU giants under construction in a group of Chinese yards. MSC, second to Maersk in the league tables, is also building 22,000 TEU vessels with nearly a dozen on order from yards in South Korea (see Table 2, to the left).

On the container side, another view can be seen from Alphaliner, which publishes a "Top 100" list of containership lines, providing a ranking of overall TEU capacity, but broken down by owned versus in-chartered vessels. Not surprisingly, the total controlled capacity here tracks very closely with that from owned vessels.

Large commercially controlled fleets are not always "owned." Bulk shipping's eco-



Photo courtesy: South Carolina Ports Authority

system includes the underlying owners, vessel operators (sometimes called “freight merchants”) and major charterers. On the tanker side, brokers Poten compile a ranking of the largest crude oil charterers. Typically, the large cargo interests may control fleets of vessels taken in under timecharters; oil “majors” will operate many chartered in tankers, in addition to those actually owned.

In the dry bulk trades, the timecharter fleets of grain majors Cargill and Bunge would rival those of large actual dry owners. Cargill, on its website, advertises its fleet of 120 Capesize ships, 180 Panamaxs, 120 Supramaxes and 130 Handymaxes. This armada, notionally around 45 million tons deadweight, rivals the largest owners of actual vessels. Oldendorff Carriers, which does rank among the top five owners (with 104 vessels) says, on its website, that it “...normally oper-

ates around 700 vessels at any one time”. Oldendorff Carriers estimated that its controlled fleet (owned and chartered) stood at 57 million tons deadweight (mdwt) in early 2018. Though hefty sounding, this figure represents 6% of the overall bulk fleet, pegged at 935 million dwt by VesselsValue.

At the short-term end of the spectrum, large cargo interests will take vessels on spot charters. Brokers Poten assemble an annual tally of the biggest crude oil charterers, with Chinese oil company Unipecc dominating the 2018 chart shown below.

On the dry bulk side, iron ore chartering dominates the tonnages, with Brazilian giant Vale moving 390 million tons of Seaborne ore in 2018. BHP, the Australian iron ore giant, was estimated to have shipped 274 million tons of the raw material from western Australia, in the year ending June 30, 2018.

Largest Tanker Charterers: Spot Fixtures

2018 Rank	Total Charterer	Cargo (dirty) (MT x 1000)	Fixtures
1	Unipecc	217,107 (14.7%)	985
2	Shell	87,593 (5.9%)	692
3	loc	70,773 (5.9%)	280
4	Vitol	59,836 (4.1%)	579
5	Chevron	52,003 (4.1%)	430

Source: Poten & Partners

COMPANIES & SITUATIONS TO WATCH

Stena / Concordia

The Stena Group’s shipping activities encompass a swath of companies across the ferry, offshore drilling and tanker businesses. The businesses are owned through the listed Stena AB, alongside shares held by private entities. Its tanker arm is partly owned through joint deals with the listed company Concordia Maritime AB. Stena Bulk’s controlled fleet consists of 111 vessels of 4.8 million dwt. These include 23 Suezmax (crude oil carriers usually around 1 mbbbl capacity), 63 MRs (product and chemical carriers usually around 350 kbbbl capacity) and a host of smaller ships. The fleet includes vessels owned or chartered by joint venture companies Sonangol (alongside the state oil company in Angola) and Stenaweco (a joint venture with a Danish company). Concordia Maritime’s fleet includes 18 owned product and chemical carriers, and joint ownership (with Stena Bulk) of six MR tankers and one Suezmax. Stena Roro owns RoRo vessels and RoPax ships leased to other operators, while Stena Line (with 39 ferries – most also handling RoRo cargo) is an industry leader.

BW Worldwide

The activities of two venerable shipping families, Bergesen and Pao, are now in the hands of privately held BW Worldwide, created in the mid-2000s when Worldwide (the Pao family business) acquired the Norway listed Bergesen company. Two group entities, BW LPG (a specialist in large LPG tankers

with more than 50 vessels, with most capacities exceeding 80,000 cbm), and BW Offshore, have listed shares. In early 2019, BW Tankers took over the shares of now-delisted Hafnia Tankers, and operates a fleet of more than 100 product tankers.

Teekay

The Teekay companies’ fleets (totaling nearly 200 vessels if newbuilds are included) are owned, or partially owned, by multiple entities in a complex corporate web that includes joint ventures and limited partnerships. Investors are able to participate in Teekay Corporation (TK), Teekay Tankers Ltd. (TNK), Teekay Offshore Partners, LP (TOO) and Teekay LNG Partners, LP (TGP), all listed on the NYSE. Teekay controlled vessels provide deep sea transportation (and lightering) of crude oil (19 Aframaxs and 29 Suezmaxs), products (nine large LR type vessels) and gas (both LNG, 48 ships and LPG, 28 ships). In the offshore sector, its shuttle tanker fleet (30 vessels) serve oil producers predominantly in the North Sea. Its 16 FPSOs and FSO are active in the North Sea and offshore Brazil. Setting the trend for “infrastructure” investors to participate in the offshore business, Teekay sold a majority slice of the TOO’s General Partner to Canadian investor Brookfield.

Angelicoussis & Nakilat

Angelicoussis Shipping Group Limited (ASGL), a private Greek owner around since the late 1940s, is active in LNG,

crude tankers and dry bulk. Maran Tankers Management (MTM) manages the tanker business, and Anangel Maritime Services Inc. (AMSI) handles the bulk carriers. For several years, this owner had dominated the Greek market’s vessel and tonnage count. The 2018 “Naftiliaki” survey of the large Greek owners pegged the group’s vessel count at 125 with a total tonnage of 24.2 mdwt. Its fleet of LNG vessels, run through Maran Gas Maritime, consists of nearly three dozen Greek flagged units- mostly of 173,000 cu. m. capacity, with another 10 on order. Maran Gas works very closely with Nakilat, the Qatar-owned fleet (tied to gas producer Qatargas- the world’s largest LNG supplier), jointly owning more than a dozen modern LNG carriers. According to Nakilat, it is “the largest owner of LNG carriers in the world, with a fleet comprising of 69 LNG carriers.” They add that the fleet, which includes 14 “Q-Max” vessels (of 263,000 m3 capacity) is “over 9 million cubic meters, which is about 12% of the global LNG fleet carrying capacity.”

Chinese Leasing

In recent years, as traditional shipping banks have retreated, a deluge of funding has come in from Chinese capital providers, who become vessel owners and lease them to their clients. Top names include AVIC International, Bocomm (Bank of Communication) Financial Leasing, China State Shipbuilding Corporation (CSSC), China Merchants Bank (CMB), and Industrial and Commercial Bank

of China (ICBC). Minsheng Financial Leasing, owner of 300+ vessels, is said to be China’s largest financial lessors of ships. CSSC made news in early 2019 with its announcements of commitments to finance \$1.5 billion of newbuilds. Clients of these lessors include some large international owners (including some who made the “Top 5” lists). Dry bulk owner Star Bulk, along the twin Scorpio companies, “STNG”, the tanker outfit (109 owned vessels plus 10 chartered in), and “SALT”, the dry bulk owner (with a controlled fleet of Ultramaxs and Kamsarmaxes, totaling 3.9 million dwt) have participated in “sale- leaseback” transactions where owned vessels are sold to lessors and then chartered back. Such transactions serve to raise cash while removing bank debt from balance sheets and also assist in payments for scrubbers.

A recent “SALT” transaction says it all. From a company news release, they say, “Scorpio Bulkers Inc. (NYSE: SALT) announced today that the company has agreed to sell and leaseback six Ultramax vessels... to AVIC International Leasing Co., Ltd. Upon completion, which is estimated to take place in the second quarter of 2019, the company’s liquidity is expected to increase by up to \$62.4 million in aggregate, comprising up to \$52.6 million upon closing after the repayment of outstanding debt and an additional tranche of up to \$9.8 million for installation of exhaust gas cleaning systems (scrubbers) on the six vessels.

Maritime Training Insights Database 2019 Training Practices Report

Results from the second annual Maritime Training Insights Database (MarTID) 2019 have been released, and training budgets – both money spent by companies and mariners themselves – continues to rise.

What is MarTID?

MarTID is a non-commercial initiative collaboratively founded by the World Maritime University, Marine Learning Systems and New Wave Media, publishers of *Maritime Reporter & Engineering News*. The mission of MarTID is to provide the maritime industry with objective and comprehensive data on how it manages and conducts training for shipboard competencies and the effects of drivers, such as technology, on this training.

This data, updated annually by means of a global survey, is designed to provide insights that can lead to enhanced policy-setting, decision-making, benchmarking and operational optimization by industry and regulatory authorities at all levels.

The secure and anonymized MarTID data provides insights into training practices, budgets, priorities, challenges and perspectives as well as a global picture of maritime training that is not currently available elsewhere.

While a complex and time-consuming endeavor to plan, execute, compile and analyze, the ultimate mission of MarTID is quite simple: creating a knowledge database that is freely available and open to all, helping companies, educators and seafarers to discover (and hopefully utilize) best maritime training practices.

Education, training and human resource development is critical for the sustainability of any industry endeavor. This is especially the case in the maritime industry where there is broad agreement that a significant percentage of maritime accidents involve human factor causes. Well trained and competent crews are critical to ship safety and security, as well as to the environmental and commercial sustainability of shipping and by extension of world trade.

MarTID 2019 Highlights

Budgets Rise, Safety Rules, Autonomy Impacts (a Little!)

Though estimates vary by source, the international shipping industry is responsible for approximately 80-90% of world trade, with more than 90,000 merchant ships trading globally, transporting every type of cargo imaginable, from raw materials to finished products, from nearly 30 million cruise ship passengers

to livestock. While ships, technology and increasingly the logistics chain as a whole garner the headlines, the seafarer is the lifeblood of world commerce, and in total, globally, there are 1,647,500 seafarers (774,000 officers and 873,500 ratings) serving on internationally trading merchant ships, according to statistics from The International Chamber of Shipping.

But the role of the modern seafarer is changing.

Driven by automation on the ship and throughout the transport logistics chain, seafarers today are increasingly asked to operate ever bigger, more complex and technologically sophisticated vessels with smaller crews. They are tasked to deliver ship and cargo safely and efficiently, guided by a rapidly increasing list of regional, national and international rules, with a rapidly decreasing impact on the environment. And by all accounts, they are succeeding.

Shipping losses on vessels more than 100 gross tons (GT) dropped precipi-

tously in 2018 – 46 – which is the lowest total this century. (To put this in perspective, there were 207 total losses reported in 2000, and 98 total losses in 2017, according to Allianz' Safety and Shipping Review 2019, an annual review of trends and developments in shipping losses and safety.)

Improved ship design, regulation and technology all arguably have played a role in this statistical improvement, but since the 'human factor' is cited in more than 80% of ship accidents, ultimately the seafarer must be credited for the lion's share of this success.

