

Kongsberg Maritime

Insights

Green technology with purpose



KONGSBERG

Featuring

Vessel's appetite
for disruption

A commitment
to cybersecurity

Featuring

Data drives our
green revolution

The quest for
quieter waters



Star attraction

The *IWS Skywalker* is making waves in the wind farm sector



KONGSBERG



Welcome

Lisa Edvardsen Haugan,
President – Kongsberg Maritime



Scan the QR code to find out more about Kongsberg Maritime.

Contact

If you're interested in talking to us about our products and systems, please contact us:

General sales enquiries

km.sales@km.kongsberg.com



Cover image: Tom Collins

Publisher

Kongsberg Maritime
Kirkegårdsveien 45
3616 Kongsberg
Norway

Editorial Team

Craig Taylor
Nigel Allen

Design and print

Connect Media



© Kongsberg Maritime, 2024

Navigating a sustainable future

Welcome to the latest issue of *Insights*, where we aim to update you on the latest technologies from Kongsberg Maritime and our customers.

As we hurtle through 2024, the pressure to decarbonise intensifies, presenting ship owners with a multitude of challenges. From navigating complex regulations to meeting stringent emissions targets, the path towards a sustainable future can be complex. Kongsberg Maritime is your trusted energy transition partner.

This issue of *Insights* dives deep into some of the solutions we offer, empowering you to make informed decisions. We take a look at recent exciting developments, including our solution to optimise energy use and reduce emissions for three new LNG-powered container ships in the United States, and a pioneering move to place the role of chief engineer on shore, in a key step on the autonomous shipping journey.

Sustainability isn't a one-size-fits-all approach. Recognising this, we showcase two retrofit projects that exemplify our commitment to tailoring solutions to existing fleets. We'll also explore the benefits of digitalisation, delving into how we're harnessing artificial intelligence (AI) to optimise operations and enhance efficiency.

Our innovation doesn't stop there. In this issue, you can discover the revolutionary *IWS Skywalker*, a wind farm commissioning service operation vessel (CSOV) equipped with cutting-edge KONGSBERG solutions for a sustainable future at sea. I hope you will also enjoy reading about the amazing REACH project – a testament to our commitment to transforming the maritime industry, with a new approach to offshore operations.

This summer, we celebrated a landmark achievement by securing our 11th order for our innovative chemical tanker design from progressive Swedish owner Terntank. Five of these vessels will be equipped with wind sails as part of a comprehensive green technology package. This exciting collaboration represents a significant stride towards a cleaner, more responsible maritime landscape.

We understand the complex decisions ship owners face – that's why we're here to provide the solutions and expertise you need to navigate the challenges and unlock the opportunities presented by the energy transition. Join us as we delve into the world of green technologies and discover how Kongsberg Maritime can be your partner on the path to a sustainable future.

Remote control

Read how one vessel is set to transform offshore operations.

See pages 10-11

23%

How an upgrade for Hurtigruten delivered a cut in emissions.

See pages 12-13

Future is now

We take a look at *IWS Skywalker*, in our four-page cover story.

See pages 16-19

56%

Estimated fuel cost saving from the Super-Efficient Bulker concept.

See pages 28-31

Kongsberg Maritime Updates

1,000 reasons to cheer

Kongsberg Maritime is celebrating 50 years of ship design in 2024, as we showcased in the last issue of *Insights*. Throughout those five decades, a wide range of vessels has been delivered, including many of the renowned UT-Design offshore vessels. Now, the 1,000th vessel from our design teams has been delivered. Hull number 1,000 is the *IWS Seawalker*, a 90-metre state-of-the-art CSOV vessel featuring innovative

walk-to-work capabilities that provides services to the offshore wind industry. The vessel, which is the third of six ordered, completed sea trials over the summer from the Chinese shipyard, China Merchants Heavy Industry.

Read about her sister vessel *IWS Skywalker* on pages 16 to 19.



Green light for ship-to-shore technology

Approval in Principle (AiP) from Det Norske Veritas (DNV) is enabling a key role to be transferred from a ship to a shore-based control centre, marking a significant step in the journey towards uncrewed vessel operations.

The move will enable the role of chief engineer to be located in a remote operations centre (ROC), where the duties can be carried out from a desk-based workstation, instead of on board a vessel.

From the workstation, the chief engineer will be able to monitor

and control systems on three vessels. They are the world's first fully electric container vessel, *Yara Birkeland*, and a pair of electric barges operated by grocery retailer ASKO (see page 5), named *Marit* and *Therese*.

Full approval for what's known as 'Chief-to-Shore' functionality is expected to be granted later this year.

Pål André Eriksen, Kongsberg Maritime's Senior Vice President Remote & Autonomous Solutions, said: "The journey towards autonomous and uncrewed

operation of vessels is defined by a set of increments. To get there, we must take each step in turn and prove the functionality and value before moving to the next. The role of chief engineer is one that already involves a lot of monitoring of automation and control systems on board. Moving this functionality to the ROC will see one person managing a range of systems across three vessels, rather than one."

Jarle Coll Blomhoff, DNV Head of Section Digital Ship Systems, said: "Remote machinery

support is a first natural step on the path to autonomy as the engineering functions on board a vessel are in many ways already automated. We believe this is a key step for Kongsberg Maritime's pathway to fully autonomous vessels, but also a technology that could contribute to a safer and more efficient world fleet by providing remote support for maintenance and troubleshooting, as well as expertise on new alternative fuels that may be hard to get on board every vessel."

Kongsberg Maritime Updates

New addition to thruster range

The ULE PM retractable azimuth thruster range has been extended with the introduction of a new model, designed specifically for a wide range of large vessels.

The ULE PM thruster features an integrated electric prime mover positioned low between the steering gear, conserving more than a metre of vertical space in the engineering compartment. This model stands out as the most compact retractable unit available for any given power requirement, allowing for straightforward, single-day installation.

The latest addition, the ULE PM 255, is particularly suited for larger vessels. Its compact size, increased power density and ease of installation make it a highly cost-effective choice. The thruster's high thrust and reliability are crucial for vessels utilising Dynamic Positioning (DP) systems.

Pasi Villanen, Kongsberg Maritime's Product Line Manager, said: "Responding to customer feedback, we have developed this latest solution for larger vessels, including wind installation vessels, shuttle tankers and other substantial offshore vessels. Our commitment to robust and reliable design principles ensures we deliver dependable products to our customers."

The ULE PM 255 thruster, like its smaller counterparts, is available as a combi unit. This versatile unit functions as an azimuth thruster and, when retracted into a tunnel, as a tunnel thruster. Kongsberg Maritime's expertise in hull interaction design further enhances the benefits of this optimal combi-solution.

Find out more at bit.ly/thrusterrange



The U.S. Coast Guard will use our Promas propulsion system

Image courtesy of U.S. Coast Guard

Contracts award is a propulsion prize

Kongsberg Maritime's prowess in the delivery of efficient propulsion systems suited to naval and coast guard mission requirements has been recognised through the award of two significant contracts.

First, the company will supply its Promas propulsion system to the latest ship in the United States Coast Guard's new Offshore Patrol Cutter (OPC) Heritage Class programme.

This initial contract is to supply Kongsberg Maritime equipment for the fifth ship, Coast Guard Cutter *Pickering*, which is the first to be built by Austal USA at their yard in Mobile, Alabama.

The Coast Guard's new OPC programme represents a significant investment in maritime capability and is expected to run to more than 20 ships. The new vessels will replace the Coast Guard's medium endurance cutters and meet the need for long-term offshore capability to maintain current and future mission effectiveness.

In Europe, Kongsberg Maritime has been selected to supply controllable pitch propellers and shaft lines from its facility in Kristinehamn, Sweden, to ship builder Damen Naval for a series of four Anti-Submarine Warfare (ASW) frigates. The new ASW frigates

are being built for the Netherlands and Belgium and will replace the current Karel Doorman-class multi-purpose frigates. They will be deployed for a wide variety of tasks, with anti-submarine warfare as their main purpose. The ships will have hybrid diesel-electric propulsion and will be designed to operate as quietly as possible. The first ship is expected to be delivered by Damen Naval in 2028.

As part of this contract, Kongsberg Maritime will supply four shipsets of its controllable pitch propeller systems and associated equipment including blades, hubcaps, hubs and shaft lines. This is the second collaboration between Damen Naval and Kongsberg Maritime in the past 18 months, and follows a similar contract signed by the companies in 2022 for the German navy's F126 frigates.

"It is great news to have Kongsberg Maritime involved in the ASW frigate project as well," said Richard Keulen, Damen Naval Director Corporate Strategy and Innovation. "We have a long-standing relationship with the company and it is a good example of the excellent cooperation that exists between the Dutch and Swedish naval shipbuilding industries."

Satellite trial for autonomous shipping

A team of experts from Kongsberg Maritime is conducting a three-month trial of Eutelsat OneWeb's low Earth orbit (LEO) satellite internet service on an autonomous barge operation across the Oslofjord.

In a collaborative project with the help of Norwegian telecommunications provider Telenor Maritime, a zero-emission, electric barge, which is owned and operated by grocery distributor ASKO, will be equipped with Eutelsat OneWeb's latest Kymeta Peregrine u8 flat panel antenna system for the duration of the trial.

The integration of the Eutelsat OneWeb antenna system on the vessel enabled Kongsberg Maritime to experience LEO connectivity and bandwidth for real-time data transfer, ship-to-shore communication and remote and autonomous vessel control.

The ASKO barge *Marit*, which is battery-powered, is one of a pair delivered in 2022. Along with sister vessel *Therese*, they have been operating extensive trials since then, transporting up to 16 trailers of cargo on each journey across the Oslofjord. This innovative operation reduces road



Satellite technology will be used on *Marit*

travel by 2 million kilometres and cuts carbon emissions by 5,000 tons annually.

During the latest trials, the barge was controlled from a remote operations centre (ROC), located in Horten. The ROC is operated by Massterly, a Kongsberg Maritime and Wilhelmsen joint venture company.

Pål André Eriksen, Kongsberg Maritime's Senior Vice President,

Remote & Autonomous Solutions, said: "Seamless connectivity remains one of the key challenges for remote and autonomous operations, particularly in the open oceans. Overcoming the challenges of global connectivity and available bandwidth will unlock great potential for the deployment of such technologies in future, and we look forward to seeing how this collaboration with Eutelsat

OneWeb and Telenor Maritime can advance the development of autonomous shipping solutions further.