With this as a backdrop, the MarTID 2019 survey found:

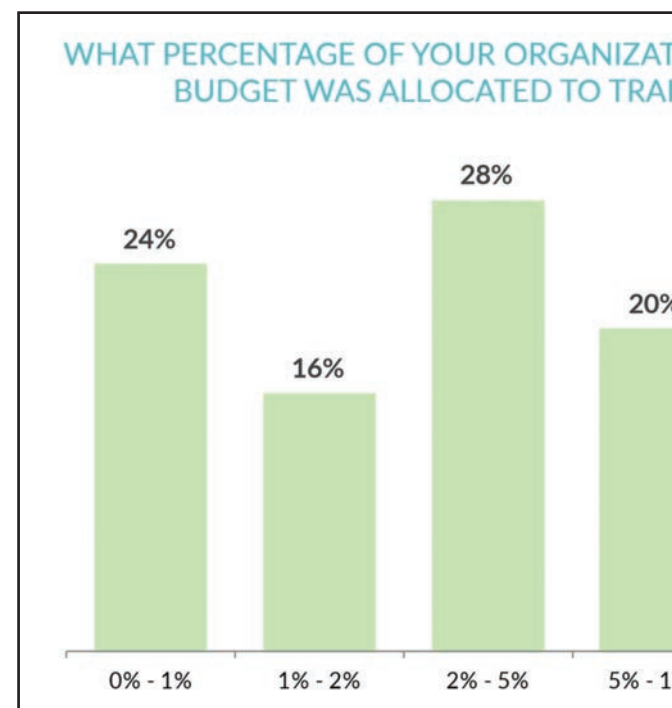
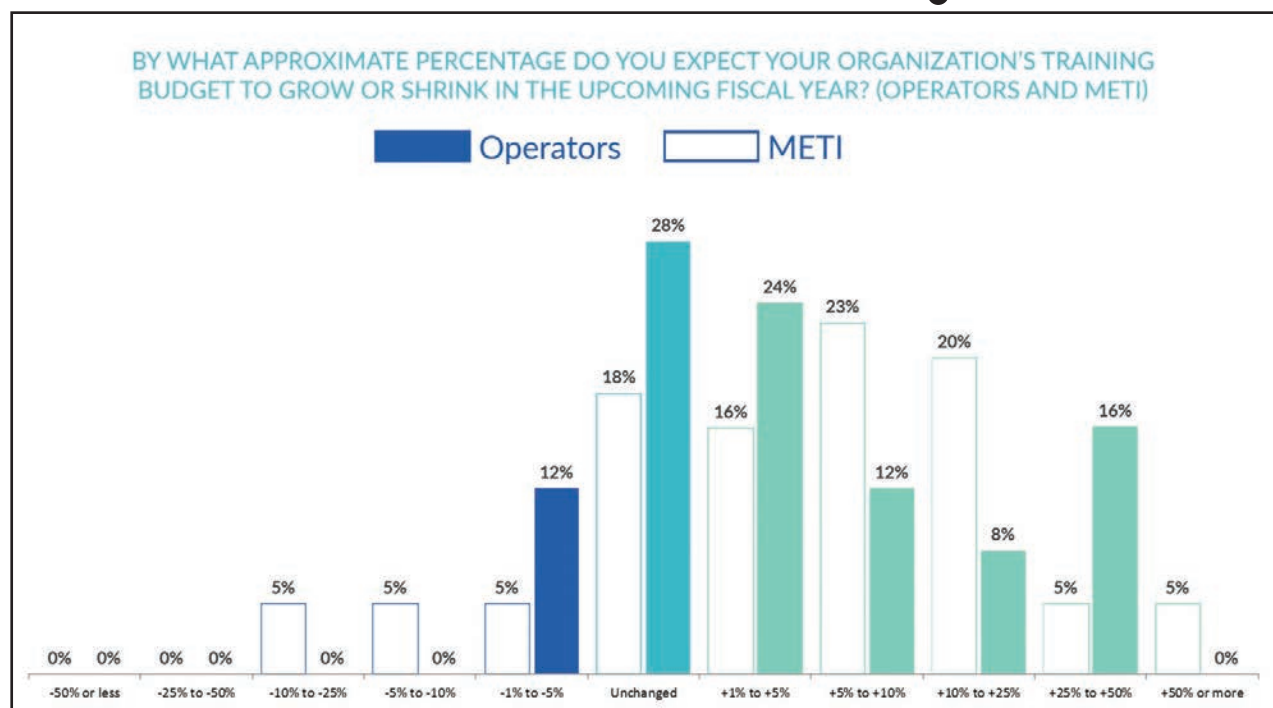
• BUDGETS RISE

Maritime training budgets continue to trend upwards, compared to the year before: more than 52% of vessel operators reported an increase in training budget, while more than 62% of maritime education and training institutions (METI) reported a larger budget for training. Around 60% of operators and 68% of METIs expect further increases in their training budget for the coming year.

• SEAFARERS SPEND MORE

More than 68% of seafarers have in-

Show Me the Money: While training needs grow, so too do budgets to support new initiatives.



creased their personal seafarer training expenditure over the last five years, and more than 55% expect their personal training expenditures to grow in the upcoming year.

• SAFETY RULES

While there are myriad training drivers, the top three drivers for MarTID 2019's target groups include:

- **Vessel Operators:** Reducing accidents, complying with regulations and managing crew competency;
- **METI:** Complying with regulations, improving safety and improving crew competency, and;
- **Seafarers:** Safety, ship operations and security.

• AUTONOMY IS COMING:

While automation and autonomy are 'hot' fodder for the trade press, views on the pace of adoption of autonomy on the working waterfront vary widely. General consensus and common sense suggest that full automation on oceangoing international routes is a generation or more away. While the technology has quickly matured, major hurdles include matters such as global political agreement, maritime and cyber security, and insurance. More tangible activity is accelerating on local/regional/national fronts where such agreements and arrangements are easier to make. In overview, vessel operators have the most conservative view on the future of autonomy, while METIs are most optimistic. From the perspective of vessel operators, today 62.5% are at no autonomous function; while 20 years



from now 20% expect to reach AL4 (Human in the loop - Operator/supervisory) and approximately 7% expect fully autonomous operations. More than 40% of the METI respondents see an autonomous future in the AL5 and AL6 range.

• METHODS CHANGE

Predictably, with increasing automation and technology in personal and professional lives, seafarer training methods are changing. While face-to-face and classroom instruction continue to dominate, the tide is turning toward increasing levels of online eLearning and video instruction, music to the ears of seafarers that pay for their own training, as travel and accommodation lead their expense

list.

2019 Results: A Deeper Dive

The total number of responses from all three groups was 174 from all global regions. This represents a 58% rise over the 110 responses received for the inaugural survey in 2018. The 2019 survey was broken into three targeted versions in order to collect and compare data from each of three important maritime industry constituents. Of the three groups, the METIs are the most represented, with 40% of the responses.

SEAFARERS

Seafarers today are in the spotlight, arguably more than ever, with an in-

The Future is Murky

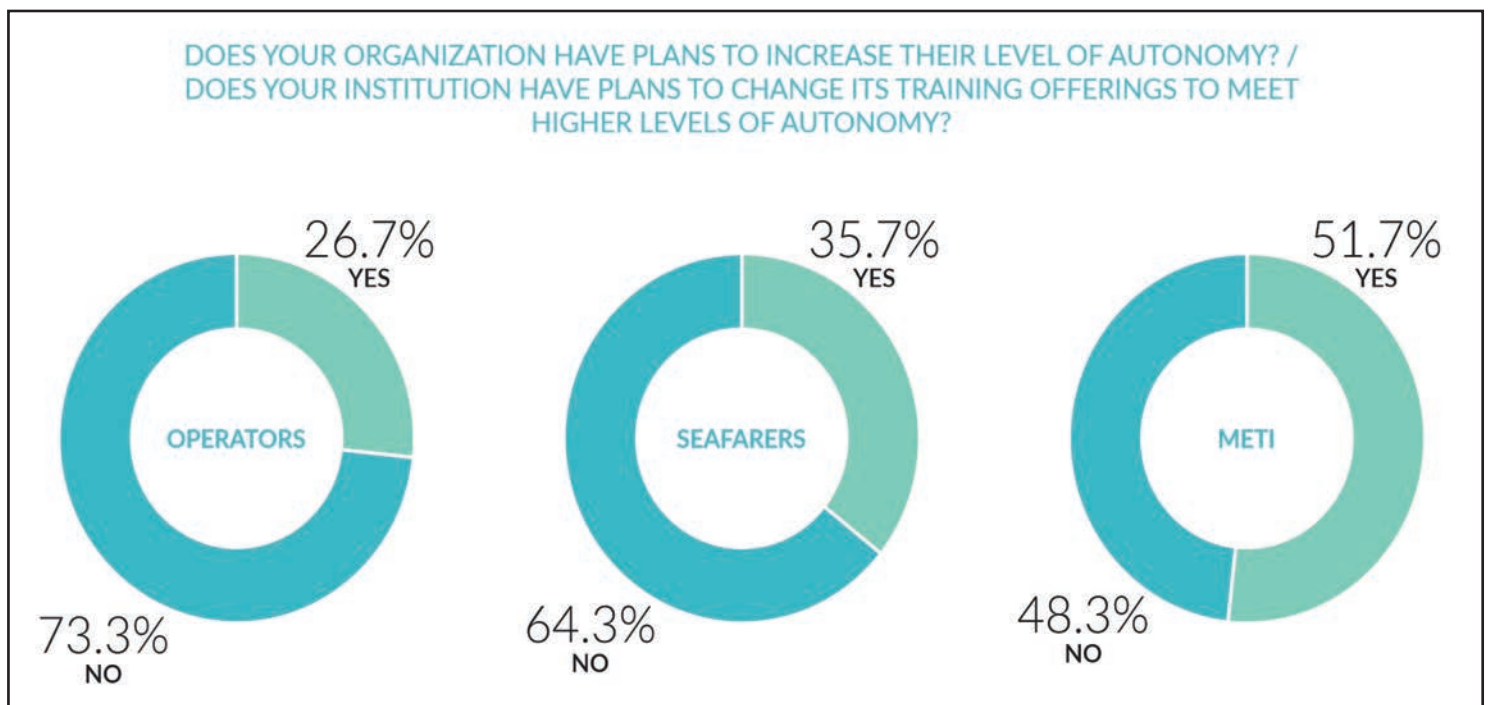
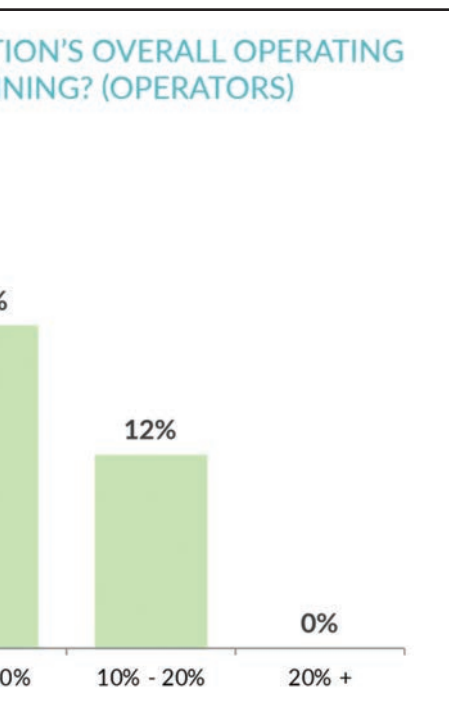
While "autonomy" garners its fair share of headlines, it appears there is much work to do in the boardroom.

creased international focus on seafarer issues such as health and wellness, both physical and mental. At the same time the maritime industry, following trends on land and in the air, actively pursue various levels of automation which will eventually change the responsibilities, the roles and perhaps even the very definition of "seafarer." Regardless, training and education will remain a core tenant for seafarers, and increasingly they are picking up the cost of their own training.