"We're grateful to ASKO for allowing us to install OneWeb's latest antenna technology on one of their vessels, which will provide a realistic operating environment to comprehensively demonstrate the low latency, high throughput capabilities of Eutelsat OneWeb's LEO satellite service."

Powerful set of products

A range of Kongsberg Maritime's integrated technologies is being supplied to optimise energy use and reduce emissions for three new 3600 TEU LNG-powered container ships being built for Matson Navigation Company at the Philly Shipyard in Pennsylvania.

To support Matson's drive to decarbonise its operations, Kongsberg Maritime will supply hybrid electrical systems, controlled and operated by the company's Energy Management System.

The Aloha Class vessels are the largest container ships



ever built in the United States and are designed to operate at speeds in excess of 23 knots in support of Matson's service hallmark – timely delivery of goods.

The Kongsberg Maritime scope of supply includes a shaft generator system, and a battery energy saving system

combined with a complete power management system.

The hybrid electrical systems will provide electrical power to the vessel's main switchboard through the KONGSBERG converters.

Lasse Brynsrud, Kongsberg Maritime's Senior Sales Manager Marine Transportation, said: "Through their investment in three new LNG-powered container ships, Matson Navigation Company is making a clear commitment to decarbonise its operations.

"We are delighted to be supporting their environmental

goals through the supply of a wide range of green ship technologies, including our hybrid electrical system, which together will optimise energy usage and reduce emissions."

Captain Jack Sullivan, Matson's Senior Vice President, Vessel Operations & Engineering, added: "The integrated systems from Kongsberg Maritime will enable us to make the most efficient use of energy on board, including power generated from the main shaft and the battery system, which provide additional emission-free energy in peak load conditions."

Cybersecurity is top priority

Kongsberg Maritime takes the issue of cybersecurity and the safety of vessels and their crews very seriously. Safety is always at the beating heart of everything we do.

We live in difficult and dangerous times. Many shipping companies and ports have been targeted by online hackers in the past five years, and the results of these criminal actions are often devastating for individuals, businesses and nations.

Hackers can cripple global maritime operations, delay the delivery of vital cargo and, in some cases, ships can be sent off course and even run aground.

This is a clear threat to fleet operations and therefore people's lives and livelihoods, and we will take all necessary steps to stop cyber criminals.

Our determination to keep our customers' assets and people safe has reached a major milestone as we have completed testing to comply with IACS IEC 62443 – UR E27 Security Level 1 cybersecurity certification.

This testing covers a wide range of our digital products, including automation, navigation and Dynamic Positioning (DP) systems.

Passed the test

This wasn't merely a box-ticking exercise, it was a statement of intent.

We started this extensive process in 2022 and it was delivered through third-party, independent verification. This made certain we met all the necessary security, quality, health, safety and environmental standards.

In all, 40 requirements had to be met to gain pass marks. However, while we passed we won't rest on our laurels. This is just the beginning of our journey to achieve the very best levels of excellence in cybersecurity throughout our operations worldwide.

The project featured a strong sense of collaboration and consensus. We worked

Oscar Kallerdahl is focused on the best standards of cybersecurity



closely with Norwegian risk management and maritime safety experts Det Norske Veritas (DNV) to achieve success and adhere to the new cybersecurity requirements which came into effect on July 1, 2024.

Oscar Kallerdahl, Kongsberg Maritime's Director Cyber Security, Automation & Control, is proud of our achievements to date. He says: "We understand the challenges shipyards and ship owners face in designing and building vessels that must maintain cybersecurity over the 25-year operation of a ship. Our focus was to establish a baseline of cybersecurity for all our digital products supporting yards, owners and operators through the lifetime of the vessel.

"Once it was clear that these new regulations were coming into place, we moved quickly, working closely with DNV to prioritise products for Type Approval certification."

We expect the majority of our automation and control digital products to receive DNV Type Approval for compliance by the end of August.

Next steps

The hard work doesn't stop there. We will expand compliance testing to include integration and energy systems, propulsion and cargo handling products.

The DNV Type Approval certification isn't just good news for ship owners. It will also benefit shipyards around the world, with certainty our

Steps to safety

The products in the first phase of the Level 1 cybersecurity certification are:

- The K-Pos DP system
- K-Steering
- K-Chief
- K-Safe
- K-Bridge
- K-Thrust
- K-IMS
- The Riser Management System
- KONGSBERG Remote Services.

products have already been certified for cybersecurity compliance. This will save time and money during the engineering and testing stages of ship production.

Kallerdahl adds: "We are in a new era of cybersecurity and it's clear that ship owners will need to be proactive in seeking the most resilient and effective security measures to protect their assets against growing and more hostile cyber threats.

"It is a priority for us to manage risk for our customers, and this certification sets a baseline for our product teams and their understanding and implementation of the right security features."

Jarle Coll Blomhoff, Head of the Digital Ship Systems section at DNV Maritime, says: "As vessels become increasingly reliant on digital technology and connectivity, cybersecurity is emerging as a key topic in the maritime industry, fundamental to ensuring safe shipping.

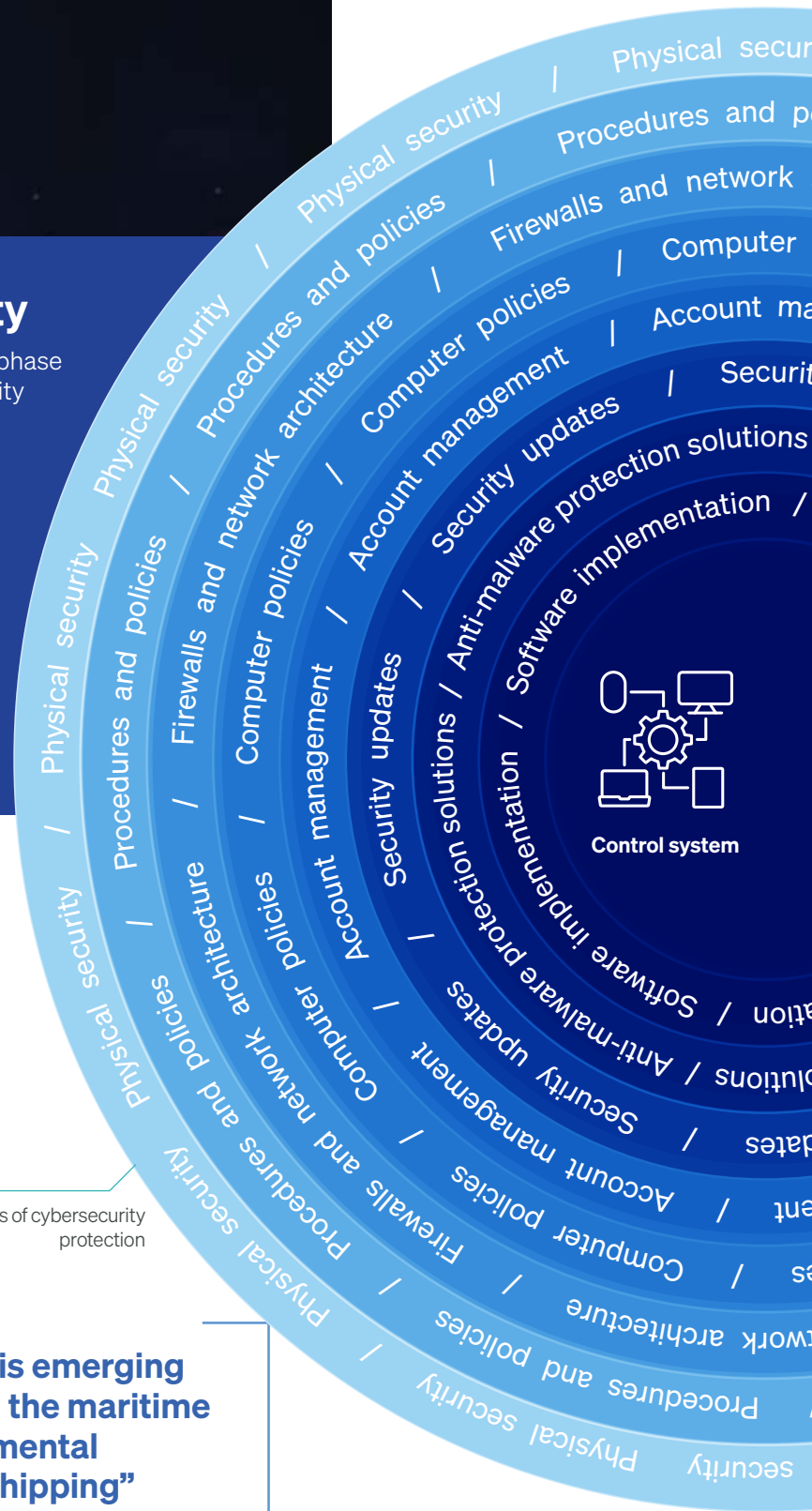
"We are pleased to continue our close cooperation with Kongsberg Maritime on cybersecurity, which started when we first developed our initial DNV Cyber Secure rules in 2017.

This project demonstrates their ongoing commitment to delivering a full portfolio of systems with a strategic and independently verified approach to cyber risk reduction."

Kongsberg Maritime's drive and determination to keep people and vessels safe from harm is something that our customers can rely on and is the driving force behind our daily operations. ●

Layers of cybersecurity protection

"Cybersecurity is emerging as a key topic in the maritime industry, fundamental to ensure safe shipping"



The transition triangle

Oskar Levander, Kongsberg Maritime's Vice President Strategy & Business Development, on the challenges and considerations facing ship owners dealing with ambitious environmental targets.



The International Maritime Organization (IMO) introduced new measures to reduce shipping emissions and carbon intensity in January 2023. The Energy Efficiency Existing Ship Index (EEXI) and the Carbon Intensity Indicator (CII) form part of short-term ambitions for carbon emissions reductions by 2050.

I've been working in this area for many years and my role is to look at what the market will need, and what we as a business can do to support our customers and to grow in the industry.

The challenges don't come from operating with net zero emissions. Once fuel production and ships are in place and everyone is dealing with equal demands and regulations, the world can afford zero emission shipping. It's the process of getting there that's difficult.

How do we ensure that fair competition remains? Who should be investing in new infrastructure? How do we transition from existing operations? The uncertainties are not helped by lack of clarity on what future regulations

might be. We know targets and ambitions, but not necessarily the mechanisms that will get us there.

Navigating change

Our job is to help customers understand and adapt to the changes we know about, and to anticipate and prepare for those we don't. At present, the IMO target is an ambition. However, it will eventually bring in regulations with clear implications for ship owners.

Here's what we know: there are likely to be new technical and economic operational measures impacting ship owners. What those measures will be is still being debated.

It's most likely that technical measures will be around carbon intensity, ensuring that fuels contain less carbon. Economic measures might involve a carbon tax, or perhaps buying rights for emissions.

All of which affects our customers. While we are primarily in the business of selling, we must also ensure that we have the right knowledge and understanding to advise our customers on reducing emissions.



Oskar Levander is committed to supporting the maritime industry

The triangle

When we talk about reducing emissions, I think of a triangle.

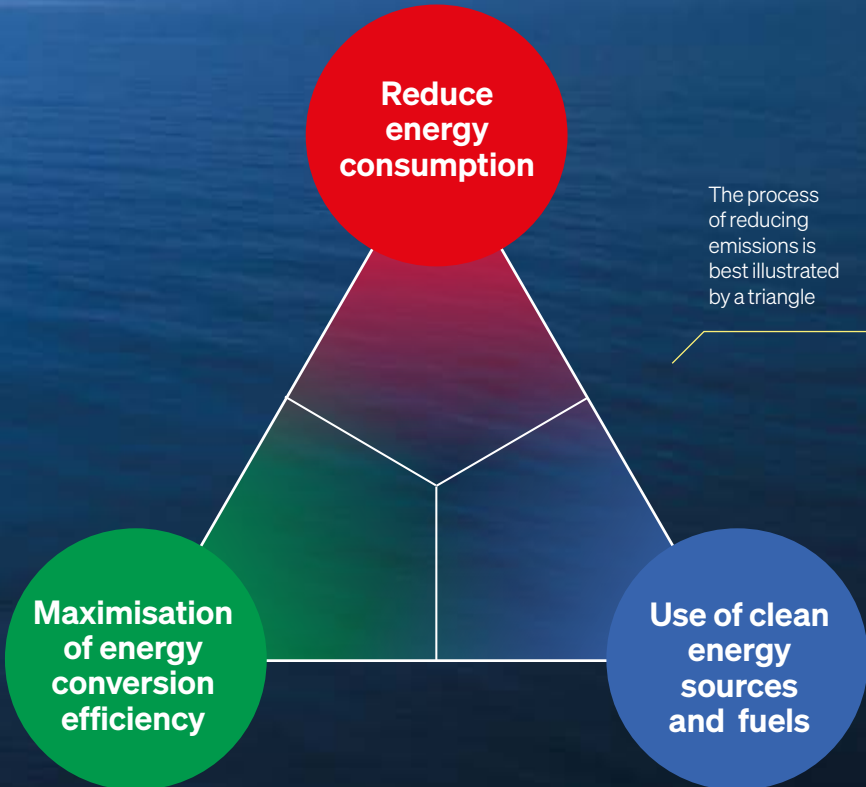
One corner represents reduced energy consumption. The second is about selecting a clean energy source, the third is about energy efficiency.

How do we help customers to consume less energy? It's about things that reduce their energy demand. That might be optimising their routes, thinking about shipping dates, vessel speeds and so on. They don't want to get to a port quickly just to end up waiting outside.

And that's where we play an essential part – consulting with customers and providing them with the tools that help them optimise their operation.

The second corner of the triangle is about selecting the right clean energy source. That might be alternative fuels, but it could also be wind power, wave power or shore power, where you charge your ship at shore and run on batteries.

We already provide solutions for some of these, but we also help our



The process of reducing emissions is best illustrated by a triangle

customers to find the right energy source for their needs.

Finally, you need to convert that clean energy into the most efficient power type for your vessel, which comes down to selecting the right machinery.

The big challenge is getting all of this together. And that is the strength of a company like ours. We have the full picture for all the customers' operations, so we're well placed to advise them. We have the ship design, we have our own- and third-party equipment, we have integrated solutions, and we know how to put everything together. You need that holistic view to really truly optimise.

Today's challenges

The regulations that came into place in January 2023 have had a clear impact. EEXI meant owners looked for one-off solutions to ensure short-term compliance.

CII, on the other hand, is the main regulation driving emissions reduction, and has ongoing implications for our customers. Simply put, CII uses calculations based on emissions, cargo capacity and distance to create an

energy index from A to E. For owners, it's not just about using less fuel.

They must also be able to document operations accurately and predict and plan the amount of energy they'll need.

We can provide tools to calculate energy use and monitor fleets. We are continuously improving those tools, while also supporting our customers by helping them upgrade and realise the value of their existing fleets.

The cost of non-compliance

A CII rating of D or E means a potential ban on operating. Ships with an E rating cannot operate until improvements are made, those rated D have up to two years to make improvements.

On top of that, certain charterers don't want bad ratings, because that

“It's an effective way to drive decarbonisation. You don't dictate what technologies to use”

impacts their own environmental targets. A good CII rating increases earning potential, a bad one reduces it.

Compliance also impacts finance. If shipowners want to achieve funding to build a new ship, the build has to be green. Which means certain types of vessels currently being built will be capable of running with alternative fuels. They may not use those fuels from day one, but they have the capability.

Non-compliance, in a nutshell, could mean no finance to build, fewer or less profitable charters and no operations. Those are heavy costs.

What lies ahead?

The next big change is likely to be the IMO's planned economical measure. It will be adopted in 2025, brought into force in 2027 and will most likely involve a price on greenhouse gas emissions.

It's an effective way to drive decarbonisation. You don't dictate what technologies to use. You focus on emissions, so ship owners can invest in the new technologies that work for them.

For example, quick wins could be smartly integrated wind propulsion and new air lubrication solutions. These are just two of the untapped technologies that can really move the needle when it comes to efficiency. Kongsberg Maritime, as an integrator, can pull together different technologies and recommend an efficient solution matched to owners' requirements.

We're also developing fleet management solutions, which are getting smarter all the time, and making use of artificial intelligence (AI) and machine learning to help optimise ship operation. There's so much data to consider that it's impossible to decide on the best way to run a vessel just by thinking about it. We use these tools to consider all the variables and help us reach the right decisions.

Whatever route customers take in the future, they need to work on minimising consumption and maximising efficiency. That will not only help achieve compliance in the near future, it will also mitigate the higher cost of low carbon fuels.

It's a strategy that will pay off, whatever happens in the future. ●

There is global interest in the REACH REMOTE vessel project



REACH REMOTE

Appetite for disruption

A pioneering vessel that is set to prove transformational for offshore operations took to the water early in 2024, and is being prepared for its first deployment – without a single member of crew on board.

The 24-metre 'REACH REMOTE 1' is the first of a pair of uncrewed offshore surface vessels delivered by Kongsberg Maritime to Norwegian company REACH SUBSEA ASA.

Crammed with state-of-the-art KONGSBERG technology, the vessels will initially carry out underwater survey duties off the coast of Haugesund in southern Norway, and with global interest in this disruptive approach to traditional duties, many more are set to follow.

Jostein Alendal, CEO of REACH SUBSEA, has big ambitions for developing a fleet of these vessels. He says: "Client interest in REACH REMOTE is continuously increasing across all regions and we have both national and international projects in our pipeline that fit these vessels very well."

"The successful sea launch of the REACH REMOTE USV marks a significant achievement for our organisation."

There is a significant amount of Kongsberg Maritime equipment onboard the vessels, including the vessel control system, sensors, energy delivery and a launch and recovery system for the remotely operated vehicle (ROV). Kongsberg Maritime is also responsible for the ship design, with the vessel designated as a UT 5208 USV.

Johnny Aarseth, Kongsberg Maritime's Executive Vice President Integration & Energy, says: "What started as a disruptive idea and a cross-industry research project seven years ago is soon to become a reality, and a big thanks to the teams at Kongsberg Maritime, Trosvik Maritime AS and REACH SUBSEA for making this happen. What we do is innovative and challenging, but it takes the industry and our companies forward with regards to efficiency and sustainability of maritime operations – and that is why we do it!"

He adds: "It's very fitting that in our 50th year of designing ships, many of which have been technology pioneers in their own right, we are able to deliver a vessel that is not only a vessel of its time, but definitely a vessel of the future.

"Nothing has been done on this scale before. Up to now we've seen smaller 'drone-type' craft carrying out limited duties, but this is something completely new, and I believe it will set the future direction for the way certain critical offshore jobs are done."

In a unique approach to delivery, Kongsberg Maritime has taken on the role of prime contractor, with responsibility for selecting and managing the yard (Trosvik Maritime), coordinating supply chain, systems integration and commissioning. With the company also responsible for vessel design, REACH REMOTE is a true turnkey project.

Kongsberg Maritime's Project Manager, Marthe Kristine Sand, sees the potential for volume sales as a key driver in this new approach. She says: "REACH SUBSEA has big plans for these vessels and wants to scale up, so we need to manage this in a way that can meet their expectations.

"This project represents a real step-change in the drive for efficient and safer offshore operations. We have been at the forefront of remote and autonomous technology development in recent years, with several ground-breaking projects demonstrating the benefits of



Watch the video

The innovative new vessels will operate without a crew

controlling vessels from shore, with a step-by-step move towards autonomous operation.

"What's different about REACH is that it will operate without crew, from day one. They will be carrying out duties that are typically done by much larger vessels, with large crew numbers. There are major cost advantages, in terms of crew and fuel consumption."

The UT 5208 USV vessels are designed around a moonpool from which the ROV is launched. KONGSBERG is providing the handling equipment for the ROV, as well as hull-mounted sensors for survey work. The ROV will feature a small robotic arm to enable simple underwater tasks, such as adjusting valves or moving debris.

The vessels will be controlled from a remote operating centre (ROC), where one captain will be able to control several vessels at the same time. Massterly, which is a joint venture between Kongsberg Maritime and Wilhelmsen, will monitor the vessels from its ROC in Horten, and the vessels will be followed by a support vessel in the early stages of operation.