The vast majority (96%) of the seafarer respondents are male, and the average age was 44 years old at the time of the survey. The average age of last year's survey respondents was somewhat higher at 48 years old. A large majority of the respondents hold a management-level certificate of competency, with an average 17.5 years of experience as a seafarer.

VESSEL OPERATORS

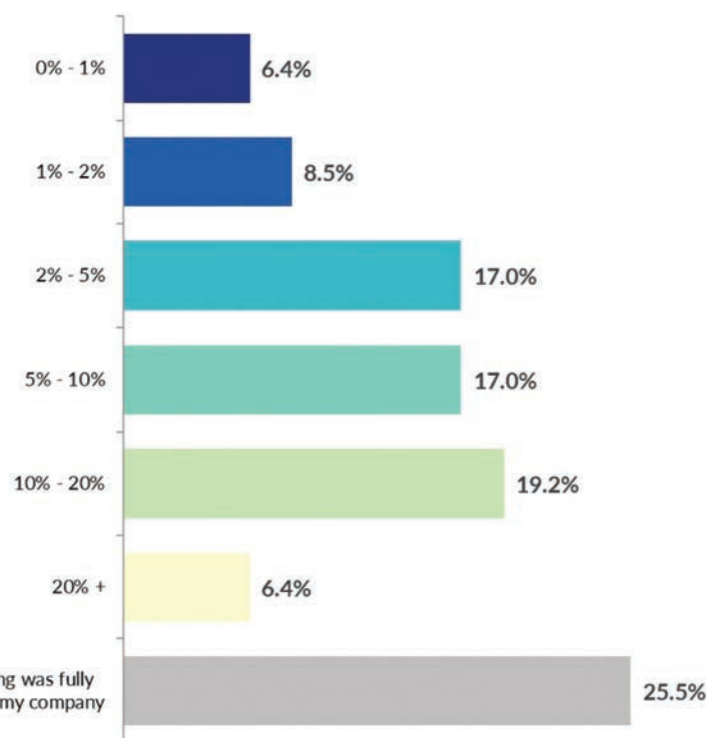
For responding vessel operators, organizational headquarters were spread out mostly between Europe, Asia-Pacific and North America. A smaller percentage of respondents were headquartered in the Africa and Latin America. The average vessel operator has 56 vessels



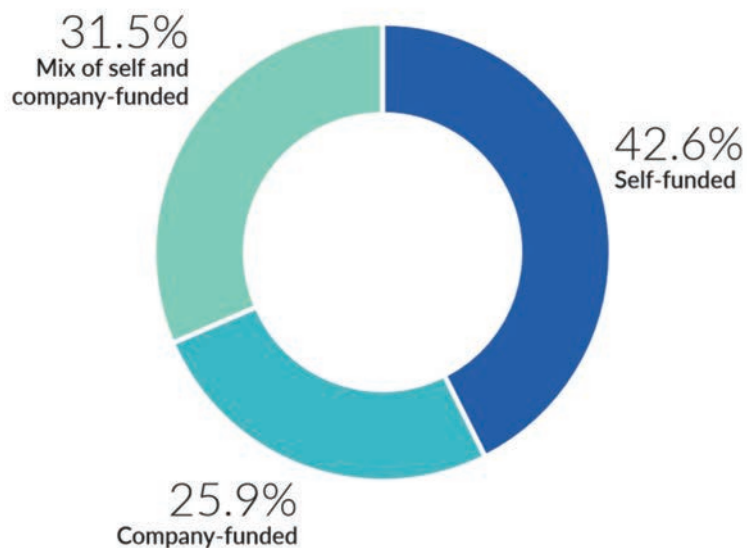
Show Me the Money (Part II):

Seafarers increasingly pay for their own training, as just more than one-quarter report that their employers foot the bill.

IN A TYPICAL YEAR, WHAT APPROXIMATE PERCENTAGE OF YOUR ANNUAL INCOME IS ALLOCATED TO SEAFARER TRAINING?



WHO IS RESPONSIBLE FOR FUNDING YOUR SEAFARER TRAINING?



under management.

METIs

METIs globally have historically ‘carried the water’ in terms of mariner training, for regulatory compliance, licensing and professional development. They, too, must adapt to ever changing maritime rules and trends, as well as education methods.

According to the MarTID 2019 survey, more than 33% of responding METIs operate more than one campus, and respondents spanned the globe with the respondent’s indicating their main campus is located in North America, Asia-Pacific and Europe. Surprisingly, more than 17% of responding METIs have been established for more than 100 years, with the majority (63.5%) operating for 25 years and more.

Crew Demographics

Female seafarers made up an average of 9.1% of the crew, organization-wide, and the average age of a seafarer in the respondent’s crew was 37 years old. In last year’s survey, the respondents indicated that in their organizations 12.8% of the crew was female. As the MarTID survey

grows in size and establishes many years of data, this will be an important metric to track.

Roughly two-thirds of the respondents do not foresee any future operational issues or training needs due to their crew’s current average age. However, the third that did see potential concerns cited the following issues:

- Understanding the difference between experience and competence
- Shifting cultural norms
- Aptitude with technology
- Changing demographics driving increased recruitment needs
- Senior ranks needing to be transitioned soon due to their approaching retirement age

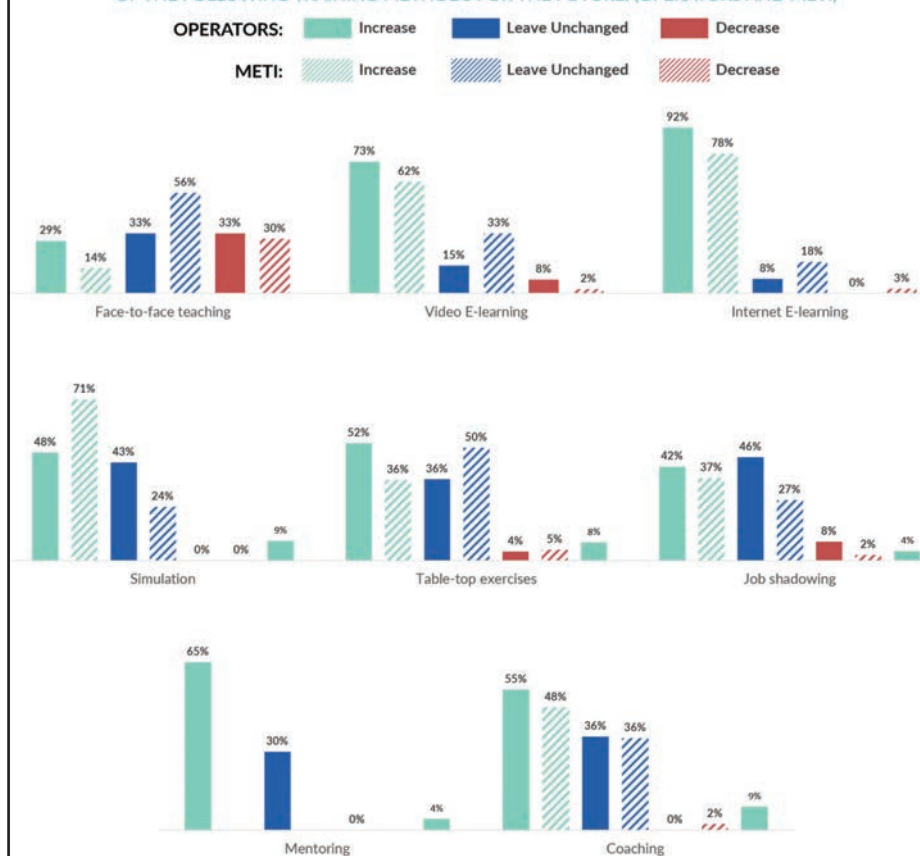
Budget Trends

Vessel operators increasingly are under both regulatory and commercial pressure, forced to invest in new ships and technologies while markets, generally, are down. On the regulatory front, the International Maritime Organization is spearheading the effort to effectively and dramatically reduce emissions from ships, most significantly with the mandate to reduce sulphur

Training Methods Are Changing

Following trends in other industries and education itself, the way in which seafarers receive their education is changing.

PLEASE INDICATE BELOW HOW YOUR ORGANIZATION/INSTITUTION PLANS TO CHANGE ITS USAGE OF THE FOLLOWING TRAINING METHODS FOR THE FUTURE. (OPERATORS AND METI)



in marine fuel from 3.5 to 0.5% by 2020, and long-term the proposal to reduce greenhouse gas emissions 50% by 2050. On the commercial side markets have traditionally experienced strong peaks and valleys, but in recent years a number of geopolitical events and a prolonged slump in the offshore energy sector have magnified the downturn. At the same time, as the logistics chain becomes ever more automated, so too must ships, a key link to keep global commerce efficient. Enter the seafarer's training and education. As ships become more sophisticated, so too must the 'seafarers' manning the ships, both onboard and ashore, to ensure safe, efficient operations.

Most vessel operators spent under 10% of their operating budget on training, with nearly 33% allocating around 2% - 5% of their budget to training. This number is similar to last year's which was 26%. As expected, the average percentage for responding education and training institutions was much higher.

Survey results indicate that training budgets continue to trend upwards, compared to the year before. More than 52% of operators reported an increase in training budget, while more than 62% of METI reported a larger budget for training. This is consistent with last year's data which showed that almost 60% of respondents expected to increase their training budgets during the 12 months which followed the 2017 survey. Likewise, between 9% and 12% of respondents indicated that their budgets were reduced over the preceding 12 months. This too was consistent with last year's predictions where 9% anticipated a reduction in budget.

The most common reason cited for increased training was new equipment being used and systems being installed (such as LNG and BRM training, or the installation of SMS – which comes with new procedures).

Meanwhile, for maritime education and training institutions, the increased budget comes from new training opportunities, increased student population, the installation of new technology (such as simulators and training software / Learning Management Systems).