Marthe adds: "Increased remote and autonomous functionality will be gradually introduced in a stepwise approach pending technology readiness. Reliability of onboard systems is critical to the success of this type of operation, particularly as the vessels are designed to have a 30-day operational window. That means they could be out on their own in the North Sea for 30 days. That's an unthinkable concept today, so we've selected proven technology."

Björg Mathisen Døving, REACH REMOTE'S Vice President, says: "We're now reaching an exciting stage as the first vessel completes sea trials and gets ready for its first deployment. This success has been down to a solid partnership between the teams at REACH SUBSEA, Kongsberg Maritime and Massterly. This powerful combination, with a determination to push the boundaries of what's possible, will deliver a truly pioneering vessel."

All three companies have had a close dialogue with Det Norske Veritas (DNV) and the Norwegian Maritime Authority throughout the project, as the approval process for an unmanned vessel differs significantly from a manned vessel.

"The journey towards this milestone has been challenging, but what started as a research project several years ago is now close to the finish line and it is amazing to see the REACH REMOTE 1 head to sea," says Marthe. ●



Main particulars

Rule length: **23.9m**

Beam moulded: **8.0m**

Maximum draught: **5.5m**

Main generator engines:
2 x Volvo Penta D13 MH, 441 kW each, at 1900 rpm (variable speed)

Thrusters: **2 x ZF ATL 4014 WM-FF L-drive, 342 kW each**



On-board KONGSBERG technology

- Autonomy and remote control systems
- Power electric system (switchboards, drives, etc.)
- Batteries
- Automation systems including; K-Chief, K-Safe, K-Thrust
- HiPAP hydro-acoustic positioning system
- MBES (Multi Beam Echo Sounder) and SBP (Sub Bottom Profiler)
- Deck Machinery ROV launch and recovery system (LARS)

Upgrades

An ambitious collaboration between Kongsberg Maritime, Myklebust Verft and Hurtigruten Coastal Express is seeing conversion of three existing passenger vessels to hybrid technology. The first two of three retrofits have been completed and the first ship, *MS Richard With*, is already delivering a **23 per cent** reduction in emissions, with that figure expected to rise further.

Green and supreme

Image: Hurtigruten / Trym Ivar Bergsmo

MS Richard With was the first of the ships to be relaunched

The project to upgrade Hurtigruten's Coastal Express passenger vessels is one of the largest of its kind in Europe with an investment value of approximately €100 million.

The 121-metre *MS Richard With*, built in 1993, was the first of three ships to be relaunched, in August 2022. The second ship, *MS Kong Harald*, returned to service in May 2023 and the final ship, *MS Nordlys*, will be complete in 2025.

Inspired by Hurtigruten's own determination to reduce CO₂ emissions from its coastal fleet by at least 25 per cent, the first two ships are in full operation along the Norwegian coast, delivering not only emissions reductions but also crucial data about the success of the project and its implications for the future.

Improving sustainability

Hedda Felin, Hurtigruten Norway CEO, highlights the maritime travel industry's responsibilities to cut emissions and be more sustainable.

"Our industry is too slow in its transition to green energy. The future of maritime tourism and transport needs to be sustainable," she says.

"We have built our last fossil fuel ship for the Norwegian Coastal Express. We are working to design ships with CO₂ emissions in mind. But it's important to start with ships in operation today."

That process began with the contract between Hurtigruten, Kongsberg Maritime and shipbuilding partner Myklebust Verft to upgrade three coastal ships.

Geir Oscar Løseth, Kongsberg Maritime's Vice President of Sales Aftermarket Advanced Offerings, says:

"By collaborating, we complement each other to deliver the result our customer wants.

"Throughout the tender process, we spoke about what Hurtigruten needed and how we could achieve it. We had clear tasks: improved capability, stronger wind resistance and, of course, 25 per cent reduction in emissions.

"We have multiple competencies in the different elements that are important for an upgrade like this. We have strong skills in structure, in propulsion, in automation and control. And we're the best in the world at combining those skills to achieve customer requirements.

"Our experts have the design and engineering expertise, product and domain knowledge, project lists and advanced computational and design tools to identify, develop and implement the right solutions," adds Geir Oscar.

From a wider perspective, the upgrade is also a much quicker way to meet the emissions requirements. Geir Oscar continues: "We can do the



MS Kong Harald features new, cleaner technology

full turnover of a vessel in four or five months. An entirely new build takes much longer time.

"We are very pleased with the performance of the first two ships and through continued cooperation with Hurtigruten, we can expect to see further optimisation of the new systems."

Making the decision to invest

Given the global climate at the time the project was being considered, Hurtigruten didn't enter this project lightly.

Hedda says: "Taking the decision to invest €100 million in upgrading our existing fleet in the middle of the [Covid-19] pandemic was tough. We had no guests and a great deal of financial uncertainty. However, I'm very pleased with the decision we made.

"We had the opportunity to upgrade the interior of the fleet and give the ships the best of today's technology. Plus, it's more environmentally friendly to retrofit a vessel than to scrap and build a new one."

The vessels are being fitted with two hybrid shaft generators, two SaveEnergy 1.120kWh lithium-ion batteries and two new Bergen B33:45V engines. They also have new tunnel thruster motors and propeller blades from Kongsberg Maritime.

On the control systems side, the team has installed the KONGSBERG digital management system, which includes health monitoring, and SaveCube integrated drive switchboards, including frequency converters, drives and DC system. ●

Read about the SEACOR upgrade project on pages 14 and 15.

"By collaborating, we complement each other to deliver the results our customer wants"

The *MS Nordlys* upgrade will be completed in 2025



Image: Hurtigruten / Daniel Chaussumier



Watch our video to find out more



Upgrades

Going green and strong

The maritime industry is setting sail on a greener course, and SEACOR Marine is one operator leading the way with hybrid upgrades to its PSV fleet. Its innovative partnership with Kongsberg Maritime will bring big environmental benefits from a surprisingly simple upgrade.

SEACOR Marine, a leader in offshore marine transportation, is investing in the future by upgrading several of its platform supply vessels (PSVs) with Kongsberg Maritime's cutting-edge hybrid energy storage systems.

This strategic move positions SEACOR as a sustainability champion while delivering significant cost savings and enhanced safety during crucial operations. The four vessels included in the contract are the *SEACOR Ohio*, *SEACOR Alps*, *SEACOR Andes* (photo, left) and *SEACOR Atlas*. Installation is expected to begin in December 2024 and be completed by the second quarter of 2025. Once installed, more than 50 per cent of SEACOR Marine's PSV fleet will be hybrid powered.

The four PSVs, all Kongsberg Maritime UT 771 CDL designs, will be equipped for battery hybrid operation with the installation of a containerised Deckhouse Energy Storage System and associated switchboards and thruster control systems. The upgrade will also include a new Kongsberg Maritime K-Pos Dynamic Positioning (DP) system installed to replace the current system on all four vessels.

The upgrade to the four vessels follows a similar upgrade completed earlier this year to the *SEACOR Yangtze* with the Deckhouse System.

"Our decision to expand our hybrid fleet aligns with SEACOR Marine's core values of innovation and environmental stewardship," says John Gellert, CEO of SEACOR Marine.

Kongsberg Maritime's energy storage systems integrate seamlessly with existing on-board power generation. This allows vessels to significantly reduce fuel consumption, especially during DP manoeuvres.

James Poulton, Kongsberg Maritime's Senior Vice President of Aftermarket Sales, elaborates: "SEACOR Marine is one of the most experienced operators of hybrid battery power systems in the offshore market, and we are delighted they have again chosen to expand their fleet of hybrid PSVs with our technology.

"We see that by installing battery power, fuel consumption in DP operation mode on these vessels can be reduced by as much as 20 per cent.

"In addition to batteries, the conversion will also feature a shore connection, enabling connection to power grids when in port, which greatly reduces the amount of engine running hours and emissions from diesel fuels. The key benefit of having battery power instantly available is to maintain the redundancy of the vessels' power system, with less engines running. This is particularly useful when operating in DP mode, but also has its value in other operational modes."

The environmental impact is clear: a significant decrease in greenhouse gas emissions and pollutants, contributing to cleaner air and a healthier planet.



The *SEACOR Yangtze* now benefits from a hybrid energy upgrade

Enhanced safety for DP operation

Beyond environmental benefits, Kongsberg Maritime's battery systems offer another crucial advantage: increased redundancy for critical offshore tasks. The battery system acts as vital backup power in case of engine failure, ensuring uninterrupted operation during DP manoeuvres.

Mike Kowalski, SEACOR Marine's Engineering Manager, explains: "As far as deciding on the power capacity of the hybrid system, having redundancy in case of shut down is always front of mind.

"We use it as spinning reserve that's just sitting there in the background. Add to that what we need for the peak shaving for the generators that are online, and we found that we don't necessarily need more batteries. We can have a safe level of redundancy with less. However, the battery capacity sizing is based around the ship's ride-through capability, compensating for any instance when a generator might go down.

"Depending on the average loading of thrusters during a DP operation, this system will give us around 20 minutes of ride-through capability, which in turn provides enough time for the ship's electrical plant to react and automatically put standby generators online. With Kongsberg Maritime's system, we don't skip a beat."

The economic case for this green upgrade is compelling as well. "This investment aligns with our commitment to operational excellence," adds Mike. "The hybrid system will not only reduce emissions but also lead to significant cost savings on fuel, and that's a key consideration for our customers."

The partnership between Kongsberg Maritime and SEACOR Marine exemplifies a successful collaboration driving positive change within the maritime industry. By combining innovative technology with a commitment to sustainability, both companies are paving the way for a cleaner, safer and more cost-effective future for ship operations.

This strategic upgrade positions SEACOR at the forefront of sustainable maritime practices, while Kongsberg Maritime continues to solidify its position as a leading provider of energy-efficient solutions for the global shipping industry. ●

"In addition to batteries, the conversion will also feature a shore connection"



Image: Tom Collins

The vessel is designed to allow fast and safe movement between wind turbines

Wind energy

Look, it's Skywalker

Innovative vessel may have a name that sounds like a hero from *Star Wars*, but the design isn't film fantasy – it's a Kongsberg Maritime creation that provides a modern and flexible solution for the wind farm industry.