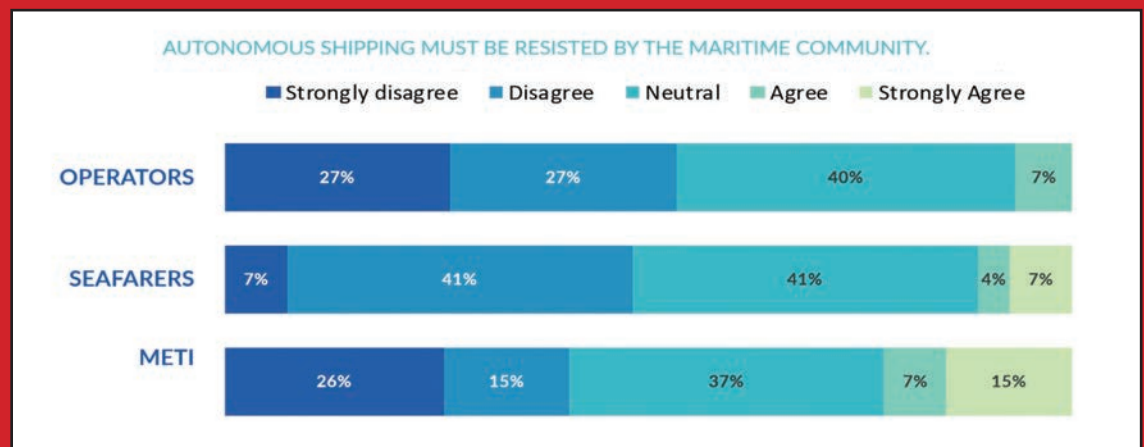
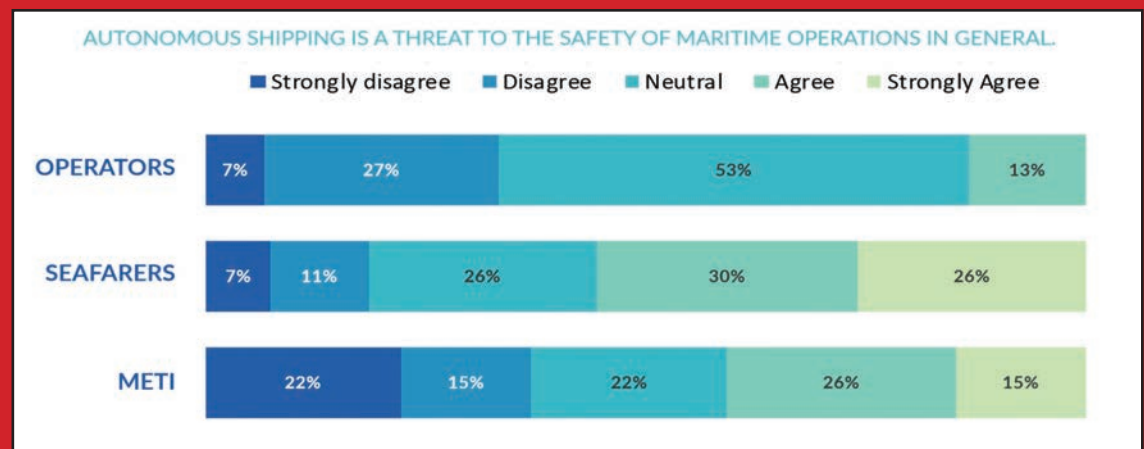
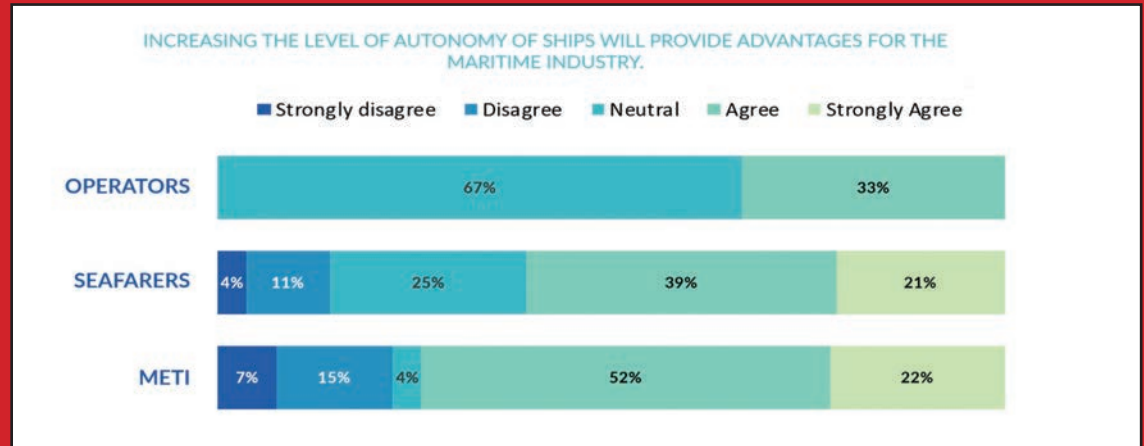
The trend toward higher training budgets continues as a majority anticipate either an increase in the budget for the upcoming year or no change at all. Around 60% of operators and 68% of METIs expect further increases in their training budget.

Get the Full Report

The full MarTID 2019 survey was being finalized as the June 2019 edition of Maritime Reporter & Engineering News was going to press. Check back in this space in July 2019 for additional survey results and insights, and online at MarineLink.com for a link to the full report later this month.

OPINIONS ON AUTONOMY

While technology behind the advent of autonomous operations is ubiquitous and covered regularly in the maritime media, less is known about the opinion of vessel operators, METIs and seafarers on the the pace and prospects of autonomy. To find out, the **MarTID 2019** asked several key questions on autonomy:



Hydrogen: The Next Big Thing?

By Joseph DiRenzo, PE

Hydrogen Fuel Cell Technology to Satisfy Future IMO Requirements

With an ongoing push by the maritime community to reduce ship emissions to satisfy IMO MARPOL Annex VI regulations and limit the sulfur content of ships from January 1, 2020 to 0.5% worldwide, many ship owners are starting to consider hydrogen fuel cell technology to satisfy evolving emissions regulations. To date, hundreds of millions of dollars have been spent on research programs to utilize hydrogen fuel cells for transportation. Several maritime powers including the European Union, the United States and Japan have initiated pilot programs to assess the feasibility of maritime hydrogen to reduce emissions while maintaining cost parity with traditional propulsion technology. A

leading voice in the field is Dr. Joseph Pratt, CEO and CTO of Golden Gate Zero Emission Marine (GGZM), who is an internationally recognized expert on maritime hydrogen. GGZM is one of several companies making the transition from feasibility study to vessel construction and operation.

First Commercial Hydrogen Fuel Cell Vessel in North America

After completing a keel laying ceremony for the Water-Go-Round in November last year and an anticipated launch in September of this year, GGZM is on track to become the first commercial hydrogen fuel cell vessel in North America. The Water-Go-Round will be a 70-foot catamaran built by Bay Ship & Yacht Co. capable of carrying up to 84 passen-

gers in the Bay Area.

According to Dr. Pratt, once launched the vessel will operate in San Francisco Bay for three months while Sandia National Laboratories, a national lab at the forefront of hydrogen fuel cell technology, conducts performance testing on the vessel and gathers data. The vessel will carry a tank array of up to 242 kilograms of compressed hydrogen at 250 bar (approximately 3,600 psi) which will provide enough fuel for up to two full days of operation. The Water-Go-Round will be propelled by two 300 kW (400 horse power) shaft motors with a 100 kilowatt hour battery to provide speeds up to 22 knots.

Some of the initial funding for the Water-Go-Round project comes from California Climate Investments, which is a

cap and trade program aimed at reducing Green House Gas emissions in the state of California.

Dr. Pratt commented that the successful launch of his business and the building of the Water-Go-Round “was a long time in the making” growing organically out of a partnerships he developed while managing the SF-BREEZE and other studies at Sandia National Labs.

“The feasibility report showed that it could be done, but we wanted to prove it. When looking at the business side [of the company], we saw a really big demand for hydrogen fuel cell vessels”.

Once the Water-Go-Round project is complete, GGZM will focus its efforts on taking lessons learned from the project to develop “ready to go” hydrogen fuel cell power systems which could be



3D rendering of the Water-Go-Round.

Photo credit Incat Crowther

used for new vessel builds and retrofits around the world.

“The Chicken Comes First”

One of the oft-quoted challenges is the “chicken and egg” dilemma when a disruptive propulsion technology enters the maritime market. Critics will claim that ship owners are reluctant to deploy new technology in new vessel construction, like hydrogen fuel cells, until the port infrastructure is in place. They will also claim that port infrastructure will not develop until there is a strong demand from ship owners creating a “chicken and egg” dilemma.

For Dr. Pratt, the answer is “clearly the chicken needs to come first... the chicken is the proof”.

Noting that the US produces more than 10 million metric tons of hydrogen annually (US DOE), Dr. Pratt believes the necessary ingredients for a rapid expansion of maritime hydrogen fuel cell technology already exists in many industrialized countries across the world.

He quipped that instead of producing an endless number of feasibility studies, it was necessary to “get the boats on the water” to prove to the international maritime community that hydrogen technology could be economically feasible.

Dr. Pratt asserts the biggest factor in determining which parts of the world will adopt this technology is “whether [ship owners] can get hydrogen”. At the moment, not all countries throughout the world have easy access to hydrogen. Moreover, the majority of vessels will require liquid hydrogen based on their required endurance since liquid hydrogen has a considerably higher energy density



The GGZM team at the Water-Go-Round keel laying ceremony. From left to right: Captain Joe Burgard, Co-Founder; John Motlow, VP Marketing and Strategy; Charlie Walther; Tyler Foster; Rose Dawydiak-Rapagnani; Thomas Escher, Co-Founder; and Dan Johnson.

Photo credit: GGZM



**NOTICE FOR REQUEST
FOR PROPOSALS FOR 2020
SHIPYARD AND DRYDOCK SERVICES**

LOCATION – EAST PACIFIC

For inquiries email:
porteng@soest.hawaii.edu



Anchor
MARINE & INDUSTRIAL SUPPLY, INC.

REQUEST ONE OF OUR NEW CATALOGS
SALES@ANCHORMARINEHOUSTON.COM

AUTHORIZED YOKOHAMA FENDER DISTRIBUTOR

- New, Used and Rental Options Available
- New Harness Installation Or Harness Repair with Quick Turnaround
- Foam and Pneumatic Fenders Available

LARGEST INVENTORY IN THE USA

NEW & USED

- Anchors
- Chains
- Fittings
- Towing
- Hardware
- Wire Rope
- Cordage
- Blocks
- Dock
- Fenders
- Buoys
- Spill Boom

IN STOCK & READY TO SHIP
WORLDWIDE 24/7

(800) 233-8014 • ANCHORMARINEHOUSTON.COM

“The feasibility report showed that it could be done, but we wanted to prove it. When looking at the business side [of the company], we saw a really big demand for hydrogen fuel cell vessels”

Dr. Joseph Pratt, CEO & CTO
of Golden Gate Zero Emission Marine (GGZM), a recognized expert on maritime hydrogen.



than compressed hydrogen gas. Because of the mature network of hydrogen suppliers in North America, Dr. Pratt believes that North America will continue to be a strong market for this type of maritime technology.

Where Does Hydrogen Come From?

One important distinction when discussing the emissions reduction potential of hydrogen fuel cell technology is the way in which the hydrogen is produced. Methods like steam-methane reforming and partial oxidation produce hydrogen using methane as a feedstock, generally from natural gas. According to the US Department of Energy (DOE), steam-methane reforming and partial oxidation produce hydrogen by combining high temperature steam (700 to 1,000 °C) with methane in the presence of a catalyst. A report by DNV GL titled *Assessment of Selected Alternative Fuels and Technologies* points out that hydrogen produced in this manner has a well to tank CO₂ emissions equivalent of 90 grams per Mega Joule (MJ) which is more than both HFO and MGO. At the writing of this article, the majority of the world's hydrogen is produced using these methods.

Another method which is gaining attention is the use of electrolysis to pro-

duce hydrogen. During the electrolysis process, electricity is used to separate water into hydrogen and oxygen. This is achieved by a number of different electrolyzers including Polymer Electrolyte Membrane (PEM), Alkaline, and Solid Oxide Electrolyzers which vary in material, production temperature and how reactions take place within the process. Electrolysis is considered “green” when the electricity used to power the equipment comes from renewable energy sources like wind, solar, nuclear, or bio-gas.

Although the Water-Go-Round project is still undecided on its hydrogen supplier and associated hydrogen production method, Dr. Pratt believes that the adoption of 100% renewable hydrogen “will need to occur in steps”. In order to gain widespread adoption, he believes, “The solution has to be economically viable... it has to be market driven, not supported by government funding initiatives. Currently, renewable hydrogen is more expensive than conventional hydrogen.”

“While renewable hydrogen is the goal, it doesn't provide an economically viable solution today.” Dr. Pratt's current strategy “is to start with the vessel and conventional hydrogen, which can be economically viable, then transition to higher renewable content as that

achieves a cost level making it viable as well. If we attempt to do both today, the overall effect may be a delay in acceptance of the technology in general.”

Can Hydrogen Be Economical?

When discussing the economic feasibility of hydrogen fuel cell technology in the context of the Water-Go-Round project, Dr. Pratt points out that “the main value proposition for hydrogen fuel cell vessels is in the overall cost reduction for the vessel. Vessel owners will never need to do a complete repower again. First you're going from a mechanical engine with hundreds of moving parts to the solid-state system of a fuel cell. Second, at end of life you do not need to swap engines; rather you just need to replace separate fuel cells once they have exceeded their life cycle. Overall this can result in maintenance reduction and down time reduction” which would ultimately reduce the overall operations and maintenance cost of the vessel.

Dr. Pratt also noted that a secondary value proposition of switching to a hydrogen fuel cell system is that the vessel is much quieter than comparable diesel engines and has no onboard pollution. This opens up many possibilities. For example, ship owners can take on non-traditional charters for passenger ves-

sels like “cooperate meetings” and “nature excursions” because of the reduced noise and air pollution.

The Future

With the Water-Go-Round project close to its first voyage, and other projects like the HYSEAS III project in the United Kingdom or the HYBRIDskip project in Norway at different stages of execution, it is clear that maritime hydrogen technology is rapidly progressing from concept to creation on a global scale. Similar to the mainstream acceptance of liquefied natural gas (LNG) as a marine fuel, hydrogen will likely achieve similar widespread adoption. Dr. Pratt asserts hydrogen fuel cell vessels will initially cluster in areas with stricter emission controls, like the Emission Control Area established in Annex VI of MARPOL, among vessels with a fixed route such as ferries, tug boats and coastal traders. As hydrogen production spreads worldwide, larger vessels with more variable routes like containerhips may start to adopt this technology. Noting the economy of scale of a container ship, Dr. Pratt is quick to point out that “one containerhip could justify a new hydrogen production facility” in a port suggesting the global adoption of this technology may be just on the horizon.

2019 GREAT SHIPS

Will your ship be honored as a "Great Ship of 2019" in the December 2019 edition of *Maritime Reporter & Engineering News*?

Every year, *Maritime Reporter & Engineering News* profiles the most outstanding ships built in shipyards around the world - recognizing ship builders, ship owners and ship designers as leaders in their field.



ENTER
YOUR
SHIP TODAY

Learn More at:

<https://greatships.shipbuilding.com>

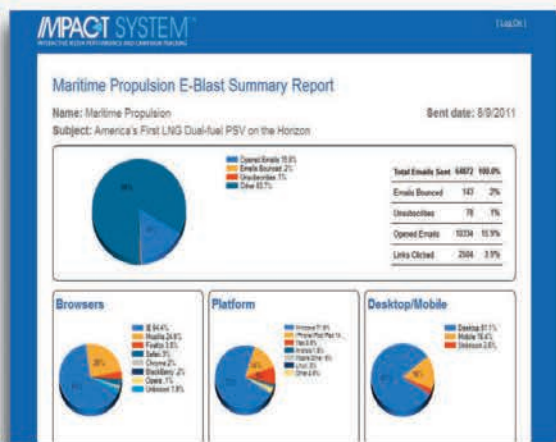
DEADLINE:
NOV 11 2019

MARITIME
REPORTER
AND
ENGINEERING NEWS

IMPACT SYSTEM™

Interactive Media Performance and Campaign Tracking

Give your online advertising real IMPACT- an exclusive tracking tool for online advertisers.



IMPACT platform displays data and traffic from:

- Browsers
- Platforms
- Desktop / Mobile
- Countries

Take control of your campaign- only from New Wave Media.

Track your banner ad exposure in real time, with an easy interface

- Impressions
- Clicks
- Click Through Rate
- Unique IPs

Access a complete report of your Eblast campaign's success.

- Total Emails Sent
- Opened Emails
- Links Clicked

Available for all online/email advertising programs, only from New Wave Media. For more information, contact your representative, or call our offices: (212) 477-6700

Ship IoT Tech: Enabling Proactive Approach to Navigation Safety

The airline industry has long employed flight data to monitor navigational and operational practices for evaluation and feedback to pilots using a system called Flight Operations Quality Assurance (FOQA). Now a similar concept is coming into the shipping industry. Danelec Marine, a manufacturer of voyage data recorders (VDR) and electronic chart display and information system (ECDIS) products, this month unveiled a new Bridge Operational Quality Assurance (BOQA) system. Hans Ottosen, CEO, explains.



Hans Ottosen, CEO, Danelec

To start, please provide background on Danelec.

Danelec Marine was one of the first companies to bring to market VDRs to meet the original IMO carriage requirements in 2002. Since then, we've supplied more than 6,000 VDRs and S-VDRs. In recent years we broadened our marine portfolio with ECDIS products and a universal ship Internet of Things (IoT) platform, which we call DanelecConnect.

What led you to develop the BOQA concept?

In 2013, the Oil Companies International Marine Forum (OCIMF) submitted a paper entitled The Proactive Use of Voyage Data Recorder Information to the IMO. The paper called for transmission of data from VDRs (excepting voice recordings and radar images) over the Internet to shore for analysis. This subset of VDR data would be small enough to facilitate cost-effective ship-to-shore transmission over satellite channels, thereby giving the potential for 24/7 monitoring. Shipping companies could auto-analyze data against established standard operating procedures (SOPs). The OCIMF paper identified specific examples of parameters, including minimum depth beneath the keel, maximum rate of turn or rudder angle at full speed, compliance with routing requirements and following the approved voyage plan. The OCIMF-proposed system would provide alerts to shore management if non-conformances are identified, and it would enable the shipping company to provide feedback to the ship's master and navigation officers as a learning experience to avoid future mistakes and enhance safety.

OQA is similar in concept to what was envisioned in the OCIMF paper six years ago. It's a scalable cloud-based event reporting, analysis and feedback solution, which uses data from the ship and analytical tools to identify deviations from operational parameters.

What are the key elements in your BOQA offering?

A key enabling technology underpinning BOQA is DanelecConnect, a shipboard hub that collects data from the VDR and other data sources. Its open architecture accepts serial, digital and analog data without special custom interfaces. With DanelecConnect, a ship can collect and transmit hundreds or even thousands of data sets via satellite to Danelec's cloud-based server ashore for less than a dollar per day in airtime costs. An API interface allows the data to be

extracted from the Danelec server into the BOQA software, which uses advanced analytical tools to record and visualize shipboard events.

How does BOQA work in typical applications?

BOQA is basically a decision-support tool designed to enhance maritime safety and enable proactive decision-making in bridge operations by automatically recording and analyzing shipboard events.

The BOQA platform encompasses six broad event categories. They are navigation events, AIS events, compliance events, weather events, motion events and customized safety events. The system can be set up for daily reports and/or instant alarms for each event type.

Taking navigational events as an example, reports include breaches of cross-track error parameters and safety corridors, departures from the ECDIS active route, penetration of no-go zones, deviations from speed and heading in the active route and unscheduled stops and starts. AIS event reports can reveal incidents of collision risks from CPA and TCPA. Weather events can include high winds and heavy weather on the ship's route. Motion events include list, roll, rate of turn and transverse accelerations.

The shipping company can use the actionable BOQA reports to create a formal proactive approach to operational risk management in ship navigation practices and procedures, with a feedback loop to the ship's master to help avoid future accidents and improve navigational safety of the ship.

What's the status of BOQA now?

We are currently running initial tests on vessels of five different shipping companies with positive results. Feedback from these ship trials will help us fine-tune the package. Some of our customers have also suggested that we include a profiling of each officer based on the BOQA data in order to customize the ongoing training the individual officer. Importantly, we've built in a capacity for the system to "learn." Thus, new types of unforeseen events can be developed by applying machine learning and artificial intelligence methods.



Wärtsilä High-res Radar

Wärtsilä launched its RS24 high-resolution, commercially available K-band maritime radar. Designed to detect far smaller objects and at a much higher radar resolution than conventional S- or X-band radars, the RS24 enables small vessels and other potential hazards close to large ships to be visible. This promotes safety, especially in congested shipping lanes and busy ports. The technology has been developed by Guidance Marine, a Wärtsilä company. The first orders for the Wärtsilä RS24 have been received and delivered, and indications are that the system will prove particularly beneficial to vessels, such as cruise ships and ferries, that make frequent port calls. The system is featured in Wärtsilä's IntelliTug project.

www.wartsila.com

Radio Holland: NavCom Package for Two Cutter Suction Dredgers

Radio Holland Netherlands (Rotterdam) recently booked an order to deliver a NavCom package to two custom-built cutter suction dredgers built at Royal IHC shipyard. RH also supplies the navigation sensors to keep the stationary dredgers on position and the supplied AIS (Automatic Identification System) will keep the vessel visible for the shipping traffic in the area. The equipment package consists amongst others of a mix of Furuno equipment and other equipment brands for VHF, MF/HF, Navtex, DGPS, as well as a Magnetic Compass, SART, EPIRB, Wind, ATEX UHF portable and GMDSS Portable handheld. "We are happy to partner with Royal IHC again for the NavCom on these two dredgers. Royal IHC is globally renowned as a specialized, leading designer and builder of dredging vessels. Important for IHC is the fact that Radio Holland is an independent company and supplier, also able to perform service everywhere with its global network," said Kenneth de Grood, account manager in The Netherlands.

NEW MT 603 Series Water-Activated GPS EPIRB

The MT603FG water-activated, GPS-equipped Emergency Position Indicating Radio Beacon (EPIRB) from GME is an advanced MEOSAR ready 406MHz digital EPIRB. Designed, engineered and manufactured in Australia, the MT603FG have obtained International Cospas-Sarsat and US FCC approval. The MT603FG is designed to ensure the safety of your vessel and crew in emergency situations, featuring an integrated 66 Channel GPS receiver delivering greater position accuracy and faster location fix than previous models. Bosting zero warm-up digital technology. MT603FG EPIRBs acquire and transmit accurate Latitude/Longitude and personal identification information to rescue authorities as soon as possible.