In the world of energy-efficient vessels, a new force has been awakened in the shape of the *IWS Skywalker*. The ship is the first of six new wind farm commissioning service operation vessels (CSOVs). It recently entered service in the North Sea, and the sense of pride that Kongsberg Maritime has is strong with this one; after all, we designed and equipped the ship to the highest standards.

It was delivered to its owners late last year and made its maiden voyage from China to Europe, with a detour around the Cape of Good Hope as a result of tensions in the Red Sea.

But the vessel, a Kongsberg Maritime UT 5519 DE design, isn't operating in a galaxy far, far away. It's based

in Hartlepool in north east England, and has started work in the Dogger Bank wind farm in the North Sea.

Insights caught up with Captain Anton Kavaler and his crew in Denmark, as they were preparing for their first deployment.

Captain Kavaler, who joined the ship in China for the delivery run to Europe, speaks highly of the *Skywalker's* capabilities. It's clear that he is filled with a new hope that this vessel will stand the test of time.

"She's a very capable ship," he says. "The *IWS Skywalker* is equipped with four Kongsberg Maritime azimuth thrusters, a new concept for propulsion that allows the same propulsion on the bow and stern. This double-ended configuration is ideal for Dynamic Positioning (DP) and the walk-to-work application, enabling quick and safe manoeuvres between turbines."

“The ship’s efficiency is unparalleled in the market,” adds Captain Kavalier. “She’s equipped with three Tier 3 engines and the largest battery pack, at 2.2 MWh, among the CSOVs in the North Sea.”

One of the key features of the vessel is the DP system from Kongsberg Maritime. “The DP system allows the operator to use it in fully automated mode, moving the vessel from one turbine to another.

“The operator can plot the coordinates of maybe five to 10 turbines, and then the vessel will automatically move from point A to B and to wherever else it needs to go, as part of the pre-defined passage plan. It’s a simple and efficient solution.”

“The *Skywalker’s* energy use is smooth, thanks to the Kongsberg Maritime automation system. Even though the operator might be experienced, if you lose concentration, even for a second,



Captain Kavalier

you will not keep the stable load at all times – only the automation system can do this,” says Captain Kavalier. “It’s a very clever system.”

The vessel is fully always manned by the IWS crew, with two trained operators for DP driving the gangways and crane. Before each mission, the crew makes sure all systems are tuned up and ready

for operation. The *IWS Skywalker* and its sisters are designed to accommodate 120 people and are certified as a special purpose vessel.

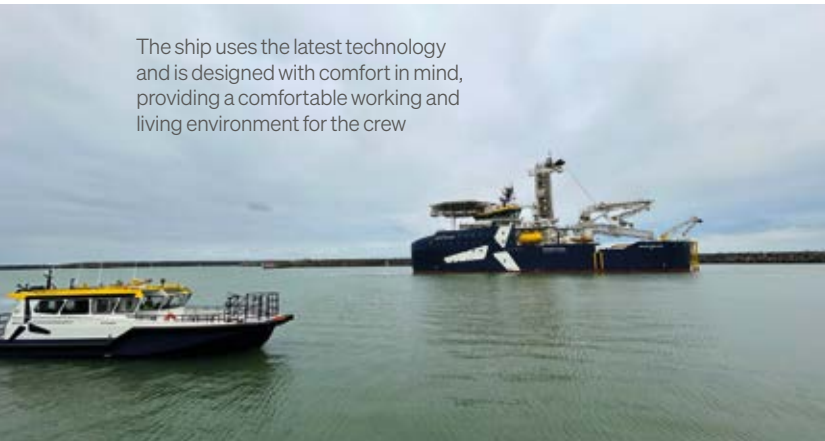
This summer, these vessels will be part of the new SOLAS (Saving of Lives at Sea) code.

The technology on board the *IWS* fleet is indicative of the fast-moving growth in the industry.

“At first, it felt like the *Starship Enterprise*,” says Captain Kavalier. “It’s new software, new hardware and this ship represents a new era of CSOVs, combining cutting-edge technology with efficient operations to meet the demands of the wind farm industry.”



The innovative walk-to-work gangway ensures safe transfer between ship and turbines



The ship uses the latest technology and is designed with comfort in mind, providing a comfortable working and living environment for the crew





Jonny Gooding,
Commissioning SOV
Manager for SSE

Dogger Bank

SSE Renewables stands at the forefront of the Dogger Bank wind farm, the world's largest offshore project currently under construction. As lead developer and constructor, SSE is responsible for a colossal undertaking.

Green energy transition

The *IWS Skywalker* is now working in the Dogger Bank wind farm. It's one of the world's largest offshore wind farms and is expected to grow significantly in the coming years. Jonny Gooding, Commissioning SOV Manager for SSE (Scottish and Southern Energy) provides insights into this exciting project and how the CSOV is transforming operations for his team.

“SSE is at the forefront of a massive clean energy project, and Dogger Bank is enormous,” says the company's Jonny Gooding. “Alpha is already generating 1.2GW, with potential for phases B, C and D to add another 3.6GW – that's enough to power six million homes. The sheer scale is incredible. Dogger Bank Alpha has 95 turbines, with Bravo and Charlie likely to have 95 to 100 each. These are giants, with monopile bases driven deep into the seabed and blades reaching 260 metres from the water's surface.”

Technician safety is paramount and those working on these turbines face unique challenges. “They access the turbines via an innovative walk-to-work gangway,” Jonny explains. “The height can vary depending on location and tide, it's typically around 20-25 metres. Once onboard, they use a small elevator to reach the specific work area.”

The *IWS Skywalker* offers a game-changing work environment. “Having spent time on several vessels for this project,” Jonny enthuses, “the *Skywalker* is phenomenal. It's quiet, with exceptional living quarters – vital for crew members after a long 12-hour shift on a turbine. They have ample space to relax, eat, socialise or unwind in the games room. This ship prioritises crew wellbeing, which is crucial for morale and productivity.”

The vessel boasts a highly efficient crew transfer system. “Previously, technicians working on wind turbines endured a rough two-to-three-hour journey on small crew

transfer vessels before even starting work,” Jonny recalls. “The *Skywalker* eliminates that entirely. Imagine waking up, having breakfast and stepping straight out onto the walk-to-work system – you're at your workplace within minutes. It's a massive improvement.”

Precise position

“The gangway functions like a giant conveyor belt, depositing technicians and their equipment directly onto the turbine base,” Jonny describes. “Kongsberg Maritime's DP system is the key that unlocks this efficiency. When the vessel is in 'DP mode', it maintains a precise position despite wave action. This allows the gangway to connect securely with the turbine, and technicians can walk across safely.”

“The system also actively compensates for the vessel's rise and fall with the waves,” Jonny highlights. “This keeps the gangway perfectly level, ensuring safe and comfortable transfers regardless of sea conditions. The ability to transport equipment trolleys eliminates manual lifting, further enhancing safety.”

“The DP system is absolutely essential for our walk-to-work operations,” Jonny concludes. “This cutting-edge technology is a game-changer for offshore wind farm maintenance. It underpins safe, efficient transfers and directly contributes to the success of this large-scale clean energy project.”



The scale is truly staggering. SSE is overseeing the installation of more than **300 turbines**, each towering **260 metres** above the North Sea – that's nearly the height of the Eiffel Tower in Paris! These giants will harness the power of the wind to generate a staggering **3.6GW of clean energy** – enough to meet the electricity needs of more than **4.5 million homes**.



Scan here to watch a video tour of the *IWS Skywalker*



Scan here to find out more about our Dynamic Positioning system



Technological
proress is a
hallmark of
Kongsberg
Maritime

In this edition of *Insights*, Bjørn Jalving, Kongsberg Maritime's Chief Technology Officer, sets a course for the future of the maritime industry. He describes the transformative role technology plays in decarbonisation efforts, the company's approach to digitalisation, the emphasis on collaboration and the exciting advancements in artificial intelligence (AI) that are shaping our tomorrows.

Data is driving our green revolution

The maritime industry is charting a new course. We have stricter environmental regulations and a relentless pursuit of efficiency and safety. Together they are propelling ship owners towards a technological horizon.

Navigating this uncharted challenge can be a complex undertaking. Integrating cutting-edge solutions such as electrification, AI and automation demands not just financial commitment, but also a trusted partner with the expertise to bridge the gap between theoretical innovation and practical application over the life cycle of the vessel.

We understand the challenges ship owners face, and we go beyond offering individual products by providing a comprehensive approach that integrates new technologies with existing systems. Our commitment and vision to drive research and development ensures our solutions are not only efficient but also future-proof, capable of adapting and evolving alongside the industry. Whether it's harnessing the power of batteries for short sea

operations or leveraging the latest innovations in AI for intelligent navigation, we're here to serve as your trusted guide, helping our customers towards a sustainable future.

There are numerous technologies and solutions available, and there's always something exciting happening in the ocean technology space.

For example, batteries are proving themselves as a powerful solution for short sea shipping. Their increasing energy density, lower costs and extended lifespans make them a compelling choice. We're already seeing them in ferries and tugs, and in future I expect to see even larger battery packs, broadening their applications. Electrification's inherent efficiency offers a clear advantage over traditional fuels, especially when operating on simple routes, closer to shore.

For deep sea vessels, the future trend will be different, as alternative fuels are the main focus. We see a significant increase in vessels delivered with dual-fuel engines that can run on methanol and LNG. On these, we have a strong position with our AutoChief Propulsion Control System and the

K-Chief Marine Automation System. We are also starting to see ammonia fuel showing promise in some pilot projects. Synthetic fuels are manufactured by combining CO₂ with hydrogen. We believe hydrogen sources will be a combination of electrolysis of hydrogen from solar and wind, and blue hydrogen produced from natural gas with carbon capture and storage. Biofuels will also have some impact.

The ongoing industrialisation in the energy sector makes green fuels realistic. However, the cost of fuel will likely increase. This underlines the importance of our solutions in reducing power consumption and improving energy efficiency.

Our key strategy is to continuously improve the hydrodynamic performance and energy efficiency of our propulsion and manoeuvring systems. Electrification simplifies design and reduces maintenance cost, as the number of mechanical components is reduced. In upgrade projects, we consistently demonstrate significant energy savings both during transit and when in dynamic positioning.