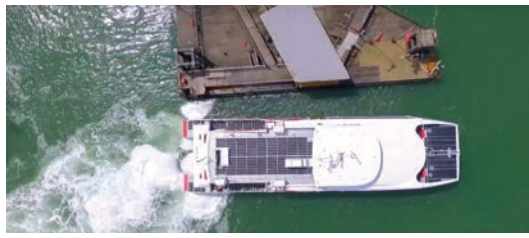
gme.net.au

Hurtigruten Inks Rotten Fish Biogas Deal

As the global marine industry aggressively moves to reduce emissions from ships, and Norway in particular has thrown down the gauntlet of zero emission cruise ships in certain fjords along its scenic coast, Norwegian cruise ship operator Hurtigruten has signed a 7.5-year deal to buy liquefied biogas (LBG) made from dead fish and other organic waste to help power its vessels. Under the contract with Biokraft, Hurtigruten ships will start receiving near-daily supplies of LBG, with the first delivery taking place in 2020. The company last year said it would invest about \$800 million to refit six vessels to partly run on the renewable fuel. "Our ships will literally be powered by nature. Biogas is the greenest fuel in shipping, a no-brainer for us, and a huge advantage for the environment," Hurtigruten chief executive Daniel Skjeldam said in a statement. The hybrid ships will run on a combination of electric power from batteries, liquefied natural gas (LNG) and liquefied biogas. Biogas is already used as fuel in parts of the transport sector, especially in buses. It can be produced by using organic waste, such that from fisheries and forestry, which the Nordic region has in abundance.

Azurtane Launches New Vessel Positioning Technology

Working in conjunction with Red Funnel, the Isle of Wight ferry company, first trials began on the ferry operator's high-speed craft RedJet7 in late April 2019. Azurtane's new technology will be capable of positioning is designed to position vessels within 4cm of a given location. Azurtane managing director, Don Gregory, believes that there are two critical aspects to maintaining an efficient high-speed ferry service. "Governed by a strict timetable, the craft must reach their way points, notional interim destinations, with only a few seconds' leeway if they are to arrive on time," he says. "Achieving that is not as simple as putting your foot down and catching up lost time. That would just add to fuel cost and carbon emissions. The secret is to be aware of the external factors that may delay the ferry such as tides, currents, wind and other vessels in the Solent.



NAVTOR NavBox Certified Cyber Secure

NAVTOR has moved to demonstrate the integrity of its innovative NavBox solution with 'cyber secure' certification (IEC 61162-460 Gateway) from DNV GL. NavBox, which automates the distribution and updates of digital charts, publications and other navigational data, now guarantees both complete regulatory compliance and security for an increasingly digitized generation of shipowners and operators. "If we look at the past two years we can identify a worrying increase of cyber criminal activity, with high profile attacks targeting, amongst others, key shipping businesses including Maersk and COSCO, as well as ports such as San Diego and Barcelona," said Tor Svanes, CEO, NAVTOR. "And this is really just the tip of the iceberg." NavBox offers a range of security features including an encrypted connection – transferring data in a format only recognised by NAVTOR software – CRC checks, the non-transferral of executable files (a key source of malware) and communication through secure servers. The unit also operates as a 'blackbox', with no screen, keyboard or mouse, diminishing risk from human interaction.

www.navtor.com

MARINE INTERIORS

Cruise & Ferry
Global Expo
Powered by SMM

CREATING DREAMS

You're invited to meet the leading players in the field of interior design, equipment and technology for passenger ships.

See what's possible when innovative suppliers showcase their latest developments for the booming cruise and ferry industry.

11 – 13 September 2019, Hamburg
marineinteriors-expo.com

Register now
for your free pass
**[marineinteriors-
expo.com/pass](http://marineinteriors-expo.com/pass)**

co-located
with

Seatrade
europa

 **Hamburg
Messe + Congress**

A Hydraulic and Pneumatic

A.1 Valves



Your One Stop Source for Marine and Navy Valves Butterfly, TOTS, Multi-Turn, PRV and Composite!

WWW.JAMOODY.COM

FOR AN EXPRESS QUOTE PLEASE EMAIL: SALES@JAMOODY.COM

Veteran Owned Small Business ISO 9001:2015 CERTIFIED

A.2 Actuators



Your One Stop Source for Marine and Navy Valves Butterfly, TOTS, Multi-Turn, PRV and Composite!

WWW.JAMOODY.COM

FOR AN EXPRESS QUOTE PLEASE EMAIL: SALES@JAMOODY.COM

Veteran Owned Small Business ISO 9001:2015 CERTIFIED

B Deck Machinery

B.1 Cranes

A APPLETON MARINE, INC.
 3030 E. Pershing St. • Appleton, WI U.S.A. 54911-8671
 (920) 738-5432 • Fax: (920) 738-5435

CRANES, WINCHES, ANCHOR WINDLASSES AND CAPSTANS

www.appletonmarine.com

C Marine Safety Equipment

C.1 Safety & Survival Gear

STEARNS®
 THE LIFE JACKET EXPERTS™

The Coleman Company, Inc
 3600 N. Hydraulic
 Wichita, KS 67219
 1.800.835.3278
www.coleman.com
www.stearnsflotation.com




D Ship Equipment

D.1 Helm Chairs

MARINE SEATING FROM LLEBROC

On the Leading Edge of Marine Seating.



WWW.LLEBROC.COM • 800.284.5771

D.2 Flow Control Products



Your One Stop Source for Marine and Navy Valves Butterfly, TOTS, Multi-Turn, PRV and Composite!

WWW.JAMOODY.COM

FOR AN EXPRESS QUOTE PLEASE EMAIL: SALES@JAMOODY.COM

Veteran Owned Small Business ISO 9001:2015 CERTIFIED



Business news you can trust and advertising results you can count on. We have you covered in every sector of the industry.

The Maritime Media Network's diverse portfolio of publications includes: *Maritime Reporter & Engineering News*, *Marine News*, *Marine Technology Reporter* and *Maritime Logistics Professional*.

Reaching a total average circulation of 114,930, these four publications reach decision makers all over the maritime industry, are audited by BPA, and are only available in the Maritime Network.

100% Requested Circulation
Audited and Verified by BPA



MARITIME PROPULSION
 Powering the Maritime Industry

Over 600,000 pages indexed by Google

- engine specs
- product listings
- suppliers
- auxiliary machinery

www.maritimepropulsion.com



BUYER'S DIRECTORY

This directory section is an editorial feature published in every issue for the convenience of the readers of MARITIME REPORTER. A quick-reference readers' guide, it includes the names and addresses of the world's leading manufacturers and suppliers of all types of marine machinery, equipment, supplies and services. A listing is provided, at no cost for one year in all issues, only to companies with continuing advertising programs in this publication, whether an advertisement appears in every issue or not. Because it is an editorial service, unpaid and not part of the advertisers contract, MR assumes no responsibility for errors. If you are interested in having your company listed in this Buyer's Directory Section, contact Mark O'Malley at momalley@marinelink.com

AUTOMATIC IDENTIFICATION SYSTEM

Saab AB (publ) TransponderTech, SE-589 41 Linköping, tel:46 13 180000, fax:46 13 182377, Info.transpondertech@saabgroup.com

BARGE FABRICATION

McDonough Marine Service, 3500 Causeway Blvd., Suite 900, Metairie, LA, USA, tel:(504) 780-8100, fax:(504) 780-8200, pstant@marmac.net

COMMUNICATIONS

David Clark Company (Wireless Headset Communication Systems), 360 Franklin Street, Worcester, MA 77060, USA, tel:(800) 298-6235, www.davidclarkcompany.com/marine

EXHAUST

Marine Exhaust Systems of Alabama, 757 Nichols Ave. Fairhope, Alabama 36532, tel:(251) 928-1234, mark@mesamarine.com

INERTIAL SENSING SYSTEMS

Silicon Sensing Systems Ltd, Clifftford Road Southway, Plymouth, Devon PL6 6DE United Kingdom, UK, tel:+44 (0) 1752 723330, sales@siliconsensing.com

MEMS MOTION SENSING

Silicon Sensing Systems Ltd, Clifftford Road Southway, Plymouth, Devon PL6 6DE United Kingdom, UK, tel:+44 (0) 1752 723330, sales@siliconsensing.com

NAVAL ARCHITECTS, MARINE ENGINEERS

Bristol Harbor Group, Inc., 99 Poppasquash Road Unit H, Bristol, RI, USA, tel:(401) 253-4318, kribeiro@bristolharbargroup.com

The Shearer Group, Inc, 3118 Harrisburg Blvd., Suite 100, Houston, TX, USA, tel:(281) 532-2080, gbeers@bristolharbargroup.com

PASSENGER AND COMMERCIAL VESSEL REPAIR, MAINTENANCE, DRYDOCKING

Blohm+Voss B.V. & Co. KG, Hermann-Blohm-Strasse 3, 20457 Hamburg, Germany Germany, tel:+49 40 3119 2110, shipservices@blohmvooss.com, www.blohmvooss.com

PIPING SYSTEMS FOR SHIP REPAIR & NEW CONSTRUCTION

Tube-Mac Piping Technologies Ltd., 853 Arvin Ave. Stoney Creek, Ontario Canada L8E 5N8, tel:(905) 643-8823 Ext. 119, chris.peitchinis@tube-mac.com contact: Chris Peitchinis, www.tube-mac.com

PORT SECURITY

Sisco Identification Solutions, 3595 Fiscal Court WPB, FL 33404

PROPULSION - HYBRIDRIVE SOLUTIONS

BAE Systems - HybriDrive Solutions, 1098 Clark Street, Endicott, NY 13760, tel:(607) 770-2083, carol.gorenflo@baesystems.com contact: Carol Gorenflo

PUMPS

Aussie Pumps, 7 Gladstone Road, Castle Hill 2154, Australia, tel:+61 (2) 88653500, marketing3@aussiepumps.com.au contact: Melinda Jansen, www.aussiepumps.com.au
Aussie Pumps, 7 Gladstone Road, Castle Hill 2154, Australia, tel:+61 (2) 88653500, marketing3@aussiepumps.com.au contact: Melinda Jansen, www.aussiepumps.com.au

SECURITY

Sisco Identification Solutions, 3595 Fiscal Court WPB, FL 33404

SURFACE PREP TOOLS

Water Cannon, 4300 West Lake Mary Blvd. Units 1010-424, USA, tel:321-800-5763, sales@watercannon.com, www.watercannon.com

TANK MEASURING SYSTEMS

Hart Systems, 4911-71st ST CT NW, Gig Harbor, WA, USA, tel:(253) 858-8481, fax:(253) 858-8486, hartsystems@centurytel.net

VACUUM TOILET SYSTEM

Jets Vacuum AS, Myravegen 1 6060 Hareid, tel:47 700 39 100, fax:47 700 39 101, post@jets.no, www.jetsgroup.com

WATER JET CLEANING

Aussie Pumps, 7 Gladstone Road, Castle Hill, Australia, tel:+61 (2) 88653500, marketing3@aussiepumps.com.au contact: Melinda Jansen, www.aussiepumps.com.au

WATER JET SYSTEMS

Aussie Pumps, 7 Gladstone Road, Castle Hill 2154, Australia, tel:+61 (2) 88653500, marketing3@aussiepumps.com.au contact: Melinda Jansen, www.aussiepumps.com.au
Aussie Pumps, 7 Gladstone Road, Castle Hill 2154, Australia, tel:+61 (2) 88653500, marketing3@aussiepumps.com.au contact: Melinda Jansen, www.aussiepumps.com.au

WINCHES & FAIRLEADS

JonRie InterTech, LLC, 982 Whispering Oak Circle, Manahawkin, NJ 29501, USA, tel:(609) 978-3523, fax:(609) 978-4959, BJDME@marinewinch.com

Promote a truly unique message with a Maritime Reporter TV interview.

With a Maritime Reporter TV interview, our editorial staff will work to develop insightful Q&A to educate and enlighten viewers about your company's latest advances, technologies and products. Interviews are conducted at events around the world and recorded, produced, and edited by the Maritime Reporter TV staff. The interview will be posted on marinelink.com and promoted to our highly engaged audience.

- Insightful Q&A with the editors of the industry's leading publication.
- Targeted marketing to the industry's largest online audience
- Optional social media boost to the industry's largest social media audience
- Includes all video production along with convenient and easy filming at the leading events around the world

To book a Maritime Reporter TV interview or for more information, contact your sales representative or call +1-212-477-6700.



www.MarineLink.com



MAXIMIZE YOUR POTENTIAL.



Find your new career at:
MaritimeJobs.com

www.MaritimeJobs.com

Marine Mechanic

New York Cruise Lines
Full Time , Project Manager
Category: Vessel Operations
Skills:

New York Cruise Lines (NYCL) is the preeminent marine-based sightseeing, dining, entertainment and transportation company. As the parent company of the iconic Circle Line Sightseeing Cruises, New York Water Taxi, The Beast Speedboat, North River Lobster Company and World Yacht, NYCL is host to over 2 million guests annually. NYCL is looking for two motivated individuals to work in our mid-town and Brooklyn locations who will work directly with our maintenance team. The Marine Mechanic will be responsible to conduct daily maintenance and repairs on all of our vessels and facilities.

Deck Engineer Machinist

Military Sealift Command
Salary: \$ \$43,658 Per annum , Full Time , Engineer
Category: Engineer / Naval Architect
Job Location: 6353 Center Drive building 8, Suite 202 Norfolk, VA, 23502 USA

Contact

Email: civmar@sealiftcommand.com
Work Phone : 757-341-4610
6353 Center Drive, Building #8, Suite 202 Norfolk, VA, 23502 United States

Description:

Announcement #: 19-328-02EXOC Title, Series, Grade (Code) Deck Engineer Machinist, WM 9952-15 (328)
Base Salary: \$43,658 Per annum Type of Appointment: Excepted Service Career-Conditional
Opening Date: February 11, 2019 Closing Date Open Continuously With Periodic Cutoffs Location: Military Sealift Command (MSC) Vessels Worldwide Who May Apply: All United States citizens and current Military Sealift Command Civil Service Mariner (CIVMAR) eligible to apply under the Veterans Employment Opportunities Act (VEOA).

Ordinary Seaman Advancement Program

Military Sealift Command
Salary: \$ \$27,037 Per annum , Full Time , Entry level
Category: Shoreside Operations
Job Location: 6353 Center Drive building 8, Suite 202

Norfolk, VA, 23502 USA

Contact

Email: civmar@sealiftcommand.com
Work Phone : 757-341-4610
6353 Center Drive, Building #8, Suite 202 Norfolk, VA, 23502 United States

Description:

Announcement #: 19-163-02EX Title, Series, Grade (Code) Ordinary Seaman Advancement Program (OSAP) (163) WM-9928-07 Base Salary: \$27,037 Per annum Type of Appointment: Excepted Service Career-Conditional Opening Date: February 11, 2019 Closing Date February 26, 2019 Location: Military Sealift Command (MSC) Vessels Worldwide Who May Apply: All United States citizens and current Military Sealift Command Civil Service Mariner (CIVMAR) eligible to apply under the Veterans Employment Opportunities Act (VEOA). Active Duty Service Members (ADSMs) must submit a certification (i.e., statement of service) at the time of application which certifies that the service member is expected to be discharged or released from active duty service under honorable conditions not later than 120 days after the date the certification is submitted.

**LICENSED PROFESSIONALS
WORLDWIDE VESSEL DELIVERY**
Masters, Engineers and Crews



www.bayfrontmarineinc.com
bfm@bayfrontmarineinc.com
Contact Mel or Diane Longo 904-824-8970

C. R. CUSHING & Co., INC.
NAVAL ARCHITECTS • MARINE ENGINEERS • TRANSPORTATION CONSULTANTS

30 VESEY ST
7TH FLOOR
NEW YORK, NY
10007

SINCE
1968

Ph: (212) 964-1180
Fax: (212) 285-1334
info@crcco.com
www.crcco.com

GEORGE G. SHARP, INC.

160 BROADWAY, NEW YORK, NY 10038
TEL (212) 732-2800 FAX (212) 732-2809

WASHINGTON (703) 835-9998
VIRGINIA BEACH (757) 499-4125
SAN DIEGO (619) 425-4211

MARINE SYSTEMS • ANALYSIS & DESIGN

BOKSA 813-654-9800
MARINE DESIGN INFO@BMDINC.COM
BOKSAMARINEDESIGN.COM

Engineered for the Sea
DESIGN • NAVAL ARCHITECTURE • ENGINEERING



New in General HydroStatics (GHS)

- * Seakeeping extensions: damping due to eddy, friction, and lift; limit statements and polar plots; capability to run on all heel angles.
- * Geometry & shape rotation about any axis.
- * Probabilistic damage now includes MSC.421(98), SOLAS 2020 amendment.
- * Crane wizard: New maxload algorithm and enhanced capacity table lookup.

GHS
General HydroStatics

Ship Stability and Strength Software

GHS Full-featured naval architect's system
GHS Load Monitor (GLM) Onboard configuration
BHS Basic hydrostatics and stability

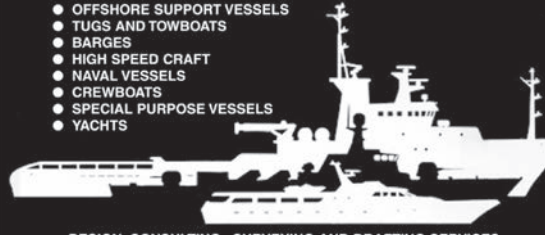
Creative Systems, Inc.
Creators of GHS™

P.O. Box 1910 Port Townsend, WA 98368 USA
phone: (360) 385-6212 email: sales@ghsport.com
www.GHSport.com

For 47 years, the software that naval architects love.

SPECIALISTS IN THE DESIGN OF:

- OFFSHORE SUPPORT VESSELS
- TUGS AND TOWBOATS
- BARGES
- HIGH SPEED CRAFT
- NAVAL VESSELS
- CREWBOATS
- SPECIAL PURPOSE VESSELS
- YACHTS




DESIGN, CONSULTING, SURVEYING AND DRAFTING SERVICES

GUARINO & COX, LLC
Naval Architects, Marine Designers and Consultants
19399 Helenburg Road Suite 203 Covington, LA 70433
Tel: (985) 871-9997 Fax: (985) 871-9927 www.guarino-cox.com

Established in 1854

CRANDALL
DRY DOCK ENGINEERS, INC.
• Consulting • Design • Inspection
Railway and Floating Dry Docks
Dry Dock Hardware and Equipment

552 MacArthur Blvd. Bourne, MA 02532
(617)884-8420 • (888)DRY-DOCK
www.crandalldrydock.com



HEGER DRY DOCK INC.
Marine Structural Engineers

Engineering for all types of drydocks

- Design
- Consultation
- Appraisals
- Inspections
- Certifications
- US Navy MIL-STD FCR
- Docking Calculations
- Mooring Designs
- Accident Investigations
- Drydocking Seminars

77 Main St., Suite 9, Hopkinton, MA 01748 | hegerdrydock.com
Phone : (508) 429-1800 | Fax : (508) 429-1811



GILBERT ASSOCIATES, INC.
Naval Architects
and Marine Engineers



100 Grossman Dr. Suite 205
Braintree, MA 02184
T: (781) 740-8193 • F: (781) 740-8197
E-mail: JGilbert@jwgainc.com
www.jwgainc.com

LAY, PITMAN & ASSOCIATES, INC.
NAVAL ARCHITECTS

- Naval Architecture Services
- Marine Engineering
- Design Services
- Construction Administration
- Regulatory Liaison
- Inspections and Surveys

2300 Marsh Point Road #303
Neptune Beach, Florida 32266
(904) 221-7447 • www.laypitman.com

Technology Associates, Inc.
Bringing Engineering to Successful Fruition



■ www.TAIEngineers.com ■
(504) 282-6166

HEC



Herbert Engineering Corp.
SHIP DESIGN & ENGINEERING SERVICES
Innovation • Analysis • Optimization
• BWTS • Post-2020 Fuel • Safety
• Efficiency • Environmental Performance
510-814-9700 www.herbert.com

M.A.C.E.
Marine Industry
FT. LAUDERDALE - USA - WORLDWIDE
PHONE: (954) 563-7071 FAX: (954) 568-6598

- N.D.T Services
- Vibration - noise - structural/modal analysis
- Field balancing, Laser Alignment
- Torque - torsional vibration analysis
- IR - Thermography inspection
- Emmision tests, Engine Performance tests
- Low Location Light Testing

MiNO Marine, LLC
Naval Architects and Marine Engineers
Design and Analysis • FEA • CFD
119 Causeway Boulevard • New Orleans, LA 70121
504-218-8162 • www.minomarine.com

MARITIME LOGISTICS PROFESSIONAL

The world's best online business resource for maritime logistics executives, owners, & managers.



MARITIMEPROFESSIONAL.COM

CG State Pilotate License Insurance/ Mariners' Disability Insurance
For Quotes on License Insurance or Mariners' Disability Insurance
See our web site: marinelicenseinsurance.com

R.J. MELLUSI & CO.
29 Broadway, Suite 2311
New York, N.Y 10006
Ph: (212) 962-1590
Fx: (212) 385-0920
Rjmellusi@sealawyers.com



Got Noise?
HYDRAULIC SUPPRESSOR

Noise, Shock, Vibration & Pulsation in Quiet, Smooth Flow Out



Oil Bladder Nitrogen (blue)
Three Stage Noise & Pulsation in Reduction Chamber

QUALITY NACOL ACCUMULATORS

- Long Lasting, No Seam, Pleated Bladders
- Forged shells, no welds
- We stock 1/5 pint to 15 gallons in Chicago

(877) 534-6445
www.wilkesandmclean.com
info@wilkesandmclean.com

WILKES & MCLEAN, LTD.

We Build the Ship First.