Delivering a lifetime of digital support

One of the main routes to decarbonising maritime operations will come through digitalisation – I see it as a three-pronged approach for a connected future.

Firstly, this means increased remote operations. Technology we are developing today will soon allow us to reduce onboard manning. The first areas to experience this will be in smart solutions for situational awareness

“One of the main routes to decarbonising maritime operations will come through digitalisation”

and collision avoidance systems, to enhance safety and offer operational flexibility. We’ve recently been given approval in principle for chief engineer-to-shore functionalities to be transferred to a shore-based remote operations centre [see page 3], and this will soon be deployed on pilot projects in Norway.

Secondly, it’s about data-driven optimisation. We use the huge amounts of data from various onboard

sources to optimise vessel operations. Cloud and vessel-based applications, for instance, can combine mission execution with energy management systems, enabling continuous vessel optimisation and fleet-wide comparisons. We can also integrate vessel data into the broader value chain, such as LNG vessel loading and unloading, streamlining processes for operators.

The third aspect is digital life cycle support. By understanding a vessel’s operational lifespan of, say, 20 to 30 years, we offer global support and upgrades throughout its life cycle. Remote diagnostics and preventative maintenance based on real-time vessel data are key to this. As AI evolves, I emphasise the need for continuous updates to neural networks, highlighting the significance of the digital life cycle for AI-powered products.

People and the planet are our priorities

We strive to simplify solutions for customers, to help build a sustainable future. This will involve reducing vessel complexity through less hardware and establishing secure

vessel connectivity. Cybersecurity is paramount and we’re actively pursuing certifications for our relevant products [see pages 6 and 7], with a tremendous amount of effort going into giving our customers peace of mind when faced with the risks of cyberattacks.

Our history with AI is extensive, dating back to using “expert systems” in our products. We’ve seen the evolution of neural networks for enhanced situational awareness, which is now being implemented in bridge systems and autonomous projects such as the REACH subsea operation [see pages 10 and 11]. Other applications will include predictive maintenance and energy optimisation.

Large language models and generative AI draw a lot of attention. This technology will be core in how we develop and maintain our products and how we increase

Digital and AI technology will play an increasing role in keeping the world’s ships safe



Yara Birkeland is the world’s first fully electric and autonomous container vessel with zero emissions



Bjørn Jalving is excited by the changes in technology

efficiency in internal operations. With safety critical systems, I believe language models, at least short term, will mainly be used to improve the user experience. Natural interaction through language and speech will ease use of advanced systems and thereby also increase safety.

We are committed to navigating the complexities of regulations and emissions control. In the rapidly evolving digital landscape, we emphasise our life cycle partnership approach, ensuring continuous improvement through ongoing upgrades.

We operate in 34 countries and have equipment on 34,000 vessels. With digital, many of our services will become more cost efficient and higher performing because we are able to log into a vessel, check the status of that vessel and increasingly offer services such as preventative maintenance.

By understanding the status of a vessel, or indeed a whole fleet, I predict that in the future our customers will be able to

download software and use new functions by being digitally enabled. And with AI you cannot have a neural network that stays constant for 20 years. It will have to be continuously updated, so this digital life cycle will be part of the future of AI-empowered products.

Collaboration is key in this competitive industry and we position ourselves as a collaborative and engaging partner, fostering a shared journey towards a more competitive and greener future.

We are an industry that contributes to around 3 per cent of global CO₂ emissions and we want to be a major player in reducing the effects of global warming, and that provides a lot of purpose. For KONGSBERG, it's about Protecting People and Planet – it underpins everything we do.

To make it happen will take a lot of new technologies. What is very exciting is that to build and support the products of the future we need to stand on a solid technological foundation, whether it is a new electrical propulsion and manoeuvring system, innovative handling system, efficient energy management system, ship automation, new Dynamic Positioning system or the connected bridge of the future.

The unprecedented pace of development and adoption of electrification, digitisation and AI creates a thrilling environment to work in. I find immense satisfaction in commercialising these new technologies and integrating them into digital life cycle partnerships. This is our commitment to building a sustainable future for the maritime industry. ●





Rim-drive

The move to make the world's waters more peaceful brings a number of benefits. It will help marine mammals and will also offer energy savings to our clients. These positives are loud and clear.

Quest for quiet

Reducing underwater noise from shipping

The International Maritime Organization (IMO) is focusing on underwater radiated noise, a growing concern that may soon lead to new regulations for ship owners and builders. These guidelines are designed to protect marine environments from the increasing noise pollution caused by commercial shipping.

Ambient noise levels in the ocean have been doubling every decade, primarily due to the continuous expansion of commercial shipping activities. Most of the noise emitted by ships falls within the frequency range below 300 Hz, which is the same range used by marine life for essential communication and survival.

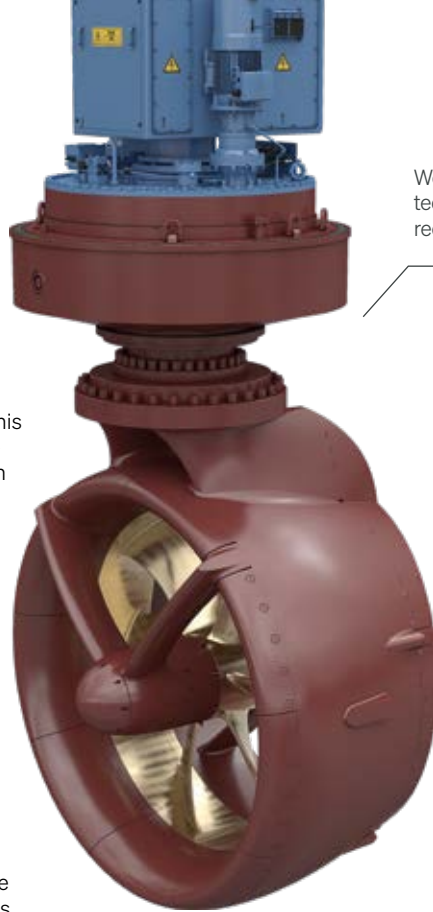
Leif Vartdal, a hydrodynamics specialist with Kongsberg Maritime, has dedicated his research to understanding how vessels emit underwater noise. His work includes designing specialised propellers for seismic research vessels around 30 years ago. These vessels required high propeller thrust to tow the heavy seismic gear and at the same time they operate under strict requirements to minimise their acoustic

emissions. Leif's expertise sheds light on the complex issue of underwater noise pollution and the potential solutions that can mitigate its impact.

Noise is a major nuisance for nature

Scientific studies have unequivocally highlighted the detrimental effects of underwater noise on marine mammals. Leif emphasises the extensive knowledge base on how sea mammals and fish respond to this noise pollution. He explains: "It's a critical issue for marine mammals, as the noise from shipping can severely disrupt their natural ability to communicate."

He cites specific studies that illustrate the extent of this problem. For instance, research conducted off Patagonia revealed that blue whales would alter their migratory paths to avoid the noisy presence of ships. Another study in northern Norway demonstrated how excessive noise from trawlers interrupted communication between humpback whales, which rely on low-frequency sounds to communicate over vast distances.



We have the right technology to reduce ocean noise

Leif emphasises the importance of a “system approach” in designing new vessels to address this issue. This approach involves ensuring that the hull, machinery and propeller design are all optimised to work together for the quietest possible operation. He says that “propellers, rather than engines, tend to be the primary sources of underwater radiated noise”. While engine noise can often be effectively reduced through techniques such as rubber mountings, propeller noise presents a more complex challenge.

“The shape of the hull significantly influences the water flow to the propeller, and achieving an optimal inflow is crucial for minimising noise. This requires close collaboration between hull designers and propeller manufacturers. However, hull design often prioritises techno-economic factors, which can conflict with the need for a smooth and uniform inflow. Achieving the different hull design objectives, as well as a favourable flow pattern to the propulsors for minimal noise generation, is a delicate balancing act that demands innovative solutions.”

Kongsberg Maritime, with its extensive experience in developing specialised rudders, propellers, thrusters and hull designs, is at the forefront of efforts to reduce noise from vessels. The company’s Hydrodynamic Research Centre, in Kristinehamn, Sweden, actively participates in projects aimed at designing and testing propeller and shaftline systems that meet the most stringent requirements for both cavitation and performance. This work is expected to benefit a wider range of ships in their quest for quieter operation.

Rim-drive is quietly making its mark

Kongsberg Maritime has been a pioneer in the development of rim-drive propulsion systems, with the first deliveries dating back nearly a decade. The direct electric drive azimuth thrusters, known for their low environmental impact in terms of both energy efficiency and noise levels, have been chosen for a new series of commissioning service operation vessels (CSOVs) for Norwind Offshore AS. A recent noise study conducted with Det Norske Veritas (DNV) resulted in the first rim-drive azimuth thruster receiving the Silent-E notation.

Roy Ove Standal, Chief Operating Officer at Norwind Offshore, recognises the system’s contributions to onboard comfort, energy efficiency and underwater ecology. He says: “The rim-drive propulsion system stands out for its ability to reduce the need for additional support systems, leading to notable energy savings. It also contributes to increased onboard comfort due to its lower noise levels. Achieving the

Silent-E notation further demonstrates our commitment to protecting the marine environment.”

Although the Silent-E notation was not a requirement for Norwind Offshore’s current operations, the company is looking to the future and setting the bar high for minimising the noise signature of its new fleet, hence going beyond minimum requirements.

DNV was the first classification society to launch Silent notation. There are several notations for underwater noise compliance, including Silent-A, for vessels using acoustic equipment, and the toughest, Silent-R, for research vessels.

“The benefits of rim-drive technology extend beyond noise reduction”

The *Norwind Hurricane* underwent an underwater noise study using hydrophones placed on the seabed.

The results confirmed the effectiveness of rim-drive technology in reducing underwater noise. Leif adds: “Rim-drive thrusters are inherently quieter than conventional thrusters due to their simpler design with fewer moving parts and excellent hydrodynamic characteristics.

“Hydrodynamically induced noise, primarily caused by tip vortex cavitation from propeller blade tips, is a major challenge in traditional thruster designs. Rim-drive thrusters eliminate this issue by using a ring propeller that lacks blade tips, thereby significantly reducing noise generation.”

The benefits of rim-drive technology extend beyond noise reduction. These thrusters also offer energy savings and reduced maintenance costs due to the simplified propulsion system with fewer mechanical components. This translates to enhanced operational efficiency and a lower total cost of ownership, aligning with Kongsberg Maritime’s commitment to providing sustainable and cost-effective solutions for the maritime industry. ●



Image: Norwind Offshore

Planet *first*

The latest cargo ships will use Kongsberg Maritime technology to maximise efficiency and save fuel while cutting emissions and providing a safe, comfortable workplace.

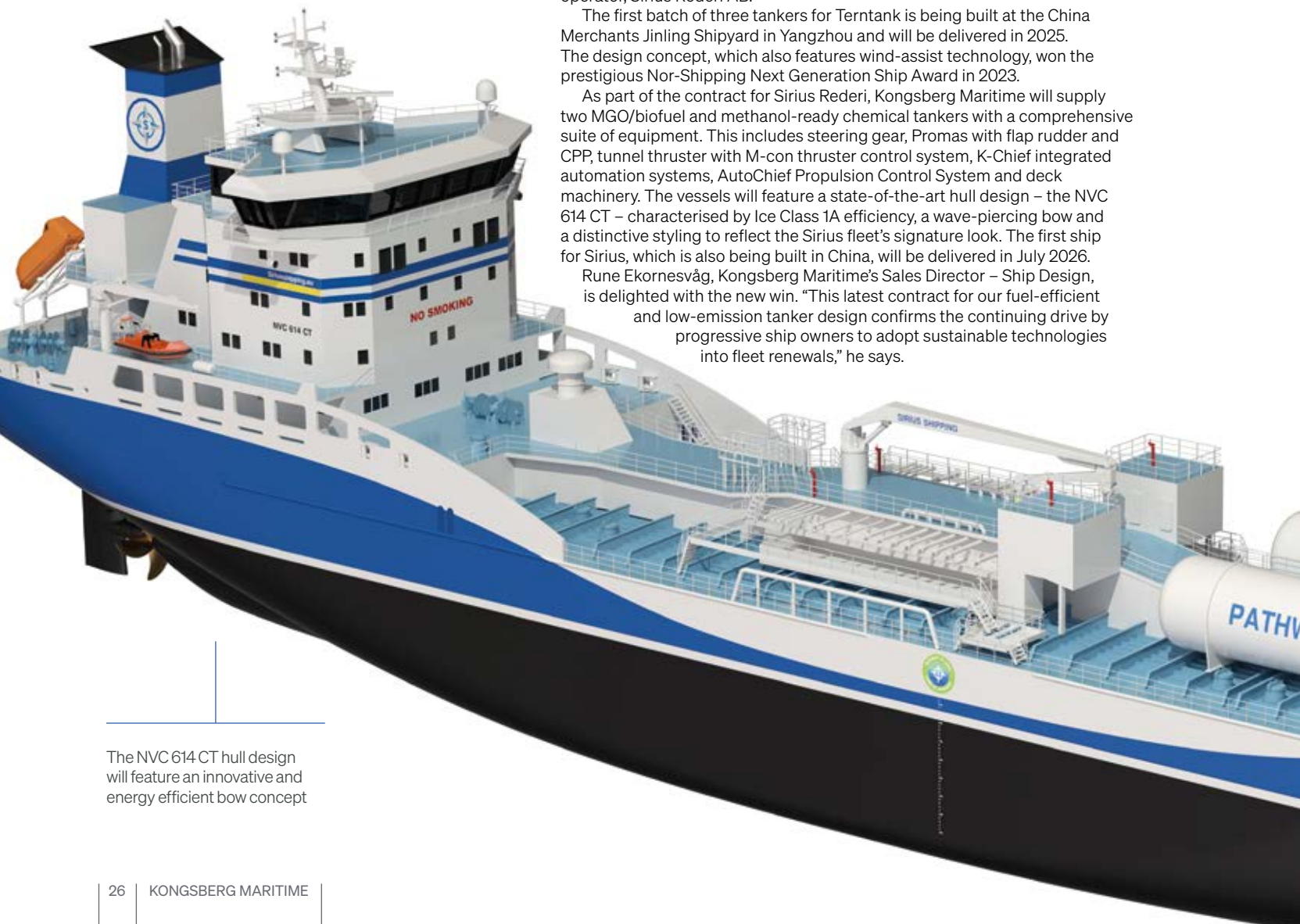
Kongsberg Maritime is taking a leading role in the development of the next generation of cargo ships through the cutting-edge technologies it has developed for its new 15,000 DWT low-emission, hybrid fuel-powered chemical tanker design.

The company has won orders for 11 ships from Danish tanker operator Terntank and, at the end of 2023, secured a further contract for two ships from Swedish tanker operator, Sirius Rederi AB.

The first batch of three tankers for Terntank is being built at the China Merchants Jinling Shipyard in Yangzhou and will be delivered in 2025. The design concept, which also features wind-assist technology, won the prestigious Nor-Shipping Next Generation Ship Award in 2023.

As part of the contract for Sirius Rederi, Kongsberg Maritime will supply two MGO/biofuel and methanol-ready chemical tankers with a comprehensive suite of equipment. This includes steering gear, Promas with flap rudder and CPP, tunnel thruster with M-con thruster control system, K-Chief integrated automation systems, AutoChief Propulsion Control System and deck machinery. The vessels will feature a state-of-the-art hull design – the NVC 614 CT – characterised by Ice Class 1A efficiency, a wave-piercing bow and a distinctive styling to reflect the Sirius fleet's signature look. The first ship for Sirius, which is also being built in China, will be delivered in July 2026.

Rune Ekornesvåg, Kongsberg Maritime's Sales Director – Ship Design, is delighted with the new win. "This latest contract for our fuel-efficient and low-emission tanker design confirms the continuing drive by progressive ship owners to adopt sustainable technologies into fleet renewals," he says.



The NVC 614 CT hull design will feature an innovative and energy efficient bow concept



Terntank opted to use wind-assist technology on its latest batch of vessels

“The vessels will be propelled by the efficient Promas propulsion system, delivering fuel consumption savings of more than 6 per cent compared to alternative systems. The ships will also showcase battery-powered hybrid propulsion, offering operational flexibility and reducing environmental impact.”

Sirius Rederi Managing Director Jonas Backman says the contract emphasises the company’s commitment to sustainability, efficiency, safety and excellent working conditions for its crews:

“The partnership with Kongsberg Maritime began years ago and focused on developing vessels that align with our environmental goals while ensuring a safe and comfortable workplace for the crew. This collaboration has resulted in a contract for two new builds, with ambitions for many more as we chart our ‘Pathway to ZERO’.”

Kongsberg Maritime’s hybrid propulsion system is a breakthrough technology that meets the needs of the maritime industry’s push for cleaner alternatives. It utilises a shaft generator as the primary power source, with an energy storage system (ESS) in peak shaving/load smoothing mode during normal service. Interestingly, it is anticipated that no auxiliary engines will be required for harbour manoeuvres, as the shaft generator and ESS will provide ample power for entering and leaving port facilities.

The ESS, incorporating a 420kWh battery solution, is designed for a power takeout of up to 1200kW. It plays a crucial role in various operations, including ballasting, cargo handling, blackout prevention

“We believe that we are poised to shape the future of the maritime industry”

and “take me home” operations. In addition, it facilitates emergency rescue operations, even in blackout scenarios.

The integration of digital systems onboard the vessels further enhances emission reductions. The K-Chief and Vessel Insight solutions leverage voyage data, including wind and current predictions, to control the main engine and associated electrical control systems. K-Chief handles critical functions such as power management, auxiliary machinery control and cargo monitoring, as well as other tasks. The Vessel Insight vessel-to-cloud infrastructure provides real-time access to vessel-specific dashboards and fleet overview data analysis tools for both crew and onshore operational staff.

Kongsberg Maritime’s strategy is built around combining its own proprietary innovations with products from other players in the marine business, to ensure

a holistic approach to environmental responsibility.

Einar Vegsund, Kongsberg Maritime’s Vice President – Ship Design, explains: “Sometimes that means we provide a ship with a lot of our equipment into an integrated solution, such as the oceanographic research ships or large-anchor handler designs. Other times we work with customers to incorporate other technology in a way that can operate within our designs.

“A great example of this approach is with our customer, Terntank. To date they have ordered 11 chemical tankers with our design. With the latest batch of five ships, they have opted to use wind-assist technology. We don’t produce these sails, but we work closely with other providers to offer advice and integrate the latest technology. These vessels are the next generation ship, and through a progressive approach to introducing new technologies, we are delivering vessels that are poised to achieve an Energy Efficiency Design Index close to 40 per cent below the 2025 Phase 3 requirements, setting a new benchmark for environmentally conscious shipping.”

Kongsberg Maritime sees a growing demand for sustainable technologies in shipping, so exploring future fuel types such as methanol, ammonia and biofuels, with a specific focus on long-range vessels, is part of the company’s strategic approach to position itself as a front-runner in designing low-emission and sustainable solutions for the shipping industry.

Rune Ekornesvåg adds: “As companies such as Terntank and Sirius Rederi embark on their journey towards environmentally efficient shipping, we see ourselves as a key enabler of this transformation.

“With a deep commitment to innovation, sustainability and meeting future emissions standards, we believe that we are poised to shape the future of the maritime industry.” ●



Bulk savings

The need for regulatory compliance is a challenging one for ship owners. While switching to low-carbon fuels is an option for some, what if conventional fuel is preferred as the way forward? Is compliance still achievable?

Kongsberg Maritime has looked at the way in which a conventional fuelled ship can be combined with a range of complementary technologies, and the answer to the big question about compliance is 'yes'. Two scenarios were examined, with fuel cost savings of 44 and 56 per cent depending on operation.

Oskar Levander, Vice President Strategy & Business Development, explains how a ship using conventional fuels can meet future compliance targets, with the addition of energy saving technology.



Reducing emissions is an important priority for ship owners

There are many ways in which ship owners can tackle the prospect of tighter regulation. The easy part is agreeing that all of these new technologies have something to offer.

“However, the difficulty lies in how to apply this to a vessel knowing that your investment choice will need to remain relevant for decades of operation,” says Oskar Levander (pictured).