**Production Lofting
Detail Design
3D Modeling**

St. John's, NL | Vancouver, BC | New Orleans, LA

709.368.0669 | 504.287.4310 | www.genodesign.com



genoa
DESIGN INTERNATIONAL

HYDREX[®]

UNDERWATER TECHNOLOGY

In-water repairs

+32 3 213 53 00
info@hydrex.us
www.hydrex.us



RUSTIBUS[®]
 maintaining your values

THE MOST POWERFUL TOOL for removing coatings and rust

www.rustibus.com

USA OFFICE Ph: 832-203-7170
houston@rustibus.com



AIMAN ALIGNMENT

3D INSPECTION AND ALIGNMENT OF MACHINERY AND HULLS. USING LASER TRACKERS, CMM ARMS, TOTAL STATIONS, 3D PHOTOGRAMMETRY, STRAIN GAUGES, OPTICAL TOOLING. SPECIALIZING IN PRECISION IN PLACE FIELD MACHINING.

Ph: 813-715-4600 • sales@aimanalignment3D.com



MARINE SALVAGE & FIREFIGHTING

- 2", 3" & 4" self-priming seawater pumps
- ☑ Huge flows to 1500 lpm
- ☑ Heads to 90m (128 psi)
- ☑ Yanmar 4.8HP diesel
- ☑ Bronze impeller/volute
- ☑ Corrosion resistant marine coating on casing
- ☑ Sacrificial anode
- ☑ Stainless steel fasteners

DESIGNED FOR A LIFE AT SEA

Aussie Pumps
aussiepumps.com.au

+612 8865 3500




HART SYSTEMS, INC.
 The Original Tank Measuring System
 Made in the USA by Hart Systems, Inc. Since 1982
 ACCURATE tank measurement made easy when just one TANK TENDER measures from 1 to 10 water, diesel and holding tanks. Pneumatic, long term reliability, no electricity, no batteries.
 (253) 858-8481 • www.TheTankTender.com

IMPENETRABLE.
 POLYFLAKE[®] High performance coatings.

E4 POWER
 Powerful, marine engineering solutions.

E4POWER.LLC.COM

Do your Advertising dollars need a lifeline?



Best value and lowest cost per thousand for your marketing budget.


www.marinelink.com

WHEN SECONDS COUNT

RADIO DIRECTION FINDERS

for:

- Man-Over-Board
- Search and Rescue
- Radio Monitoring
- Asset Recovery
- COSPAS-SARSAT 406MHz
- Radio Location



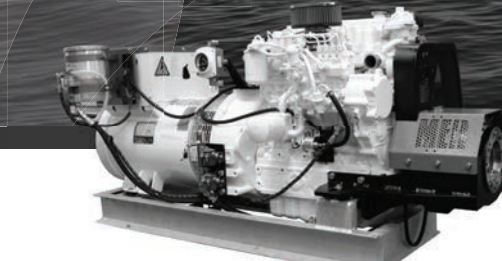
RT-300
 RT-500

(954) 495-8700
rhotaint.com

RHO
 International Inc.

IHEA

POWERING THE MARINE INDUSTRY SINCE 1964!



8-500kW Marine Generators

- // Pull harder in the harshest marine environments
- // More copper and premium corrosion resistance
- // Superior motor starting and low operating temps
- // Better fuel economy and longer engine life
- // Easy to service and worldwide dealer support
- // Proudly made in America

1.800.777.0714 toll free
www.merequipment.com

BOLLARD
 ENGINES & GENERATORS



America's Crane and Handling Systems Company
Allied Marine Crane
503.625.2560
www.alliedsystems.com/crane


Vesconite Hilube
Rudder and Stern Tube Bearings

- Use dry or underwater
- No grease needed
- Lowest friction
- Fit and forget



Call for free Design Manual
1-866-635-7596
www.vesconite.com

Industrial – Grade Pressure Washers




Water Cannon.com
CELEBRATING **35** YEARS OF SERVICE
WaterCannon.com
800.333.9274

Maritime Today
E-News Service
In business, time is of the essence.



Stay up to date with the latest **NEWS & INFORMATION...**
...from the industry's leading source, providing you with daily updates on the subjects that pertain to your business.
www.marinelink.com



OceanMedix®
The Source For Medical, Emergency, Safety Equipment - Since 2006
<http://www.OceanMedix.com>
1-866-788-2642

Working, Fishing, Towing, Supporting, Defending
Subchapter M
Commercial Vessel Medical Kits
Coastal & Offshore Configurations
Available in Three Sizes

MR
Vessels, Barges & Real Estate for Sale/Rent

List your maritime real estate here!
Contact us today: +1 561-732-4368




ZIDELL
MARINE CORPORATION

Specializing In Barges

- Single or Double Hull, Inland or Ocean-Going
- Chartering & Sales

Ask for Bill Gobel
(503) 228-8691 • (800) 547-9259
2020 SW 4th Ave Suite 600
Portland, OR 97201

ADVERTISER INDEX

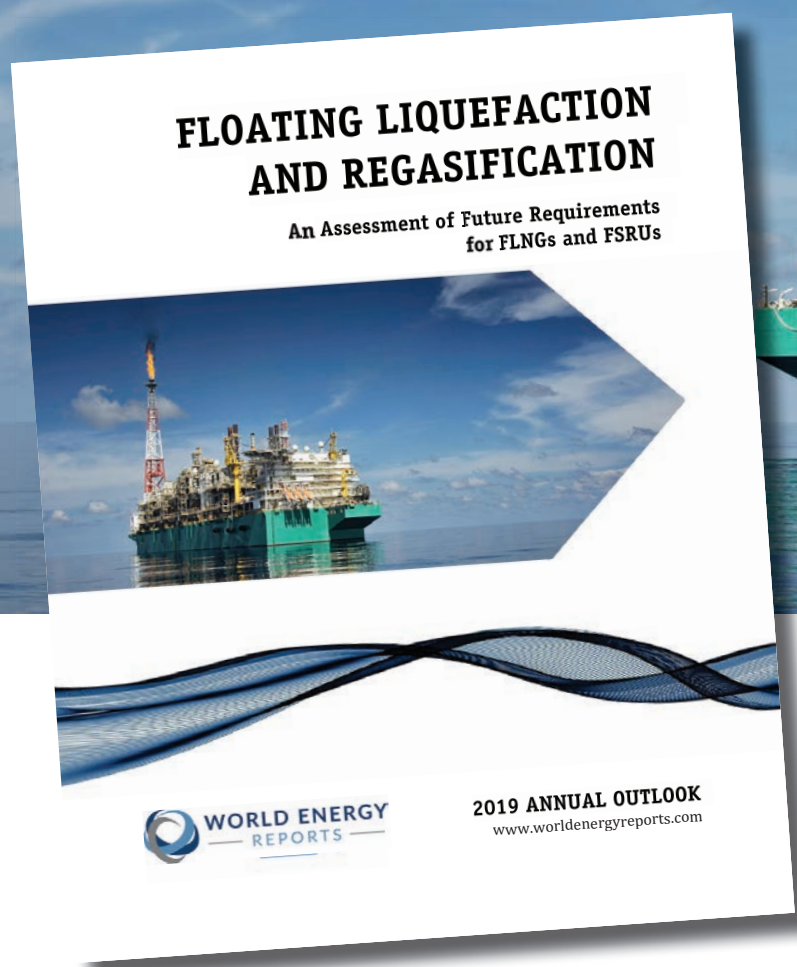
Page	Advertiser	Website	Phone #
15	ABS Americas	www.eagle.com/cybersecurity	(281) 877-6774
51	Anchor Maine & Supply, Inc	www.anchormarinehouston.com	(800) 233-801
9	Chevron Marine Lubricants	www.chevronmarineproducts.com	Please visit us online
11	David Clark Company	www.davidclark.com	(800) 900-3434
25	DCL Mooring and Rigging	www.dcl-usa.com	(800) 228-7660
23	Detyens Shipyards, Inc.	www.detyens.com	(843) 308-8000
25	Ebac Systems	www.ebacusa.com	(757) 873-6800
40	Europort 2019	www.europort.nl	Please visit us online
19	Fireboy-Xintex Inc	www.fireboy-xintex.com	(616) 735-9380
7	Furuno USA, Inc.	www.FurunoUSA.com	Please visit our website
1	Glosten	www.glosten.com	(206) 624-7850
5	Hydrogenics	www.hydrogenics.com	(905) 361-4574
23	International Registries, Inc.	www.register-iri.com	(703) 620-4880
3	KVH	www.kvh.com/getagile	Please visit us online
56	Marine Interiors - Cruise & Ferry Global Expo	www.marineinteriors-expo.com/pass	Please visit us online
C4	Maritime Professional Training	www.mptusa.com	(954) 525-1014
25	Prime Mover Controls	www.pmc-controls.com	(604) 433-4644
25	R.M. Young Company	www.youngusa.com	(231) 946-3980
C2	ShipMoney	www.ShipMoneyCorporate.com	(954) 990-5429
51	University of Hawaii Marine Center	porteng@soest.hawaii.edu	Please email us
41	Whiffletree Marine Safety	www.whiffletreecorp.com	(207) 647-3300
C3	World Energy Reports	www.worldenergyreports.com	(212) 477-6700

**The industry's leading news site.
Part of the world's largest maritime
publishing network.**

www.marinelink.com

The listings above are an editorial service provided for the convenience of our readers. If you are an advertiser and would like to update or modify any of the above information, please contact: productionmanager@marinelink.com

POWERFUL MARKET INTELLIGENCE



UNPARALLELED BUSINESS INSIGHTS, DATA, AND MARKET ANALYTICS COVERING:

- YEARLY OUTLOOK
- MONTHLY REPORTS
- LIVE - 24/7 ONLINE DATABASE

- FPSOs
- SEMIs
- SPARs
- TLPs
- FLNGs
- FSRUs

We don't just provide a snapshot of the sector. Our online fully searchable databases update all of the project information on a 24/7 basis. As we receive new information about projects from our network of industry contacts, the database is immediately updated to reflect the latest situation.

This unique data intelligence package is only available from World Energy Reports, to learn more, visit our website or call:
+1-212-477-6944



WORLD ENERGY
— REPORTS —

www.worldenergyreports.com

MPT. SERIOUSLY S.M.A.R.T.

ONE SCHOOL. **UNLIMITED** POSSIBILITIES.



There is nothing like incredibly-real training to better prepare you for serious real-life maritime situations. Our ongoing investment in S.M.A.R.T. simulation provides a visually immersive level of realism that is simply not available in other programs. This is just another reason why MPT is the most complete full-service private maritime training school in the country.

OUR UP-TO-THE-MINUTE, INDUSTRY-LEADING TRAINING INCLUDES:

ENGINEERING COURSES

QMED, DDE, License Prep and more

REFRESHER AND REVALIDATION COURSES

Basic Training, Advanced Fire, Dynamic Positioning, Medical and more

ABLE SEAMAN / ABLE SEAFARER DECK PROGRAM

Including RFPNW tasks

CHIEF MATE / MASTER PROGRAMS

Including advanced courses, and prep courses to ensure success

QUALIFIED ASSESSORS AVAILABLE

Speak to a MPT counselor for guidance

For training that can create serious real-life opportunities, call us or visit MPTusa.com today.



MPT

MARITIME PROFESSIONAL TRAINING
Fort Lauderdale, Florida

Sea The World

USCG | MCA
NAUTICAL INSTITUTE
MARSHALL ISLANDS