“The fundamental target here was to design a vessel that could comply with the predicted CII (carbon intensity indicator) regulations throughout its lifetime.

“For this study, we decided to look at a vessel with global operations. We settled on a bulk carrier as the basis of a new concept. To represent a common vessel size, we selected a Kamsarmax bulk carrier of 82,000 DWT. It also represents a vessel type for which a switch to an alternative fuel could become restrictive, in terms of global availability of low-carbon bunker fuels.”

Kamsarmax is a medium-sized vessel that could traditionally fit through the old Panama Canal and access the port of Kamsar in West Africa. Today, it is more a maritime term for a bulk carrier of this capacity.



Add-on tech for big results

With the vessel size agreed, the Kongsberg Maritime team, working alongside ship designers Deltamarin, looked at available technologies and savings they would bring to typical Kamsarmax operations. Oskar says: “We have one of the largest technology portfolios, so we looked at what we could bring to the table. We also researched the other manufacturers that offer energy-saving systems, such as wind sails and air lubrication.”

The result is a new vessel design that is known as the ‘Super-Efficient Bulk Carrier’. The study compared this vessel in two operational profiles, both based on 12 months of operation. One scenario looks at a vessel in global operation, without a fixed route where wind calculations look at an average. The second was a more focused study of a regular transatlantic operation between Rotterdam and Sept-Îles, Quebec. In this scenario, with more favourable wind conditions, the vessel performed even better with estimated savings of more than 50 per cent.

In order to achieve significant savings in fuel, there are several features on the ship that each contribute to the significant fuel savings. One of these is the operation of the vessel itself. Oskar says: “Slow steaming is becoming a more popular choice for many ship owners. There is a clear realisation that by slowing down you can cut fuel and emissions, and reduce maintenance costs, too. However, many ships have already reduced speed and you do not want to slow down too much as the earning potential is reduced. In this case, we assumed a 1 knot speed reduction.

“Next, we looked at one of the major contributors – wind technology. There are a lot of options, but we chose to have a different approach to what we’ve seen in this space to date.

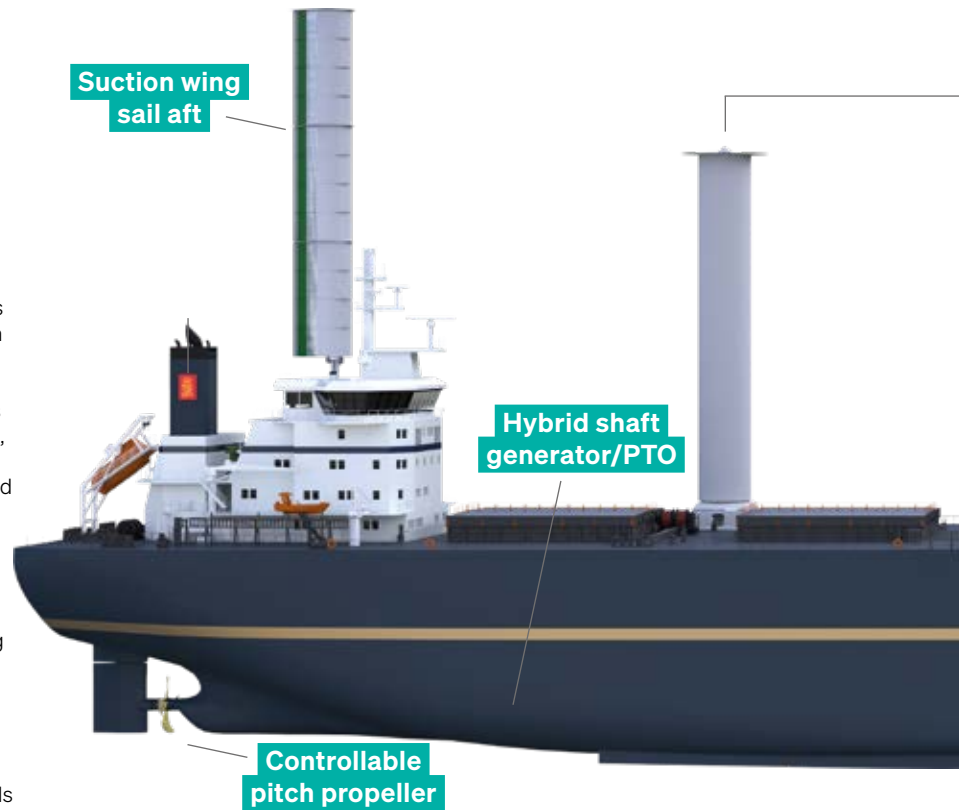
All manufacturers, be that those making wing sails or rotors, only offer their own solution and each solution works well in specific conditions. For example, a prevailing headwind gives better results with a wing sail, while rotor sails give maximum benefit in side winds. However, we must remember that there's nothing constant with wind.

"What we chose to do was equip this vessel with two types of wind-assist technology, in order to get the best of both. So, instead of installing five of one type we have opted for three Flettner rotors and two suction wing sails. The combined wind propulsor setup results in larger savings compared to either wind technology being used on its own. The three rotors in the middle are also tiltable to aid cargo handling.

"The other significant driver of fuel saving is the use of air lubrication, a system where air bubbles are pumped out at the bow and spread out along the length of the ship reducing resistance between water and the hull. This technology is becoming more popular on larger ships with flat bottom hulls; however, no vessel has yet been able to capture the full potential of this technology. In conventional bubble systems, the bubbles 'escape' quickly towards the aft and to the sides, as the vessels move over them, meaning that a lot of air needs to be continuously pumped below the hull. Concepts with an air cavity below the hull that trap the air have been tested at model scale, but there are technical complications to get it to work correctly."

New hull is a design innovation

To address these shortcomings, Kongsberg Maritime has devised an innovative hull form that will trap bubbles, to maximise the effects of resistance reduction. The key features of the design are a sloping hull, where the bow is slightly higher in the water than the stern, at an angle of around



1 degree. The inclined hull slows down the movement of air bubbles making them stay longer below the hull. Combined with the slope, the bilge keels, running along each side of the hull, are turned down in the vertical creating 'walls' to keep bubbles beneath the ship reducing the air consumption.

In addition, the hull is made wider to enlarge the bottom of the vessel where the air lubrication is effective and reduces the hull side area where the air does not have an effect.

Oskar adds: "The optimum dimensions for a hull with air lubrication are not the same as for a vessel without."

The wider hull does come with a small impact of bare hull resistance, but the saving with air lubrication is bigger. In addition, the wide hull also makes it possible to have the same DWT despite the inclined hull, with a lower draft forward.

Oskar explains: "With the new aspects of the hull form, you can really get the best from air lubrication and make game-changing savings, through reduction of frictional resistance. The estimated net saving from the new air lubrication is about double compared to a conventional hull arrangement with air lubrication. Couple that with the savings gained from wind power, slow steaming and smart management of energy on board, and you have a real alternative to the low-carbon fuel option."

The Super-Efficient Bulker includes proven Kongsberg Maritime technology. The Hybrid Shaft Generator is a large shaft-mounted PTO (power take out) with frequency control for improved efficiency and lower emissions.

The Super-Efficient Bulker in numbers

Total annual fuel consumption (propulsion+hotel load)

SCENARIO 1 Global operation		SCENARIO 2 Transatlantic (Rotterdam to Sept-Îles)	
Operation/ Design feature	Fuel cost saving (%)	Operation/ Design feature	Fuel cost saving (%)
Slow steaming	-17%	Slow steaming	-17%
Wind: sails/rotors	-18%	Wind: sails/rotors	-30%
Hybrid Shaft Generator – Power Take Out (PTO)	-2%	Hybrid Shaft Generator – Power Take Out (PTO)	-2%
Air lubrication	-11%	Air lubrication	-10%
Wider, hull	+4%	Wider, hull	+4%
Total saving	-44%	Total saving	-56%

Three Flettner rotors

Suction wing sail forward

Hull slopes by 1 degree and vertical bilge keels trap bubbles

Air lubrication system

A PTO solution is ideal for this ship, as the electric hotel consumption is much larger due to the electric motors needed for the wind propulsion devices and compressors supplying the air lubrication. An increase in hotel power occurs when the propulsion power is reduced, so taking the power off the main engine is the optimum solution.

Flexibility and fuel efficiency

The ship is further equipped with a controllable pitch propeller as they give flexibility when operating with wind and a larger PTO capacity. Energy is optimised through an Intelligent Energy Management System (iEMS) in combination with energy optimisation, and route optimisation software systems to get the best optimisation from wind and propulsion. Keeping the hull clean also contributes to reducing resistance, so a Hull Skater is also proposed. It is an onboard robot that roams the hull, using non-abrasive brushes to remove early-stage growth. This proactive cleaning prevents friction-causing build up, allowing the vessel to sail more smoothly and contribute to reducing fuel consumption.

“This project has been a real eye-opener for us,” adds Oskar. “While each element makes a difference, it’s the combination of these technologies where the real difference is made. The fuel saving calculations were determined through comparison with latest bulker designs, rather than an old vessel as the benchmark.

“With the new aspects of the hull form, you can really get the best from air lubrication”

“The opportunity to reduce fuel costs by half compared to state-of-the-art conventional vessels, without the need to blend low-carbon fuels, is something I believe will be attractive to ship owners, particularly with the vessel size we examined. The Super-Efficient Bulker also offers a short payback of about five years, so the upfront investment is returned thanks to significantly reduced running costs.

“Wind and air lubrication are great technologies. At KONGSBERG, with our experience as an integrator, it means we can pull together the best technologies out there, along with our own, and offer something that could offer an alternative destination on the journey to cleaner, more efficient shipping.” ●

Oskar Levander explains the decarbonisation challenge in an interview on pages 8 and 9.

The new hull design will trap bubbles and maximise performance



KONGSBERG

Cybersecurity

Safety isn't a feature, it's a foundation

Modern maritime operations rely on digital systems, making cybersecurity a growing concern for vessel owners. That is why we are certifying all our digital products and solutions against cyber threats. Our commitment to cybersecure maritime solutions meets current regulatory demands and will secure our customers' operations for the future.

Find out more at kongsberg.com/maritime

Scan the QR code to
find out more about
Kongsberg Maritime.



Kongsberg Maritime – Protechtg People and Planet